

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FACEBOOK, INC.,
Petitioner,

v.

PALO ALTO RESEARCH CENTER INC.,
Patent Owner.

IPR2021-01461
Patent 9,208,439 B2

Before KARL D. EASTHOM, SHEILA F. McSHANE, and
CHRISTOPHER L. OGDEN, *Administrative Patent Judges*.

OGDEN, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Petitioner Facebook, Inc. (“Facebook”)¹ filed a Petition (Paper 2, “Pet.”) under 35 U.S.C. §§ 311–319 requesting *inter partes* review of claims 1–5, 7–11, 13–17, 19, and 20 of U.S. Patent No. 9,208,439 B2 (Ex. 1001, “the ’439 patent”). Patent Owner Palo Alto Research Center Inc. (“PARC”)² filed a Preliminary Response (Paper 7, “Prelim. Resp.”).

Under the authority delegated to us by the Director under 37 C.F.R. § 42.4(a), we may institute an *inter partes* review when “the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a); *see also* 37 C.F.R. § 42.108(c) (2020). Applying that standard, we institute an *inter partes* review of all the challenged claims of the ’439 patent for the reasons explained below. This is a preliminary decision, and we will base our final written decision on the full trial record, including any timely response and evidence by PARC.

II. BACKGROUND

A. RELATED PROCEEDINGS

Both parties are involved in the following related U.S. district court case: *Palo Alto Research Center Inc. v. Facebook, Inc.*, No. 2:20-cv-10753-AB (C.D. Cal. filed Nov. 25, 2020). Pet. 1; Paper 3, 2. According to

¹ Facebook identifies itself as the only real party in interest. Pet. 1.

² PARC identifies itself and its parent companies Xerox Corp. and Xerox Holdings Corp. as the real parties in interest. Paper 3, 2.

Facebook, the district court granted a stipulated stay of this proceeding. Pet. 4 (citing Ex. 1014 (granting joint request to stay proceedings)). The parties also identify the following related matters: *Palo Alto Research Center Inc. v. Twitter, Inc.*, No. 2-20-cv-10754-AB (C.D. Cal. filed Nov. 25, 2020); *Palo Alto Research Center Inc. v. Snap Inc.*, No. 2:20-cv-10755-AB (C.D. Cal. filed Nov. 25, 2020). Pet. 1; Paper 3, 2–3. We refer to the above three proceedings as the “related district court proceedings.”

As PARC notes, the ’439 patent is also the subject of *inter partes* reviews IPR2021-00986 (instituted November 23, 2021) and IPR2021-01430 (instituted Mar. 15, 2022). Paper 3, 3.

B. THE ’439 PATENT (EX. 1001)

The ’439 patent issued on December 8, 2015 from an application filed on April 29, 2013. Ex. 1001, codes (22), (45). It relates to “a method and system for collecting mobile device contextual information and facilitating efficient adaptation of a generic contextual intelligence system for customized applications.” Ex. 1001, 1:8–12. A context-aware system on a mobile device detects the computing environment, and the system may recommend activities, such as leisure activities, based on a user model. *Id.* at 1:22–23, 1:30–31.

Figure 6, reproduced below, is a flowchart illustrating the steps of processing an event. *Id.* at 2:23–25.

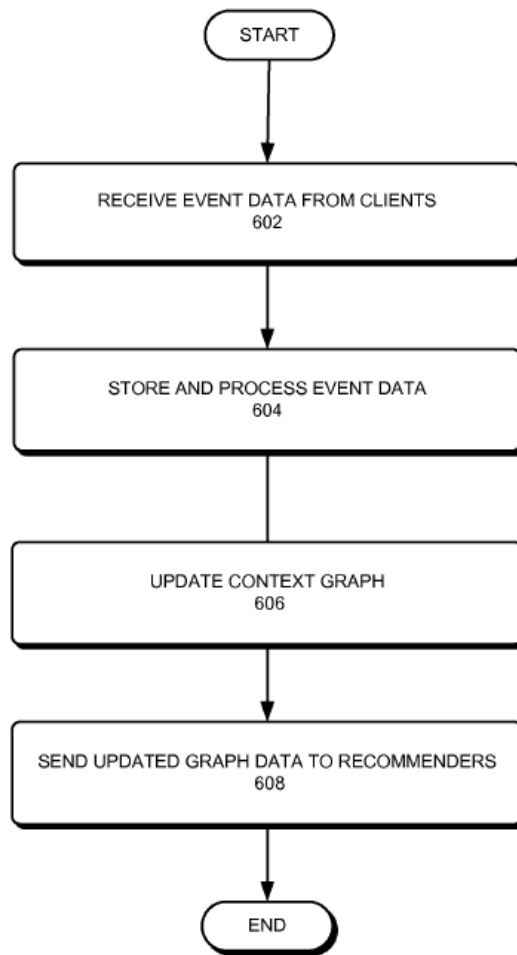


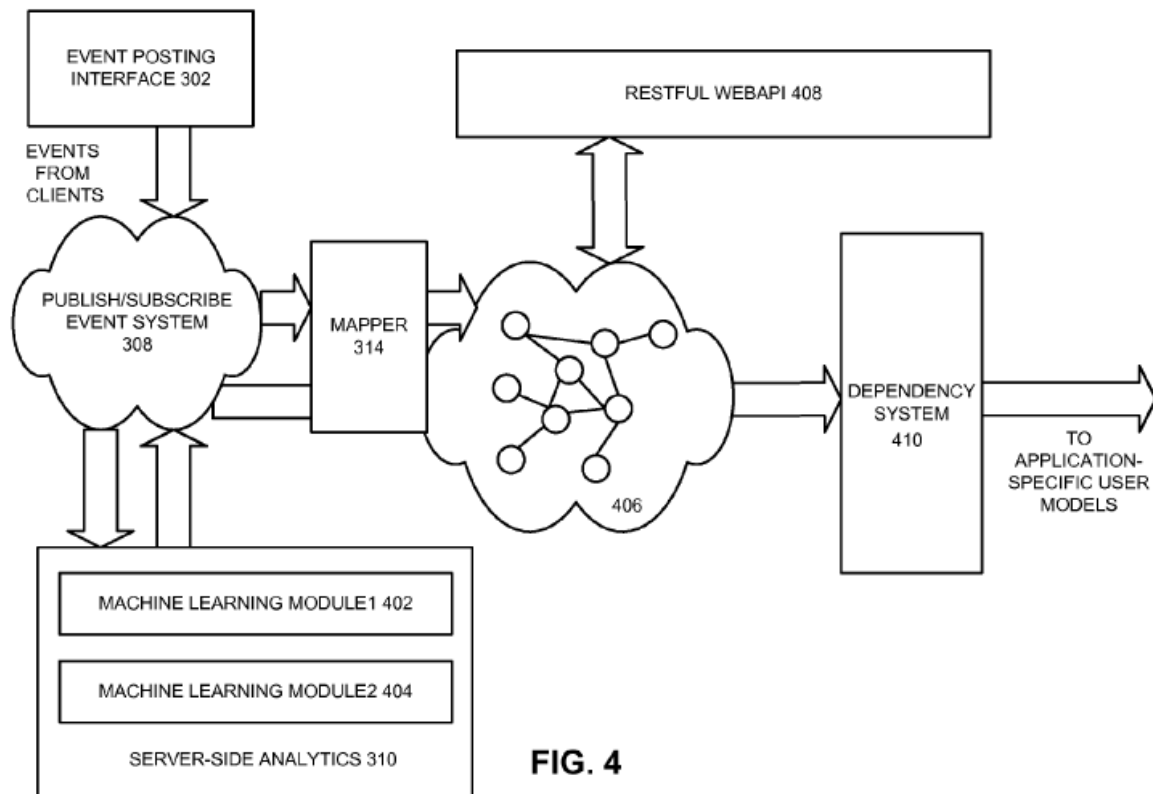
FIG. 6

In the steps shown in Figure 6 above, a server receives event data from clients (operation 602), and then stores and processes the event data (operation 604). Ex. 1001, 9:13–19. The server then analyzes the event data and uses it to update a “context graph” (operation 606). *Id.* at 9:19–24. Next, the server sends the context graph data, and changed graph data, to relevant “recommenders” (operation 608). *Id.* at 9:26–29.

