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Paper 42
Date: October 22, 2020

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MICROSOFT CORPORATION,
Petitioner,

v.

IPA TECHNOLOGIES INC.,
Patent Owner.

IPR2019-00837
Patent 7,069,560 B1

Before LYNNE E. PETTIGREW, MINN CHUNG, and KEVIN C. TROCK, *Administrative Patent Judges*.

PETTIGREW, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
Denying in Part and Dismissing in Part Patent Owner's Motion to Exclude
35 U.S.C. § 318(a); 37 C.F.R. § 42.64

I. INTRODUCTION

In this *inter partes* review, instituted pursuant to 35 U.S.C. § 314, Microsoft Corporation ("Petitioner") challenges claims 1–4, 14–19, 26, and

36–44 of U.S. Patent No. 7,069,560 B1 (Ex. 1001, "the '560 patent"), owned by IPA Technologies Inc. ("Patent Owner"). This Final Written Decision is entered pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons discussed below, Petitioner has shown by a preponderance of the evidence that claims 1–4, 14–19, 26, and 36–44 of the '560 patent are unpatentable.

A. Procedural History

Petitioner filed a Petition for *inter partes* review of claims 1–4, 14–19, 26, and 36–44 of the '560 patent. Paper 1 ("Pet."). Patent Owner filed a Preliminary Response. Paper 6 ("Prelim. Resp."). Applying the standard set forth in 35 U.S.C. § 314(a), which requires demonstration of a reasonable likelihood that Petitioner would prevail with respect to at least one challenged claim, we instituted an *inter partes* review of the challenged claims. Paper 9 ("Inst. Dec.").

Following institution, Patent Owner filed a Patent Owner Response (Paper 19, "PO Resp."), Petitioner filed a Reply (Paper 27, "Pet. Reply"), and Patent Owner filed a Corrected Sur-reply (Paper 38, "PO Sur-reply"). Patent Owner filed a Motion to Exclude (Paper 33, "PO Mot."), Petitioner filed an Opposition to Patent Owner's Motion to Exclude (Paper 34, "Pet. Opp. to Mot."), and Patent Owner filed a Reply in Further Support of Its Motion to Exclude (Paper 36, "PO Mot. Reply"). An oral hearing was held on July 27 and 28, 2020, and a copy of the hearing transcript has been entered into the record.[1] Paper 41 ("Tr.").

[1] A single hearing was held for eight related cases—IPR2019-00810, IPR2019-00811, IPR2019-00812, IPR2019-00813, and IPR2019-00814, challenging claims of U.S. Patent No. 6,851,115 B1; and IPR2019-00835, IPR2019-00836, and IPR2019-00837, challenging claims of the '560 patent.

B. Real Parties in Interest

Petitioner identifies Microsoft Corporation as the real party in interest for the Petition. Pet. 3. Patent Owner names as the real party in interest IPA Technologies Inc., which is a wholly owned subsidiary of Wi-LAN Technologies Inc., which is a wholly owned subsidiary of Wi-LAN Inc., which is a wholly owned subsidiary of Quarterhill Inc. Paper 3, 2.

C. Related Matters

The parties inform us that the '560 patent is the subject of the following district court proceedings: *IPA Technologies Inc. v. Microsoft Corp.*, 1:18-cv-00001 (D. Del.); *IPA Technologies Inc. v. Google LLC*, 1:18-cv-00318 (D. Del.); *IPA Technologies Inc. v. Amazon.com*, 1:16-cv-1266 (D. Del.). Pet. 3; Paper 3, 2.

In addition to the present proceeding, we instituted two other *inter partes* reviews based on petitions filed by Petitioner challenging claims of the '560 patent. In IPR2019-00835, the Board determined that claims 1, 20, 21, 26, 27, 28–35, and 45–49 of the '560 patent had been shown to be unpatentable and that claim 28 had not been shown to be unpatentable. *Microsoft Corp. v. IPA Techs. Inc.*, IPR2019-00835, Paper 42 (PTAB Oct. 15, 2020) (Final Written Decision). In IPR2019-00836, in a decision issued concurrently with this one, we determine that Petitioner has shown claims 1, 5–9, 12, 13, 22–25, and 52 of the '560 patent to be unpatentable but has not shown claims 10, 11, 50, 51, and 53–55 to be unpatentable.