According to the ’439 patent, “[a] context graph is an in-memory model that stores facts and assertions about a user’s behavior and interests.”

Id. at 3:20–22. “A recommender is an application that recommends items or activities for a user.” *Id.* at 3:23–25.

Figure 4, reproduced below, is a block diagram relating events, a mapper, and a context graph. Ex. 1001, 6:59–61.



As shown in Figure 4, event posting interface 302 sends events received from clients to publish/subscribe event system 308. Ex. 1001, 7:7–9. Based on subscriptions to publish/subscribe event system 308, mapper 314 uses the event data to modify context graph 406. Ex. 1001, 7:7–9, 7:44–47. “Context graph 406 functions as a storage component of a generalized user model. A user model describes predicted current and future activities and interests for a user.” *Id.* at 7:34–36.

C. CHALLENGED CLAIMS AND ASSERTED GROUNDS OF
UNPATENTABILITY

Claims 1, 7, and 13 of the '439 patent are independent. Claim 1, representative of the challenged claims, reads as follows:

1. A method, comprising:
 - [a] receiving, from a mobile device, event data derived from contextual data collected using detectors that detect a physical context surrounding the mobile device;
 - [b] modifying a context graph that stores facts and assertions about a user's behavior and interests using the event data;
 - [c] in response to determining that there exists a registration for notification of changes that matches the modification to the context graph, sending a notification of context graph change to a recommender.

Ex. 1001, 10:30–40 (Facebook's reference letters added in brackets).

Facebook argues three grounds for *inter partes* review, as summarized in the following table:

Claims Challenged	35 U.S.C. §	Reference(s)/Basis
1–4, 7–10, 13–16, 20	103 ³	Cheng, ⁴ Falchuk ⁵
5, 11, 17	103	Cheng, Falchuk, Richardson ⁶
19	103	Cheng, Falchuk, Shalloway, ⁷ Powell ⁸

³ 35 U.S.C. § 103 (2018).

⁴ Cheng, US 2013/0018954 A1 (published Jan. 17, 2013) (Ex. 1003).

⁵ Falchuk et al., US 8,694,901 B2 (issued Apr. 8, 2014) (Ex. 1004).

⁶ Leonard Richardson & Sam Ruby, *RESTFUL Web Services* (2007) (Ex. 1005).

⁷ Alan Shalloway & James R. Trott, *Design Patterns Explained: A New Perspective on Object-Oriented Design* (2d ed. 2005) (Ex. 1006).

⁸ Thomas A. Powell, *Ajax: The Complete Reference* (2008) (Ex. 1007).

Pet. 3.

D. DECLARATORY TESTIMONY

Facebook relies on the declaration of Christopher M. Schmandt (Ex. 1002). *See* Pet. 3. PARC does not challenge Mr. Schmandt's qualifications to provide expert testimony, and does not submit rebuttal testimony at this stage.

Facebook also relies on a declaration by Dr. Sylvia D. Hall-Ellis (Ex. 1015) as to the public availability of Richardson, Shalloway, and Powell. *See* Pet. 11. PARC does not contest Dr. Hall-Ellis's testimony at this stage.

III. GROUNDS OF THE PETITION

For the reasons below, we determine that there is a reasonable likelihood that Facebook would prevail in showing that at least one of claims 1–5, 7–11, 13–17, 19, and 20 of the '439 patent is unpatentable under the grounds raised in the Petition. Before analyzing those grounds in detail, we first address the level of ordinary skill in the art, and whether we need to construe any claim terms explicitly for our analysis.

A. LEVEL OF ORDINARY SKILL IN THE ART

The level of ordinary skill in the pertinent art at the time of the invention is relevant to how we construe the patent claims. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc). It is also one of the factual considerations relevant to obviousness. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

To assess the level of ordinary skill, we construct a hypothetical “person of ordinary skill in the art,” from whose vantage point we assess obviousness and claim interpretation. *See In re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir. 1998). This legal construct “presumes that all prior art references in the field of the invention are available to this hypothetical skilled artisan.” *Id.* (citing *In re Carlson*, 983 F.2d 1032, 1038 (Fed. Cir. 1993)).

Relying on Mr. Schmandt’s testimony, Facebook argues that a person of ordinary skill in the art “would have possessed at least a bachelor’s degree in electrical engineering or computer science, and two years of work experience in the field of context-based computer systems, such as the collection, processing and use of context data in computer systems capable of adapting their operation based on context.” Pet. 6 (citing Ex. 1002 ¶¶ 15–18). Facebook also contends that a person might qualify as an ordinarily skilled artisan “with more formal education and less technical experience, or vice versa.” *Id.*

PARC does not dispute this proposed level of ordinary skill in its Preliminary Response. We adopt Facebook’s proposed articulation for this decision because it is supported by testimonial evidence and appears reasonable in light of the subject matter of the ’439 patent. If PARC proposes a different articulation at trial, we will consider that proposal and any supporting evidence in light of the full trial record.

B. CLAIM CONSTRUCTION

In an *inter partes* review, we construe a patent claim “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b) (2020). This

includes “construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” *Id.* The ordinary and customary meaning of a claim term “is its meaning to the ordinary artisan after reading the entire patent,” and “as of the effective filing date of the patent application.” *Phillips*, 415 F.3d at 1313, 1321. We also consider “[a]ny prior claim construction determination concerning a term of the claim in a civil action . . . that is timely made of record” in this proceeding. 37 C.F.R. § 42.100(b).

Facebook states that it “does not believe express claim construction is necessary at this time.” Pet. 8. Likewise, PARC does not propose any explicit claims constructions. *See generally* Prelim. Resp. Because the parties have not proposed particular claim constructions and none are necessary for our decision to institute an *inter partes* review, we do not explicitly construe any terms at this time. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“[W]e need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))). To the extent that particular claim terms are significant, we discuss them below in the context of the asserted prior art.

C. CLAIM 1

In its first ground, Facebook contends that claims 1–4, 7–10, 13–16, and 20 are unpatentable as obvious over Cheng in view of Falchuk. Pet. 13–14, 25–82. Facebook’s analysis focuses first on claim 1. Pet. 11–36.

Likewise, we begin our analysis with claim 1, followed by a discussion of the other claims.

A claim is unpatentable under § 103 for obviousness 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 the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). For a combination of known elements that are not explicitly found together in the prior art, we consider “whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *Id.* at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). A successful petition must “articulate specific reasoning, based on evidence of record, to support the legal conclusion of obviousness.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016) (citing *KSR*, 550 U.S. at 418); *see also* 35 U.S.C. § 322(a)(3); 37 C.F.R. §§ 42.22(a)(2), 42.104(b)(4).

We base our obviousness inquiry on factual considerations including (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, (3) the level of skill in the art, and (4) any objective indicia of obviousness or non-obviousness that may be in evidence.⁹ *See Graham*, 383 U.S. at 17–18.

⁹ At this stage, the parties do not identify any objective indicia of obviousness or non-obviousness, so this does not factor into our decision to institute an *inter partes* review. *See* Ex. 1002 ¶ 177 (Mr. Schmandt stating that he is not “aware of information, such as commercial success, unexplained results, long felt but unsolved need, industry acclaim, simultaneous invention, copying by others, skepticism by experts in the

Based on these factors, we conclude that Facebook has made a sufficient showing that claim 1 would have been obvious over Cheng in view of Falchuk. Thus, for the reasons below, we determine that Facebook is reasonably likely to prevail on claim 1.

1. Overview of Cheng

Cheng describes “situation-aware user sentiment social interest models,” particularly in the context of social networking services. Ex. 1003 ¶¶ 3, 5–9. In discussing the background art, Cheng notes that other companies had been developing analytics to extract a user’s interest and sentiments from social networking data, but these efforts were “blind[] about the user’s situation” at any particular moment, which a system might use to make contextually appropriate suggestions to the user. *Id.* ¶ 10. “For example, even though a user may like good wine, suggesting going to a wine tasting nearby may not be a good idea when his friends with him at the time do not like wine.” *Id.*

Thus, Cheng describes “[a] method for constructing user models from user usage and context data . . . where a personal interest graph for a user is construct[ed] from interests of the user derived from usage data and situational data derived from one or more sensors of [an] electronic device.” Ex. 1003, code (57). “The personal interest graph can be modified by annotating one or more nodes of the personal interest graph with influence information.” *Id.*

field, and failure of others, suggesting that the claims addressed in this Declaration are not obvious.”); *see generally* Prelim. Resp. (not alleging any evidence of objective indicia of nonobviousness).

Figure 2 of Cheng, reproduced below, illustrates the high-level architecture of this system (Ex. 1003 ¶ 19):

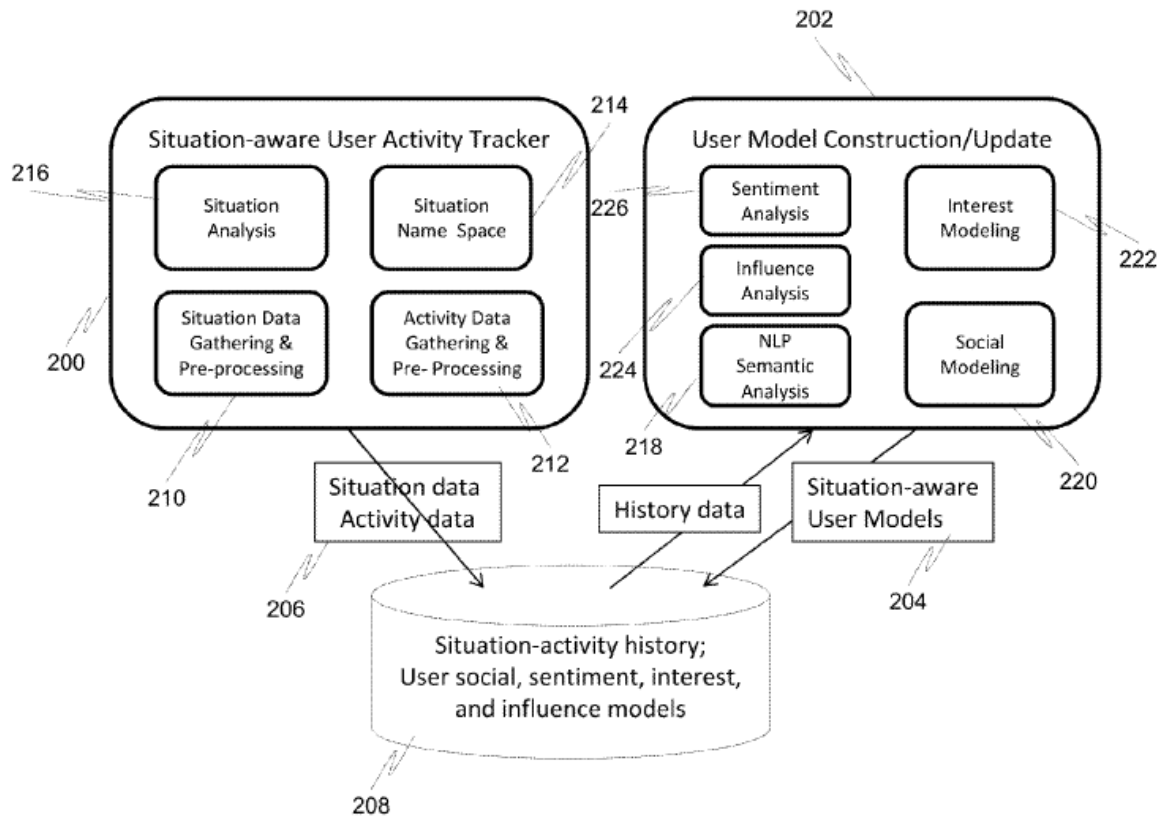


FIG. 2

As shown above in Figure 2, Cheng’s system has two main parts: (1) situation-aware user activity tracker 200, which logs user activity data within a device and application, and corresponding situation data at the time of usage; and (2) user model construction/update module 202, which “builds and updates user models.” Ex. 1003 ¶ 37. Storage 208 stores the user’s annotated “relations, interests, influence, and sentiments.” *Id.* “[T]he output of the system is a set of models 204 about the user’s relationship, interests, who influences the user about a topic, whom the user influences about a topic, and the user’s sentiments towards a topic/concept or person.” *Id.*

As part of construction/update module 202, sentiment analysis module 226 “can compute the user’s sentiments about people and concepts in various situations” (Ex. 1003 ¶ 48), as illustrated below in Figure 7:

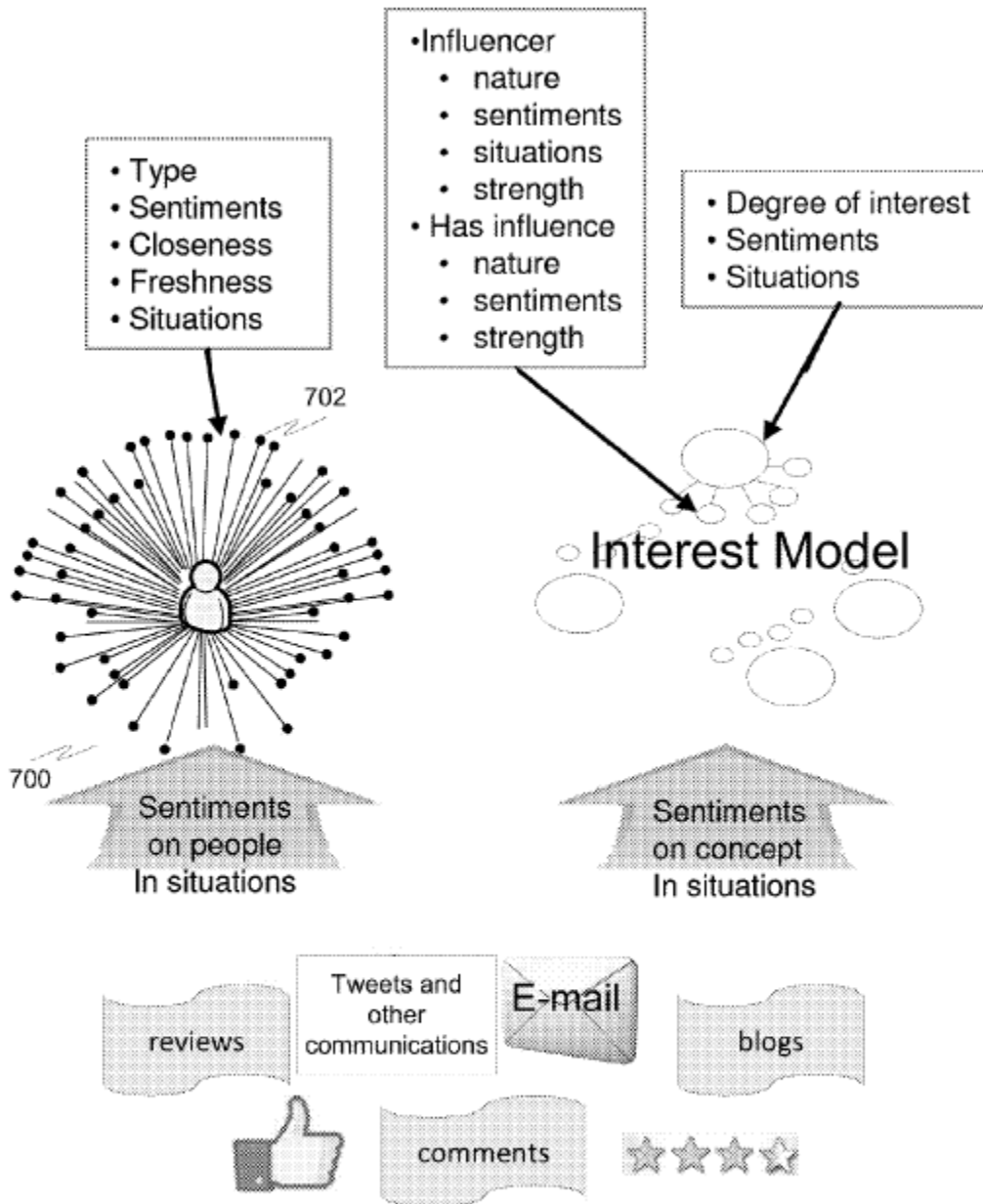


FIG. 7

Figure 7, above, depicts “the output of sentiment analysis.” Ex. 1003 ¶ 48. The lower part of Figure 7 illustrates how module 226 may obtain user sentiments “by tracking user actions such as clicks of a like, share, or recommend button,” or “by analyzing the texts associated with user online activities such as blogs, emails, tweets, reviews, comments, etc.” *Id.* Using this information, module 226 constructs personal interest graph 700, a tree-like structure that includes a number of edges and nodes such as node 702. Ex. 1003 ¶ 48. Node 702 “can be annotated with the sentiment information about the concept represented by the node,” as illustrated in the box above personal interest graph 700. *Id.* These annotations may include “the types and the strengths of users’ sentiments and the situation in which such sentiments are expressed.” *Id.*

For example, an “edge” may link the user to a node representing another person. *See* Ex. 1003 ¶ 48. “When the user expresse[s] sentiments toward a person, the sentiment information can be recorded in the personal social graph, for example by annotating the edge linking the user to the person.” *See id.*

Once constructed, the personal interest graphs “can then be directly used by applications, such as for predicting user needs, for making recommendations, and for decision making.” Ex. 1003 ¶ 52. In one embodiment, “a client device runs the situation-aware user activity tracker and sends the data to be stored on a server or in a cloud.” *Id.* ¶ 55. Then, “[a]t recommendation time, the client device identifies the current situation, and asks the server/cloud to identify the items for recommendation.” *Id.*

2. *Overview of Falchuk*

Falchuk describes a “system and method for determining and presenting contextual suggestions on a mobile device” relating to a “user context.” Ex. 1004, code (57). By “user context,” Falchuk “mean[s] a machine[-]readable version of the multitude of information surrounding the daily life of a user.” *Id.* at 2:11–13. The user context can be stored “as a series of instances” of “a hierarchic, rich state model having subtrees, such that each subtree is an instance of a context ontology and thus permits machine-readable interpretation and inference.” *Id.* at 4:42–44, 4:61–64. “The model is dynamically . . . updated as context changes,” and “[a] key part of the system captures the user’s ‘goals.’” *Id.* at 5:23–24, 5:28. These goals can be entered explicitly or inferred based on the user’s context. *See id.* at 5:39–44. The system seeks to “provide the right reminder at the right time and place, as well as mitigating conflicting and complementary reminders and events.” *Id.* at 2:7–9.

The components of Falchuk's system are illustrated below in Figure 2:

FIGURE 2

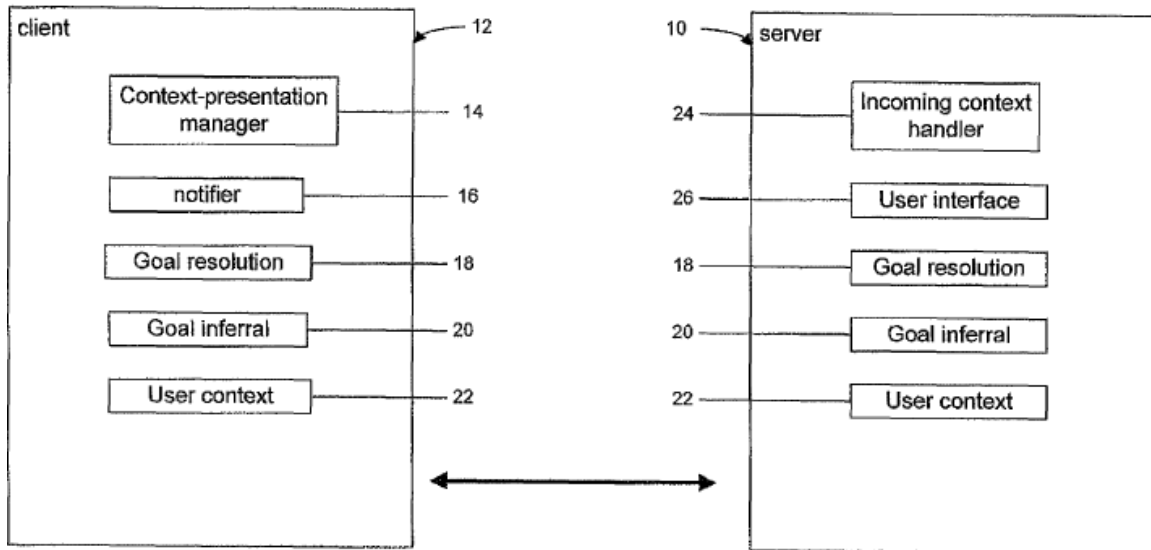


Figure 2, above, shows server 10 on the right-hand side, which includes components such as incoming context handler 24. Ex. 1004, 3:33–34. Incoming context handler 24 receives and parses incoming messages relating to the user's context. *See id.* at 4:47–54. Client 12 is shown on the left-hand side of Figure 2, and has components including context-presentation manager 14, which “can operate to queue up notifications and/or suggestions that are to be conveyed to the user.” *Id.* at 3:56–58. Client 12 also includes notifier 16, which “can marshal a visual or ambient notification that the system intends the user to consume.” *Id.* at 4:4–5. Server 10 and client 12 may each also have goal resolution components 18, goal inferral components 20, and user context components 22, which are involved in identifying goals and storing the user context. *See id.* at 3:32–33, 3:35–36, 4:10–29.

When an event occurs that changes the user context, “goal resolution component 18 scours the user context 22, possibly applying rules, to see

whether a given goal can be advanced by a given event(s). For example, if event *e* (that just happened) makes goal *g* possible, then a notification may be readied.” Ex. 1004, 4:10–18. Context-presentation manager 14 queues up such notifications until an appropriate time, after which notifier 16 displays the notification to the user, where the display may be on the screen of a mobile device. *See id.* at 3:56–60, 6:28–31.

3. *Challenge to Claim 1*

Regarding claim 1, Facebook relies primarily on Cheng for the preamble and limitations 1[a]–[c] except for the final aspect of limitation 1[c] that recites “sending a notification of context graph change to a recommender.” Pet. 9. For that part of limitation 1[c], Facebook relies on the teachings of Falchuk. Pet. 9–10. We address Facebook’s arguments about each of these limitations below, and PARC’s preliminary arguments in response:

(a) Preamble and limitation 1[a]

The preamble and limitation 1[a] of claim 1 recite “[a] method, comprising: receiving, from a mobile device, event data derived from contextual data collected using detectors that detect a physical context surrounding the mobile device.” Ex. 1001, 10:30–33. Facebook argues that Cheng and Falchuk both disclose this method, and that “Cheng discloses receiving event data from a mobile device, such as a mobile phone, as claimed.” Pet. 11.