The '560 patent was the subject of two *inter partes* reviews in which the Board determined that claims of the '560 patent had not been shown to be unpatentable: *Google LLC v. IPA Technologies Inc.*, IPR2019-00730, Paper 72 (PTAB Sept. 16, 2020) (Final Written Decision); *Google LLC v.*

IPA Technologies Inc., IPR2019-00731, Paper 73 (PTAB Sept. 16, 2020) (Final Written Decision).

The '560 patent is a continuation of U.S. Patent No. 6,851,115 B1 (Ex. 1122, "the '115 patent"), which is the subject of other *inter partes* reviews (IPR2019-00810, IPR2019-00811, IPR2019-00812, IPR2019-00813, and IPR2019-00814) involving the same parties as this proceeding. *See* Ex. 1001, code (63).

D. Overview of the '560 Patent

The '560 patent describes "software-based architectures for communication and cooperation among distributed electronic agents" using "interagent communication languages enabling client agents to make requests in the form of arbitrarily complex goal expressions that are solved through facilitation by a facilitator agent." Ex. 1001, 1:20–25. Figure 4 of the '560 patent is reproduced below.

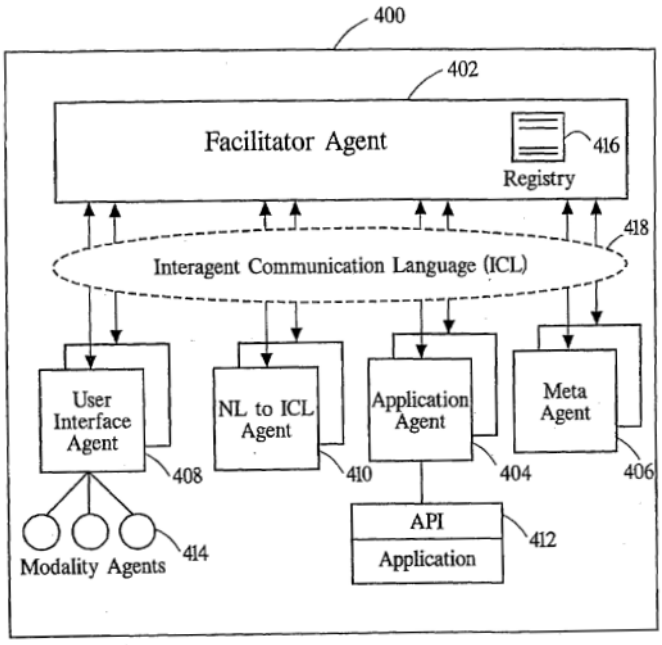


Fig. 4

Figure 4 depicts the structure of an exemplary distributed agent system of the '560 patent. *Id.* at 6:38–44. Figure 4 shows that system 400 includes facilitator agent 402, user interface agents 408, application agents 404, and meta-agents 406. *Id.* The '560 patent discloses that system 400 is organized "as a community of peers by their common relationship" to facilitator agent 402, which is "a specialized server agent that is responsible for coordinating agent communications and cooperative problem-solving." *Id.* at 6:41–43, 6:46–48.

The '560 patent discloses that cooperation among agents is structured around the following three-part approach: (1) providers of services register their capabilities specifications with a facilitator; (2) requesters of services construct goals and relay them to the facilitator; and (3) the facilitator coordinates the efforts of the appropriate service providers in satisfying these goals. *Id.* at 10:53–61. Such cooperation among agents is achieved via messages expressed in a common language, referred to as the Interagent Communication Language ("ICL"). *Id.* at 10:61–11:7.

Referencing Figure 3 (not reproduced herein) and Figure 4, the '560 patent describes a preferred embodiment for the operation of a distributed agent system. *Id.* at 7:24–50. The '560 patent describes that, when invoked, a client agent makes a connection to a facilitator, e.g., facilitator agent 402, and registers with the facilitator a specification of the capabilities and services it can provide. *Id.* at 7:26–32. For example, a natural language agent may register the characteristics of its available natural language vocabulary. *Id.* at 7:32–34. When facilitator agent 402 receives a service request and determines that registered services 416 of one of its client agents will help satisfy a goal of the request, the facilitator sends that client a request expressed in ICL 418. *Id.* at 7:36–40. The client agent

parses this request, processes it, and returns answers or status reports to the facilitator. *Id*. at 7:41–43.

Referencing Figures 5 and 6 (not reproduced herein), the '560 patent describes an exemplary embodiment in which user interface agent 408 runs on a user's laptop, accepting user input, sending requests to facilitator agent 402 for delegation to appropriate agents, and displaying the results of the distributed computation. *Id*. at 7:64–8:14. For instance, when the question "What is my schedule?" is entered on user interface (UI) 408, UI 408 sends the request to facilitator agent 402, which in turn asks natural language (NL) agent 426 to translate the query into ICL. *Id*. at 8:15–25. The translated ICL expression then is routed by facilitator agent 402 to appropriate agents, e.g., calendar agent 434, to execute the request. *Id*. at 8:25–27. Finally, results are sent back to UI agent 408 for display. *Id*. at 8:27–28.

E. Challenged Claims

Of the claims challenged in the Petition, claims 1 and 26 are independent. Claims 2–4 and 14–19 depend directly or indirectly from claim 1, and claims 36–44 depend directly or indirectly from claim 26. Claim 1 is illustrative and reproduced below.

> 1. A software-based, flexible computer architecture for communication and cooperation among distributed electronic agents, the architecture contemplating a distributed computing system comprising:
>
> a plurality of service-providing electronic agents;
>
> a distributed facilitator agent functionally distributed across at least two computer processes, the facilitator agent capable of bi-directional communications with the plurality of service-providing electronic agents, the facilitator agent including:

an agent registry that declares capabilities for each of the plurality of service-providing electronic agents currently active within the distributed computing environment; and

a facilitating engine operable to interpret a service request as a base goal, the facilitating engine further operable for generating a goal satisfaction plan associated with the base goal, wherein the goal satisfaction plan involves:

using reasoning to determine sub-goal requests based on non-syntactic decomposition of the base goal and using said reasoning to co-ordinate and schedule efforts by the service-providing electronic agents for fulfilling the sub-goal requests in a cooperative completion of the base goal; and

wherein the plurality of service-providing electronic agents and the distributed facilitator agent communicate using an interagent Communication Language (ICL), wherein the ICL includes:

a layer of conversational protocol defined by event types and parameter lists associated with one or more of the events, wherein the parameter lists further refine the one or more events.

Ex. 1001, 29:56–30:23.

F. Asserted Grounds of Unpatentability

Petitioner asserts that the challenged claims are unpatentable based on the following grounds (Pet. 4):

Claims Challenged	35 U.S.C. §	References
1–4, 14–19, 26, 36–44	103(a)[2]	Kiss,[3] FIPA97[4]
2–4, 14–17, 39–42	103(a)	Kiss, FIPA97, Cohen[5]

G. Testimonial Evidence

In support of the unpatentability contentions in its Petition, Petitioner relies on a declaration of Dr. Henry Lieberman (Ex. 1050, "Lieberman Decl.") and a declaration of Dr. Timothy Finin (Ex. 1049, "Finin Decl."). Patent Owner cross-examined Dr. Lieberman and Dr. Finin via deposition. *See* Ex. 2069 ("Lieberman Dep."); Ex. 2068 ("Finin Dep.").

In support of its Patent Owner Response, Patent Owner relies on a declaration of Dr. Nenad Medvidovic (Ex. 2032, "Medvidovic Decl.") and a Declaration of Dr. Philip R. Cohen (Ex. 2033, "Cohen Decl."). Petitioner cross-examined Dr. Medvidovic via deposition. *See* Ex. 1129 ("Medvidovic Dep.").