In particular, Facebook identifies the recited “contextual data” in Cheng’s disclosure as “raw data collected by sensors associated with a mobile device,” and identifies “event data” as “data derived by ‘pre-

processing’ the collected contextual data or alternatively, to the data derived from one or more steps of the ‘data fusion’ process described in Cheng.” Pet. 13; *see also* Pet. 11–18 (citing Ex. 1001, 2:60–62 (explaining the term “[c]ontextual data”), 3:4–12, 3:49–51, 9:2–5, 9:9–11; Ex. 1002 ¶¶ 62, 65, 66, 68; Ex. 1003 ¶¶ 11, 31, 32, 34, 35, 37, 38, 40, 42, 55, 57, claim 24, Fig. 2).

At this stage, PARC does not dispute that Cheng discloses the preamble of claim 1¹⁰ or limitation 1[a]. We find Facebook’s arguments sufficiently persuasive at this stage.

(b) Limitation 1[b]

Limitation 1[b] recites “modifying a context graph that stores facts and assertions about a user’s behavior and interests using the event data.” Ex. 1001, 10:34–36. Facebook contends that Cheng discloses the recited context graph in the form of Cheng’s “personal interest graph.” *See* Pet. 19–26 (citing Ex. 1001, 3:20–22 (explaining the term “context graph”), 7:26–29, 9:60–10:2; Ex. 1002 ¶¶ 70, 72–76; Ex. 1003 ¶¶ 14, 29, 31, 32, 37, 40, 45, 46, 49, 53, 54, 56, 58, Figs. 5, 8, 9).

In particular, Facebook contends that Cheng’s personal interest graph “stores facts and assertions about a user’s behavior and interests,” as recited, because in this graph, a node “represents a concept and an edge connecting the two concept nodes represents the ontological relationship between the concepts.” Pet. 20 (quoting Ex. 1003 ¶ 45) (citing Ex. 1003 ¶ 14). For example, Facebook points to Cheng’s disclosure that “[a] node may also

¹⁰ The preamble merely indicates that the claimed invention is a method, which we presume limits the scope of claim 1. But we need not resolve that question because neither party raises the issue and Facebook shows sufficiently that Cheng discloses a method.

carry the information to indicate the degree of a user's interest about the concept represented by the node.” Pet. 21 (emphasis omitted) (quoting Ex. 1003 ¶ 46).

In its Preliminary Response, PARC notes that claim 1 requires the context graph to store both “facts *and assertions*” about a user's behavior and interests. Prelim. Resp. 19. According to PARC, Facebook ignores the difference between facts and assertions and fails to show how Cheng teaches a context graph that includes “assertions.” *Id.* In particular, PARC contends that Cheng's description of storing user “interests” and “activity” merely constitutes the storing of facts such as “the fact that a user is interested in music and movies.” *Id.* (quoting Pet. 21) (citing Pet. 20). In contrast to such “facts,” PARC contends that an “assertion” would be something like “‘personal habits’ such as ‘a user tends to drink coffee at four o'clock, or that the user tends to go to work at two o'clock.’” *Id.* at 20 (quoting Ex. 1001, 7:29–33). PARC argues that Facebook's analysis is insufficiently specific in articulating “what Cheng's ‘facts *and assertions*’ are or how Cheng's interest and activity data is an ‘assertion’ as described in the '439 Patent and independent claims.” Prelim. Resp. 20 (citing Pet. 21).

Based on the preliminary record, we disagree with PARC's argument that Facebook fails to adequately identify both “facts and assertions” within Cheng's user interest model. As Facebook notes in the Petition, Cheng's model is a graph that includes nodes and edges, where a node “represents a concept and an edge connecting the two concept nodes represents the ontological relationship between the concepts.” Pet. 20 (quoting Ex. 1003 ¶ 45) (citing Ex. 1003 ¶ 14). At this stage, we find Facebook's argument persuasive that an ontological relationship reflects an “assertion” about a

user's behavior and interests. Thus, at this stage, Facebook has sufficiently shown that Cheng discloses limitation 1[b].

(c) Limitation 1[c]

Limitation 1[c] recites, “in response to determining that there exists a registration for notification of changes that matches the modification to the context graph, sending a notification of context graph change to a recommender.” Ex. 1001, 10:37–40. Facebook relies on the combination of Cheng and Falchuk to teach this limitation. *See* Pet. 26–36. In particular, Facebook points out that the '439 patent describes a “recommender” as “an application that recommends items or activities for a user.” Pet. 26 (emphasis omitted) (quoting Ex. 1001, 3:23–25). Facebook contends that Cheng uses a recommender in conjunction with its personal interest graph for making recommendations based on the model. Pet. 27 (citing Ex. 1003 ¶¶ 11, 52, 54, 56).

But Facebook states that “Cheng does not provide further detail regarding the interaction between the recommender and the personal interest graph.” Pet. 27. Thus, Facebook argues that a person of ordinary skill in the art would have looked to Falchuk for the specific teaching recited in limitation 1[c]. *Id.* Facebook contends that, like Cheng, Falchuk discloses a model of user context in the form of a hierarchical tree structure representing a context ontology, which “can include items such as short and long term goals.” Pet. 28 (quoting Ex. 1004, 4:65–67) (citing Ex. 1003 ¶ 45; Ex. 1004, 4:42–46, 4:61–64). Facebook contends that in Falchuk, “‘events’—such as a change in a user's location—change the user context model,” and “in response . . . , the goal resolution component determines whether the event

advances a given goal—which may cause a *notification* to occur.” Pet. 29 (citing Ex. 1002 ¶ 86; Ex. 1004, 4:10–18, 6:15–31).

According to Facebook, the “registration” recited in limitation 1[c] “corresponds in Falchuk to a goal explicitly entered by a user or inferred by the system.” Pet. 31. Facebook identifies the recited “recommender” as Falchuk’s “context presentation manager” 14 and “notifier” 16 components, “both individually and collectively.” Pet. 33 (citing Ex. 1002 ¶ 89). And Facebook contends that the step of “sending a notification of context graph change” corresponds to “the process of reporting a notification to the context presentation manager in Falchuk and/or instructing the notifier to display the notification to the user.” Pet. 32–33 (citing Ex. 1002 ¶ 89).

Facebook also contends that “[i]t would have been obvious to combine Cheng’s system with Falchuk’s teachings regarding adding, matching and providing notifications about goals.” Pet. 33. According to Facebook, Cheng and Falchuk are both analogous references to the ’439 patent because they are in the same field of context-aware computer systems and are reasonably pertinent to the problem faced by the ’439 patent inventors. Pet. 34 (citing Ex. 1001, 1:8–12; Ex. 1002 ¶ 92). Facebook also argues that Cheng and Falchuk “describe interoperable components and technologies.” Pet. 36 (citing Ex. 1002 ¶ 97).