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[2] The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) ("AIA"), amended 35 U.S.C. §§ 102 and 103. Because the '560 patent has an effective filing date prior to the effective date of the applicable AIA amendments, we refer to the pre-AIA versions of §§ 102 and 103.

[3] U.S. Patent No. 6,484,155 B1, issued Nov. 19, 2002, filed July 21, 1999 (Ex. 1005, "Kiss").

[4] Foundation for Intelligent Physical Agents, *FIPA 97 Specification Version 1.0*, published Oct. 10, 1997 (Exs. 1006–1012, collectively "FIPA97").

[5] Cohen et al., *An Open Agent Architecture*, AAAI Technical Report SS-94-03 (1994) (Ex. 1014, "Cohen").

II. DISCUSSION

A. Legal Principles

A claim is unpatentable under 35 U.S.C. § 103(a) 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). The question of obviousness is resolved on the basis of underlying factual determinations, 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 ordinary skill in the art; and (4) when in evidence, objective indicia of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

To prevail on its challenges to Patent Owner's claims, Petitioner must demonstrate by a preponderance of the evidence that the claims are unpatentable. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). "In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable." *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify "with particularity . . . the evidence that supports the grounds for the challenge to each claim")). This burden never shifts to Patent Owner. *See Dynamic Drinkware, LLC. v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (citing *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1326–27 (Fed. Cir. 2008)) (discussing the burden of proof in *inter partes* review).

B. Level of Ordinary Skill in the Art

We begin our analysis by addressing the level of ordinary skill in the art. Petitioner's declarant, Dr. Lieberman, opines that a person of ordinary

skill in the art at the time of the invention of the '560 patent would have been someone familiar with the principles and conventions of computer science and computer networking, and also with multi-agent systems and inter-agent communication languages as documented in agent-centered literature by 1999. Ex. 1050 ¶ 32; *see* Pet. 5 (citing Ex. 1050 ¶ 32). Dr. Lieberman also testifies that a person of ordinary skill in the art may have been a graduate student in mathematics, engineering, or computer science, and may have had an advanced degree in one of these disciplines, and would also have had at least two years of experience working in the field of computer science, or a related field, and may have worked in academia, either as a professor or a graduate student, for a technology company, or for a government. Ex. 1050 ¶ 32.

Citing the testimony of its declarant, Dr. Medvidovic, Patent Owner asserts that a person of ordinary skill in the art at the time of the '560 patent's effective filing date would have had "a Bachelor's degree in Computer Science or equivalent field and at least two years of work experience in design and development of distributed systems, software specification languages, or a related area." PO Resp. 28 (citing Ex. 2032 ¶ 41). Patent Owner criticizes Petitioner's articulation of the level of ordinary skill in the art as being "vague and uncertain" due to Petitioner's and Dr. Lieberman's use of the word "may" in their proposed definition. *Id.* at 28–29. Patent Owner contends that Petitioner's proposed definition "leav[es] every aspect of the level of skill 'fluid,'" which is "particularly problematic here, where Petitioner claims that it would have been obvious to create an agent system that is very complex and advanced in its facilitation, goal processing, and inter-agent communication capacities." *Id.* at 29 (citing Ex. 2032 ¶ 44).

Petitioner responds that its proposal "realistically expresses alternatives—*i.e.*, that a Skilled Artisan would have been at least a graduate student in several relevant fields, and would have had at least two years of work experience in those fields." Pet. Reply 12; *see* Pet. 5. Petitioner also argues that Patent Owner does not articulate how any differences between the parties' proposals that would alter or even affect the outcome of this proceeding. Pet. Reply 12.

Patent Owner asserts that it has "identified how the difference between the proposals would affect this proceeding" because Patent Owner has pointed out that "it is Petitioner's burden under the law to address each *Graham* factor and Petitioner has failed to proffer a coherent level of ordinary skill in the art, [and] Petitioner's obviousness assertion fails for that reason alone." PO Sur-reply 16–17 (citing PO Resp. 29).

But Patent Owner does not identify any "meaningful differences" between the parties' proposed definitions or how "the outcome of [this proceeding] would have been different" if we adopted Patent Owner's proposed definition, as opposed to Petitioner's proposal. *See ESIP Series 2, LLC v. Puzhen Life USA, LLC*, 958 F.3d 1378, 1385 (Fed. Cir. 2020) (citing *Genzyme Therapeutic Prod. Ltd. P'ship v. Biomarin Pharm. Inc.*, 825 F.3d 1360, 1371–72 (Fed. Cir. 2016)). For example, Patent Owner does not argue the challenged claims are not unpatentable under Patent Owner's proposed definition of the level of ordinary skill in the art, nor does it identify any claim limitation that would have been taught by the asserted prior art under Petitioner's proposed definition, but *not* under Patent Owner's proposal. *See* PO Resp. 28–29; PO Sur-reply 16–17.

In our view, the parties' proposals are not materially different despite the differences in wording between them (e.g., the education level of a

Bachelor's degree in Computer Science or equivalent field under Patent Owner's proposal, as opposed to a graduate student's level of education with or without a Bachelor's degree under Petitioner's proposed definition). *See* Pet. 5; Pet. Reply 12; PO Resp. 28. For purposes of this Final Written Decision, we find no meaningful differences between the parties' respective definitions that would materially alter the outcome of this Decision. These proposals are similar for all purposes relevant to this Final Written Decision, and both are consistent with the level of ordinary skill in the art reflected in the disclosure of the '560 patent and the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995).

Nonetheless, for this Final Written Decision, we adopt Patent Owner's definition of a person of ordinary skill in the art at the time of the claimed invention. That is, a person of ordinary skill in the art at the time of the claimed invention would have had "a Bachelor's degree in Computer Science or equivalent field and at least two years of work experience in design and development of distributed systems, software specification languages, or a related area." Our analysis and conclusions in this Final Written Decision would be the same regardless of whether Petitioner's or Patent Owner's definition of the level of ordinary skill in the art is adopted.

C. Claim Construction

In an *inter partes* review, we apply the same claim construction standard that would be used in a civil action under 35 U.S.C. § 282(b), following the standard articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). 37 C.F.R. § 42.100(b) (2019). In applying such standard, claim terms are generally given their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art, at

the time of the invention and in the context of the entire patent disclosure. *Phillips*, 415 F.3d at 1312–13. "In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence." *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

In our Decision on Institution, we preliminarily interpreted several claim terms as follows:

Term	Construction
"event"	"a message or goal communicated between agents"
"event type"	"a type of an event"
"goal"	"a request for service"
"compound goal"	"a single goal expression that specifies multiple sub-goals to be performed"
"non-syntactic decomposition of the base goal"	"generation of a sub-request (sub-goal/sub-delegation) based on factors other than the syntax of how the goal was received or made"

Inst. Dec. 27–35.

The parties do not dispute the constructions of these five terms in the Patent Owner Response or Petitioner Reply. *See* PO Resp. 30–31, 43; Pet. Reply 1. Upon considering the complete record, we see no reason to deviate from our preliminary constructions and, therefore, adopt the constructions of the claim terms "event," "event type," "goal," "compound goal," and "non-syntactic decomposition of the base goal" as set forth above for this Final Written Decision.

In the Petition, Petitioner discusses constructions for several additional claim terms: "goal satisfaction plan," "layer of conversational protocol," "arbitrarily complex goal expression," "single process facilitator agent," and "parameter lists further refine the one or more events." Pet. 8–16. In addition, Petitioner discusses the constructions of "computer process(es)" and "hierarchical topology" in the Reply. Pet. Reply 6–9, 11–12. Patent Owner disputes constructions for the following terms: "goal satisfaction plan," "computer process(es)," and "hierarchical topology." PO Resp. 32–50; PO Sur-reply 2–16. We discuss constructions for the disputed terms below.

No other disputed claim terms need to be construed expressly for purposes of this Final Written Decision. *See Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (holding that only terms that are in controversy need to be construed, and "only to the extent necessary to resolve the controversy"); *see also Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (applying *Vivid Technologies.* in the context of an *inter partes* review). To the extent it is necessary for us to consider the meaning of any other claim term, we do so in the context of our unpatentability analysis.