Next, Facebook argues that an ordinarily skilled artisan would have recognized in Falchuk “a clear benefit to the system of Cheng, *e.g.*, timely notifying its recommender about changes to the context graph that are meaningful to the user.” Pet. 34 (citing Ex. 1002 ¶ 94). Specifically, Facebook points to a teaching in Cheng that, “[a]t a particular moment, what a user needs or likes and what is appropriate to suggest to the user can be

highly variable based upon the user’s situation,” which suggests a motivation for using a recommender like in Falchuk that would allow such recommendations to be made in a timely manner as soon as the context graph changes. Pet. 35 (alteration in original) (quoting Ex. 1003 ¶ 10) (citing Ex. 1002 ¶ 94). Also, Facebook argues that incorporating Falchuk’s recommender into Cheng’s system would obviate any need for the user to request a recommendation explicitly, and allow the system to make recommendations at a time when “the user may not even realize . . . that they should request a recommendation.” Pet. 35 (citing Ex. 1002 ¶¶ 94–96; Ex. 1004, 3:23–28).

In its Preliminary Response, PARC contends that, “while Cheng mentions ‘recommendations’ and ‘personal interest graph,’ Cheng says nothing about ‘recommendations’ being related to any ‘registration for notification of changes,’” or the remaining aspects of limitation 1[c]. Prelim. Resp. 21. PARC also contends that Falchuk does not “fill in the gap between the limitation and Cheng.” *Id.*

In particular, PARC argues that, “at most, Falchuk’s server determines events. But Falchuk’s server does not send notifications. Instead, Falchuk’s client determines context and queues up a notification based on any context change—and it does so no matter the change.” Prelim. Resp. 21 (citing Ex. 1004, 6:14–46, Fig. 4). “In sum,” PARC argues, “Falchuk’s client (not server) always sends notifications, and there is no need, desire, or teaching in Falchuk to use a server to either (1) register for a notification, or (2) determine whether the notification registration matches one for which the recommender has registered.” *Id.* at 21–22. According to PARC, “Falchuk

merely queues up possible notifications whenever context changes, irrespective of the change.” *Id.* at 22 (citing Pet. 29–30).

Based on the preliminary record, we disagree with PARC that the location of various components in Falchuk’s server 10 or client 12 undermines Facebook’s arguments for combining Cheng with Falchuk. Although Falchuk processes events in incoming context handler 24, which resides in server 10, Falchuk teaches that “server 10 can be . . . some separate internal, e.g. also resident on the mobile phone, component such as a GPS location tracker that emits events of interest to the system.” Ex. 1004, 3:22–24, 3:33–34; *see also id.* at 6:17–18 (“[A]n external system, separate internal component, or server 10 emits an event toward the mobile 12.”).

In the embodiment in which both server 10 and client 12 are on the same mobile device, the mobile device would receive the event data, and the “recommender” would also reside on the mobile device, which is consistent with an embodiment in Cheng in which “the client device identif[ies] the items for recommendation,” and with Cheng’s teaching that “one of ordinary skill in the art will recognize there may be other ways to partition the functions [of tracking activity and making recommendations] without violating the spirit of the invention.” Ex. 1003 ¶ 55; *see also* Pet. 42 (arguing that “Cheng makes clear that the locations of the functional components of its system are not material to the operation of its system and would have been regarded as a routine implementation decision by a skilled artisan.” (citing Ex. 1003 ¶¶ 40, 55)). Additionally, nothing in the plain language of claim 1 explicitly requires the claim elements to be on separate devices, as the “recommender” is simply an application. *See* Ex. 1001, 10:30–40; *see*

also id. at 3:23–25 (“A recommender is an application that recommends items or activities for a user.”).

We also disagree that the preliminary record supports PARC’s argument that the “recommender” in the combined Cheng–Falchuk system always receives notifications for all changes to the personal interest graph (i.e., without regard to whether there is a “registration”). In its Petition, Facebook contends that the “recommender” of Cheng’s modified system would include Falchuk’s notifier 16. *See* Pet. 33. In Falchuk, notifier 16 apparently does not receive the notification until it “is asked to actually render a notification, for example on the mobile’s screen.” Ex. 1004, 6:29–31; *see also id.* at Fig. 4 (steps S10, S11). This occurs when the system determines that the notification relates to a particular goal (i.e., a “registration,” according to Facebook). *See id.* at 6:31–44; Pet. 33; Ex. 1002 ¶ 90.

Finally, PARC argues that Facebook has failed to carry its burden of showing that a person of ordinary skill in the art would have combined Cheng and Falchuk as Facebook asserts, “such that notifications would be served based on specific context graph changes.” Prelim. Resp. 22. According to PARC, Facebook’s arguments in this regard are conclusory and driven by hindsight, and Facebook has not shown that Falchuk and Chen are analogous art. *See id.* at 23.

At this stage, we disagree on all the above points. As we outline above, Facebook has articulated a reason why a person of ordinary skill would have modified Cheng by incorporating Falchuk’s system for providing goal-based recommendations associated with changes in Cheng’s personal interest graph. In particular, we note that Falchuk, like Cheng,

stores its user context information 22 in a tree-like structure representing a context ontology which the system dynamically updates as the context changes. *See* Ex. 1003 ¶ 48; Ex. 1004, 4:61–64, 5:23–24. Because Facebook’s arguments rely on Cheng and Falchuk for the combined teachings, rather than the ’439 patent, we do not determine at this stage that Facebook improperly relied on hindsight reconstruction. *See In re McLaughlin*, 443 F.2d 1392, 1395 (CCPA 1971) (“[S]o long as [a reconstruction based on prior art] takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made and does not include knowledge gleaned only from applicant’s disclosure, such a reconstruction is proper.”).

Based on the preliminary record, we find Facebook’s showing sufficiently persuasive that a person of ordinary skill in the art would have had reason to implement limitation 1[c] by combining Cheng’s system with Falchuk’s teachings about a recommender that notifies a user based on changes to the context graph corresponding to user goals (“registrations”).

(d) Conclusion as to claim 1

For the above reasons, we determine that Facebook has shown that there is a reasonable likelihood it would prevail in an *inter partes* review with respect to at least claim 1.

D. CLAIMS 2–4, 7–10, 13–16, AND 20

Independent claims 7 and 13 are directed to a “computer-readable storage medium” and a “computing system,” respectively, that implement essentially the same method as claim 1. *Compare* Ex. 1001, 10:30–40, *with id.* at 11:1–13, *and id.* at 11:47–12:7. For these claims, Facebook relies

substantially on its arguments for claim 1. *See* Pet. 44–46 (claim 7) (citing Ex. 1001, 10:60–11:2; Ex. 1002 ¶¶ 113–115; Ex. 1003 ¶¶ 40, 55, 57, 58); Pet. 46–47 (claim 13) (citing Ex. 1002 ¶ 123; Ex. 1003 ¶ 57).

Claims 2, 8, and 14 depend from independent claims 1, 7, and 13, respectively, and further recite the following additional steps: (a) “receiving, from the mobile device, additional event data including application event data and/or operating system event data;” (b) “modifying the context graph based on the additional event data;” (c) “determining that the modification to the context graph matches the registration;” and (d) “sending a second notification of context graph change to the recommender.” Ex. 1001, 10:41–50 (claim 2); *accord id.* at 11:14–26 (claim 8); *id.* at 12:8–20 (claim 14). Essentially, these claims repeat the steps of claim 1 except with regard to “additional event data including application event data and/or operating system event data.” *Id.* at 10:42–44. For these limitations, Facebook relies on Cheng and Falchuk in an analogous way to that discussed above in the context of claim 1. *See* Pet. 36–40, 46, 47.

Claims 3, 9, and 15 depend from claims 1, 7, and 13, respectively, and further recite that “the event data includes high-level event data generated by the mobile device from contextual data.” Ex. 1001, 10:51–53 (claim 3); *accord id.* at 11:27–29 (claim 9); *id.* at 12:21–23 (claim 15). For these claims, Facebook relies on the disclosure in Cheng of two levels of event data derived from the contextual data, one of which is the result of a data fusion step which, according to Facebook, corresponds to the recited “high-level event data.” *See* Pet. 40–43 (citing Ex. 1001, 4:45–48; Ex. 1002 ¶¶ 108–109; Ex. 1003 ¶ 40, 42, 55, Fig. 2).

Claims 4, 10, and 16 depend from claims 1, 7, and 13, respectively, and further recite steps of “receiving a query for context graph data from the recommender; and sending the context graph data to the recommender.” Ex. 1001, 10:54–57 (claim 4); *accord id.* at 11:30–34 (claim 10); *id.* at 12:24–30 (claim 16). Facebook contends that “Cheng makes clear that a recommender application queries a personal interest graph for data” and argues that “[b]ecause the query for the context graph data comes from the recommender, as noted, it is the recommender that receives that data in response to its query.” Pet. 43–44 (citing Ex. 1002 ¶¶ 111–112; Ex. 1003 ¶¶ 34, 54–56); Pet. 46 (claim 10); Pet. 47 (claim 16).

Claim 20 depends from claim 1 and further recites “wherein sending the notification comprises notifying the recommender of topological changes in the context graph and/or changes to individual properties of nodes and edges in the context graph.” Ex. 1001, 12:52–55. Facebook relies essentially on its arguments for claim 1, and particularly limitation 1[c]. Pet. 47; *see supra* part III.C.3(c). Facebook also argues that “[b]ecause concepts are represented as nodes in the personal interest graph, a skilled artisan would have understood that adding a node for a new concept based on usage activity data would result in a topological change to the graph.” *See* Pet. 48–49 (citing Ex. 1003 ¶ 45). Thus, according to Facebook, “[a] notification associated with such an update . . . would comprise notifying the recommender of topological changes in the personal interest graph and/or changes to the individual properties of nodes in the personal interest graph.” Pet. 49 (citing Ex. 1002 ¶ 133).

PARC does not dispute Facebook’s specific showing for claims 2–4, 7–10, 13–16, or 20, and we find it sufficiently persuasive at this stage for us to determine that Facebook is reasonably likely to prevail on these claims.

E. CLAIMS 5, 11, 17, AND 19

Claims 5, 11, and 17 depend from claims 1, 7, and 13, respectively, and further recite “receiving real-time event data through a RESTful WebAPI; and modifying the context graph based on the received real-time event data.” Ex. 1001, 10:58–62; *accord id.* at 11:35–40; *id.* at 12:31–48. In its second ground, Facebook argues that “[b]oth Cheng and Falchuk disclose web-based systems, although neither explicitly describes the use of a RESTful WebAPI.” Pet. 53 (citing Ex. 1003 ¶¶ 31, 40). But Facebook argues that a person of ordinary skill in the art would have modified the Cheng–Falchuk combination by incorporating Richardson’s teachings about using of a RESTful WebAPI for receiving real-time event data in the context of Amazon’s S3 cloud storage service. *See* Pet. 49–54, 57–58 (citing Ex. 1001, 4:60–64, 5:9–14, 5:16–17, 5:62–67, 7:18–21, 9:19–21; Ex. 1002 ¶¶ 114–115, 123, 136–142, 151–156; Ex. 1003 ¶¶ 7, 10, 31, 40, 53, 54; Ex. 1004, 2:5–9, 3:46–48, 4:10–23, 4:56–58, 5:23–24, 7:12–21; Ex. 1005, 36, 45–73).

According to Facebook, incorporating the teachings of Richardson into the Cheng–Falchuk combination would have been a “clear and straightforward” combination motivated by the desire “to use an existing, well-established storage service in order to save on implementation and maintenance costs—and Amazon’s S3 is one of the most well-known ‘cloud’ storage services.” Pet. 55 (citing Ex. 1002 ¶ 147; Ex. 1003 ¶ 40, 55; Ex. 1005, 36). Facebook also contends that “an ordinarily skilled artisan would

have been motivated to use a RESTful WebAPI to harness an industry standard and technologically mature technology.” Pet. 55–56 (citing Ex. 1002 ¶ 148).

PARC does not dispute Facebook’s specific showing for claims 5, 11, or 17, and we find it sufficiently persuasive at this stage for us to determine that Facebook is reasonably likely to prevail on these claims.

F. CLAIM 19

Claim 19 depends from claim 1 and further recites “sending a second notification to the recommender by pushing events into the recommender’s publish/subscribe system asynchronously using a long-poll persistent push connection.” Ex. 1001, 12:47–51. For its third ground challenging claim 19, Facebook relies on the arguments for claim 1, and also relies on Shalloway as teaching a push-based notification system, and on Powell for teaching that the push notification would be performed “asynchronously using a long-poll persistent push connection.” *See* Pet. 58–67 (citing Ex. 1001, 4:49–51, 7:54–60, 8:4–9; Ex. 1002 ¶¶ 158–161, 164–168, 170–176; Ex. 1003 ¶¶ 31, 40, 55, 56; Ex. 1004, 3:46–48, 4:56–58, 6:15–21; Ex. 1006, 69–83; Ex. 1007, 19, 65–68; Ex. 1010, 5, 13; Ex. 1011, 5–6, 8–9).

PARC does not dispute Facebook’s specific showing for claim 19, including Facebook’s proposed motivations for combining Shalloway and Powell with the Cheng–Falchuk combination, and we find Facebook’s showing sufficiently persuasive at this stage for us to determine that Facebook is reasonably likely to prevail on this claim.

IV. DISCRETIONARY DENIAL UNDER 35 U.S.C. § 314(a)

PARC argues that the Board should discretionarily deny Facebook’s Petition. Prelim. Resp. 13–18. Under 35 U.S.C. § 314(a), the Director has discretion to deny institution of an *inter partes* review. *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2140 (2016) (“[T]he agency’s decision to deny a petition is a matter committed to the Patent Office’s discretion.”). As with other non-dispositive factors considered for institution under § 314(a), the Board weighs factors as part of a “balanced assessment of all relevant circumstances in the case, including the merits.” Patent Trial and Appeal Board Consolidated Trial Practice Guide 58 & n.2 (Nov. 2019), <https://go.usa.gov/xpvPF> (“CTPG”) (discussing follow-on petitions and parallel proceedings).

In *General Plastic Co., Ltd. v. Canon Kabushiki Kaisha*, the Board articulated a non-exhaustive list of factors to be considered in determining whether to exercise discretion under § 314(a) to deny a petition that challenges the same patent as a previous petition. IPR2016-01357, Paper 19 (PTAB Sept. 6, 2017) (precedential), slip op. 9–10. The *General Plastic* factors follow:

1. whether the same petitioner previously filed a petition directed to the same claims of the same patent;
2. whether at the time of filing of the first petition the petitioner knew of the prior art asserted in the second petition or should have known of it;
3. whether at the time of filing of the second petition the petitioner already received the patent owner’s preliminary response to the first petition or received the Board’s decision on whether to institute review in the first petition;
4. the length of time that elapsed between the time the petitioner learned of the prior art asserted in the second petition and the filing of the second petition;

5. whether the petitioner provides adequate explanation for the time elapsed between the filings of multiple petitions directed to the same claims of the same patent;
6. the finite resources of the Board; and
7. the requirement under 35 U.S.C. § 316(a)(11) to issue a final determination not later than 1 year after the date on which the Director notices institution of review.

Id. (footnote omitted).

A. FACTOR 1

PARC contends the first factor weighs in favor of denial because Facebook allegedly coordinated its Petition with Snap and Twitter, who filed their own petitions challenging the '439 patent in May 2021 and August 2021, respectively. Prelim. Resp. 15–16. PARC also contends that “Facebook, Snap, and Twitter coordinated their invalidity contention work and served overlapping invalidity contentions in the parallel district court cases.” *Id.* at 16 (citing the related district court proceedings); *see supra* part II.A (identifying these proceedings).