1. "goal satisfaction plan"

The claim term "goal satisfaction plan" is recited in challenged independent claims 1 and 26 of the '560 patent. Ex. 1001, 30:7–15 (claim 1), 32:43–51 (claim 26). It is also recited in independent claim 50 of the '560 patent, not challenged in this proceeding. *Id.* at 35:1–10. Petitioner contends that a "goal satisfaction plan" is a "procedure for sending one or more requests for service to one or more agents in order to satisfy a goal." Pet. 9. Patent Owner disagrees and asserts that the claim term "goal

satisfaction plan" should be construed to mean "a plan for the satisfaction of a complex goal expression in an optimal or near-optimal manner that is consistent with any advice parameters or constraints." PO Resp. 32.

a. Claim Language

We begin our claim construction analysis by considering the language of the claims themselves. *Phillips*, 415 F.3d at 1314. Addressing the claim language of the disputed term, we note that the claim language "a goal satisfaction plan" indicates that the term's plain meaning is "a plan for satisfying a goal."

In independent claims 1 and 26, the recited "goal satisfaction plan" is further constrained by specific limitations recited in the claims. Claim 1 recites:

> a facilitating engine . . . further operable for generating a *goal satisfaction plan* associated with the base goal, wherein the goal satisfaction plan involves:
>
> using reasoning to determine sub-goal requests based on non-syntactic decomposition of the base goal and using said reasoning to co-ordinate and schedule efforts by the service-providing electronic agents for fulfilling the sub-goal requests in a cooperative completion of the base goal.

Ex. 1001, 30:5–15 (emphasis added). Claim 26 recites substantially similar language:

> a facilitating engine . . . further operable to generate a *goal satisfaction plan* associated with the compound goal, wherein the goal satisfaction plan involves:
>
> using reasoning to determine sub-goal requests based on non-syntactic decomposition of the base goal and using said reasoning to co-ordinate and schedule efforts by the service-providing electronic agents for fulfilling the sub-goal requests in a cooperative completion of the base goal.

Id. at 32:35–51 (emphasis added).

Patent Owner argues that additional claim limitations specify that the goal satisfaction plan is designed for optimal goal satisfaction and takes into account advice parameters. PO Resp. 34–35 (citing Ex. 2032 ¶ 50). Patent Owner, however, only identifies limitations that do not appear in the claims of the '560 patent. *Id.* (erroneously citing claim 1 as reciting "a suitable delegation," "dispatching . . . based on a match," and "domain-independent coordination strategies, domain-specific reasoning, and application-specific reasoning comprising rules and learning algorithms; and . . . a match between the subgoal being dispatched and the registered functional capabilities"). Therefore, Patent Owner does not show persuasively that any claim language in the '560 patent requires the narrow construction it proposes.

Thus, at least based on the claim language, it is not appropriate to limit "goal satisfaction plan" as Patent Owner contends. As discussed above, the meaning and the scope of "goal satisfaction plan" is clear on the face of each claim because claims 1 and 26 each recite specifically what a "goal satisfaction plan" includes or comprises. Therefore, absent compelling evidence to the contrary, it is neither necessary nor appropriate to limit the meaning of the term "goal satisfaction plan" beyond the plain meaning indicated by the claim language—i.e., "a plan for satisfying a goal."

b. Written Description

Patent Owner cites the following statement in the "Summary of the Invention" section:

> [e]xtreme flexibility is achieved through an architecture organized around the declaration of capabilities by service-providing agents, the construction of arbitrarily complex goals by users and service-requesting agents, and the **role of facilitators in delegating and coordinating the satisfaction of**

> **these goals, subject to advice and constraints** that may accompany them.

PO Resp. 35–36 (quoting Ex. 1001, 4:67–5:6). The very first sentence of the paragraph cited by Patent Owner states, however, "[a] first *embodiment* of the present invention discloses a highly flexible, software-based architecture for constructing distributed systems." Ex. 1001, 4:55–57 (emphasis added). Indeed, all of the portions of the Specification cited by Patent Owner, including the passage reproduced above, describe various embodiments of the '560 patent. *See* PO Resp. 35–38 (citing Ex. 1001, 4:67–5:6, 5:48–49, 15:60–62, 16:22–24, 16:34–44, 16:62–17:2, 18:60–19:6, 29:25–33, Fig. 11).