As Patent Owner recognizes, the first factor examines whether the same petitioner or a related petitioner previously filed a petition directed to the same claims of the same patent, and can also apply in some circumstances when “when different petitioners submit multiple petitions to challenge the same patent.” Prelim. Resp. 14 (citing *Valve Corp. v. Electronic Scripting Products, Inc.*, IPR2019-00062, Paper 11 (PTAB Apr. 2, 2019) (precedential) (“*Valve I*”); *see also Valve Corp. v. Electronic Scripting Products, Inc.*, IPR2019-00064, Paper 10 (PTAB May 1, 2019) (precedential) (“*Valve II*”). *Valve II* held that “when different petitioners challenge the same patent, [the Board] consider[s] any relationship between

those petitioners while weighing the *General Plastic* factors.” *Valve II* at 10. In weighing this factor against the second petitioner Valve in *Valve II*, the Board noted that “Valve and HTC were co-defendants in the District Court litigation and were accused of infringing the [challenged] patent based on the same product, namely HTC’s VIVE devices that incorporate technology licensed from Valve.” *See id.* at 11. Also, Valve joined the previous petition as a party and the later-filed Valve petitions challenged the same claims as the previous petition. *See id.* at 11 (noting a “complete overlap in the challenged claims”).

Similar considerations do not exist here. Facebook did not previously file a petition challenging the ’439 patent, nor did Facebook seek to join the earlier Snap or Twitter petitions. *See generally* IPR2021-00986, IPR2021-01430.

There is also no evidence in the record that Facebook coordinated with Snap or Twitter in their respective petitions: Facebook represents that it “played no role in [the] preparation or filing” of the Snap or Twitter petitions. Pet. 4. And, as Facebook persuasively argues, the grounds in its Petition are different from those in the Snap and Twitter petitions, except that the Twitter petition also cited Cheng as a secondary reference. Pet. 4–5. And we agree with Facebook that “the present Petition presents Cheng in a different light.” Pet. 5.

Therefore, this factor favors not exercising discretionary denial.

B. FACTORS 2, 4, AND 5

PARC contends that “Twitter, Snap, and Facebook knew, or should have known, about the prior art the other assert in their respective petitions

because of the art’s alleged public availability and Facebook’s, Snap’s, and Twitter’s pre-trial coordination by at least the May 7, 2021 Joint Scheduling Conference filing in the district court.” Prelim. Resp. 16 (citing Ex. 2006). According to PARC, on June 15, 2021, the three companies “served the exact same invalidity charts for the ’439 Patent” for a number of references including Cheng. *Id.* at 16–17 (citing Exs. 2007–2015). PARC argues that these charts “even us[e] the same labels (B20, B21, and B33).” *Id.*

Some Board decisions—including *General Plastic*—indicate that a petitioner bears some responsibility to provide a reasonable explanation about when it learned of the references in its petition. *See General Plastic*, Paper 9 at 10 (“Petitioner provided no meaningful explanation for the delay in filing the follow-on petitions.”). *General Plastic* also reasons that “[c]onsidering other factors (i.e., factors 2, 4, and 5) allows us to assess and weigh whether a petitioner should have or could have raised the new challenges earlier.” *General Plastic* at 18.

But in this case, Factor 2 of *General Plastic*, “whether at the time of filing of the first petition the petitioner knew of the prior art asserted in the second petition or should have known of it,” is of little probative value. Facebook did not file a first petition and there is no evidence of a significant relationship between Facebook and prior petitioners Snap and Twitter. Hence, the issue of whether Facebook could have raised the prior art at issue here in the first petition is not relevant. *General Plastic* at 19–20.

Factors 4 and 5 involve the length of time between when Facebook learned of Cheng, Falchuk, Richardson, Shalloway, and Powell and when it filed the Petition, and whether Facebook has adequately explained this time period between its Petition and the earlier petitions.

Again, unlike Facebook’s Petition, Snap’s petition does not rely on Cheng, Falchuk, Richardson, Shalloway, or Powell, and Twitter’s petition relies on Cheng only as a secondary reference. *See* IPR2021-00986, Paper 1; IPR2021-01430, Paper 2. Therefore, as to factor 5, even assuming Facebook knew of Snap’s and Twitter’s prior art and challenged claims, that is not an indication that Facebook had knowledge of this Petition’s prior art combinations at the earlier time. And even if Facebook became aware of Cheng, Falchuk, Richardson, Shalloway, or Powell around the time it filed its initial invalidity contentions, the time gap between that awareness and the filing of its Petition does not reflect an unreasonable delay in view of time typically required for preparing a petition.

Accordingly, these factors favor not exercising discretionary denial.

C. FACTOR 3

The filing date of this Petition precedes both PARC’s preliminary response to Snap’s petition, PARC’s preliminary response to Twitter’s petition, and the institution decision in the two prior cases. *See* IPR2021-00986, Papers 10, 11; IPR2021-01430, Papers 9, 12. PARC does not address the third factor. *See* Prelim. Resp. 15–18.

Accordingly, this factor favors not exercising discretionary denial.

D. FACTORS 6 AND 7

Regarding factor 6, PARC contends that “the Board should not waste its resources considering both Facebook’s use of Cheng and Twitter’s use[] of Cheng.” Prelim. Resp. 17 (citing Pet. 4–5). PARC also disagrees with Facebook “that its use of Cheng is unlike Twitter’s use of Cheng.” *Id.* For factor 7, PARC contends that “the Board is unlikely to be able to issue a

final written decision as to this Facebook Petition within one year of its November 23, 2021 institution of Snap’s ’439 Patent petition,” which according to PARC, would be prejudicial for PARC. *Id.* at 18.

Given the differences between this Petition and the Snap petition, joinder is not possible under current precedent. *See Facebook, Inc. v. Windy City Innovations, LLC*, 973 F.3d 1321, 1336 (Fed. Cir. 2020) (“We therefore conclude that the unambiguous meaning of § 315(c) is that it allows the Director discretion to join a person *as a party* to an already-instituted IPR but does not permit the joined party, by virtue of the joinder decision alone, to bring new issues from a second proceeding into the existing proceeding.”). And the appearance of Cheng in both this case and the prior IPR2021-01430 proceeding will provide some basis for efficiency in timely resolving the issues of this review.

Accordingly, these factors are neutral or favor not exercising discretionary denial.

E. CONCLUSION ON DISCRETIONARY DENIAL

Under a holistic analysis and under the particular circumstances of this case, the interests of efficiency and integrity of the patent system tilt toward not exercising discretionary denial of the Petition under § 314(a).

V. CONCLUSION

Based on the evidence available on the preliminary record, Facebook has demonstrated a reasonable likelihood of success in showing that at least one of the challenged claims of the ’439 patent is unpatentable on at least one of the grounds raised in the Petition. Thus, as directed by *SAS Inst., Inc.*

v. Iancu, 138 S. Ct. 1348 (2018), we institute an *inter partes* review on all grounds raised in the Petition. And under the circumstances, we decline to exercise our discretion to deny institution under § 314(a).

VI. ORDER

In consideration of the foregoing, it is

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1–5, 7–11, 13–17, 19, and 20 of the '439 patent is instituted with respect to all the grounds set forth in the Petition; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, *inter partes* review of the '439 patent commences on the entry date of this Order, and notice is hereby given of the institution of a trial.

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Patent 9,208,439 B2

For PETITIONER:

Heidi L. Keefe
Phillip Morton
Andrew C. Mace
COOLEY LLP
hkeefe@cooley.com
pmorton@cooley.com
amace@cooley.com

For PATENT OWNER:

Ashley Moore
James Quigley
Alexandra Easley
MCKOOL SMITH, P.C.
amoore@mckoolsmith.com
jqigley@mckoolsmith.com
aeasley@mckoolsmith.com