In general, "a particular embodiment appearing in the written description may not be read into a claim when the claim language is broader than the embodiment." *SuperGuide Corp. v. DirecTV Enters., Inc.*, 358 F.3d 870, 875 (Fed. Cir. 2004) (citation omitted). As discussed above, challenged independent claims 1 and 26 do not recite all of the limiting features required by Patent Owner's proposed construction of "goal satisfaction plan." Thus, unless one of the established exceptions, such as lexicography or disavowal, applies, the challenged claims are not restricted as Patent Owner contends. *See, e.g.*, *GE Lighting Sols., LLC v. AgiLight, Inc.*, 750 F.3d 1304, 1309 (Fed. Cir. 2014) ("the specification and prosecution history only compel departure from the plain meaning in two instances: lexicography and disavowal") (citation omitted). Here, Patent Owner does not argue lexicography or disavowal. Nor does Patent Owner explain any other reason why the Specification limits "goal satisfaction plan" as it contends. Thus, claim construction in this case is governed by the general principle that "a particular embodiment appearing in the written description may not be read into a claim when the claim language is broader than the

embodiment." *SuperGuide*, 358 F.3d at 875; *see also WesternGeco LLC v. ION Geophysical Corp.*, 889 F.3d 1308, 1323–24 (Fed. Cir. 2018) ("It is well established that claims are not limited to preferred embodiments, unless the specification clearly indicates otherwise." (citing *Comaper Corp. v. Antec, Inc.*, 596 F.3d 1343, 1348 (Fed. Cir. 2010) ("[T]his court has repeatedly cautioned against limiting claims to a preferred embodiment."))). Accordingly, none of the embodiments in the Specification cited by Patent Owner limits "goal satisfaction plan" as Patent Owner contends.

c. Prosecution History

Turning next to the prosecution history, Patent Owner asserts that "examples in the file history confirm the elements of 'goal satisfaction plan' reflected in Patent Owner's proposed construction." PO Resp. 40. Patent Owner argues that, during the prosecution of the application for the '115 patent (i.e., the parent of the '560 patent),

> [a]pplicant further stated that "the facilitating engine is able to use reasoning to delegate the sub-goals to service providing agents in such a way as '**to best complete the requested service request**.'…The facilitating engine is able to use reasoning to delegate the sub-goal task of roasting coffee to the service-providing agent that can roast beans in the least amount of time because the facilitating engine has reasoned that the least amount of time taken to make coffee is the best way to accomplish the base goal of making coffee." Applicant concluded that "the base goal is carried out **not by merely parsing the request into sub-goals**" but rather "the facilitating engine used reasoning to decide upon using competing message transfer agents to reminding Bob of lunch, in lieu of delegating the task to just one message transfer agent."

Id. (citing Ex. 1002, 172–73). Patent Owner argues that similar language appears in Applicant's remarks during prosecution of the '560 patent. *Id.* (citing Ex. 1120, 171–72); *see* Ex. 1120, 172 ("The reasoning includes 'one

or more of domain-independent coordination strategies, domain-specific reasoning, and application-specific reasoning comprising rules and learning algorithms.").

Similar to its arguments based on the language of the claims, Patent Owner's contentions regarding the prosecution history refer to claim language that does not appear in the claims of the '560 patent (e.g., "to best complete the requested service request" and "one or more of domain-independent coordination strategies, domain-specific reasoning, and application-specific reasoning comprising rules and learning algorithms"). Patent Owner does not explain persuasively why prosecution statements directed to language not in the claims of the '560 patent should limit the construction of "goal satisfaction plan" as Patent Owner contends.

d. Extrinsic Evidence

Patent Owner also cites the testimony of its declarant, Dr. Medvidovic, in support of Patent Owner's proposed construction of "goal satisfaction plan." PO Resp. 40–41 (citing Ex. 2032 ¶¶ 55–56, 58–63, 200). We have reviewed the cited testimony from Dr. Medvidovic, but do not find anything in his testimony that would change our analysis based on intrinsic record discussed above. *See Phillips*, 415 F.3d at 1318 (authorizing the consideration of extrinsic evidence in determining the meaning of claims but noting that it is "in general . . . less reliable than the patent and its prosecution history in determining how to read claim terms").

e. Other Arguments

The parties dispute whether Petitioner's use of "procedure" (in place of a "plan") and "sending one or more requests for service" in Petitioner's proposed construction is appropriate. *See* PO Resp. 41–43; Pet. Reply 2, 5–6; PO Sur-reply 3, 10. We need not address these arguments in detail

because, for the reasons discussed above, we see no reason to depart from the plain meaning of the term "goal satisfaction plan."

f. Conclusion

Based on the complete record and after examining the claims as a whole, the written description, and the prosecution history, we construe the term "a goal satisfaction plan" according to its plain meaning—"a plan for satisfying a goal."

2. "computer process"

The claim term "computer processes" is recited in independent claims 1 and 26 in the limitation "a distributed facilitator agent functionally distributed across at least two computer processes." Ex. 1001, 29:63–64 (claim 1), 32:26–27 (claim 26). Various dependent claims recite the term "computer process." *See, e.g.*, Ex. 1001, 30:24–27 (claim 2 reciting "the distributed facilitator agent includes a plurality of single process facilitator agents each executing within a separate computer process"). Petitioner contends that a "computer process" is "a program, a part of a program, or a list of steps to be completed by the computer." Pet. 32 (citing Ex. 1034, 383 (computer dictionary defining "process" as "[a] program or part of a program; a coherent sequence of steps undertaken by a program")). Patent Owner disagrees and asserts that a "computer process" is "an operating system process within a computer's architecture that represents one or more running programs and their activities." PO Resp. 44; *see* Ex. 2032 ¶ 69. In its Reply, Petitioner argues that because Patent Owner does not assert any different outcome based on its proposed construction, and Petitioner shows how the prior art discloses "computer processes" under either party's construction, the term need not be construed to resolve any controversy. Pet.

Reply 11–12. Patent Owner disagrees, asserting that the construction of the term affects the merits of Petitioner's arguments. PO Sur-reply 16.

The terms "computer process" and "computer processes" are recited repeatedly in the claims of the '560 patent, and many of Patent Owner's arguments responding to Petitioner's unpatentability contentions relate to claim limitations involving "computer processes." Accordingly, we construe the term "computer process" to assist us in resolving the parties' dispute regarding unpatentability.

a. Claim Language

We begin our claim construction analysis by considering the language of the claims themselves. *Phillips*, 415 F.3d at 1314. Patent Owner notes that the term "computer process" appears in the claims in the context of "at least two" or "separate" computer processes relating to a distributed facilitator agent. PO Resp. 44–45 (citing claims 1, 2, 20, and 21). Patent Owner argues that in the context of those claims, having a distributed facilitator agent as a separate "program" (under Petitioner's construction) does not necessarily allow for the degree of separation contemplated by the claims because multiple programs may be run on the same processes. *Id.* at 45 (citing Ex. 2032 ¶ 71). Petitioner does not reply to this argument. *See* Pet. Reply 11–12.

Patent Owner essentially argues, with the support of Dr. Medvidovic, that a "process" is not limited to a "program" because multiple programs may be executed in the same computer process. Ex. 2032 ¶ 71. Patent Owner does not explain persuasively how claim language involving the distributed facilitator agent and separate computer processes necessarily suggests that a process is not a program.

The same paragraph in Dr. Medvidovic's declaration also states that "[a] process is not [a] program because a program is a static notion . . . while a process is what actually occurs in a computer when a program is executed." *Id.* The claim language does provide some support for the concept that a computer process involves running or executing a program, which is part of Patent Owner's proposed construction. For instance, claim 20 requires "a planning component *executing* within a first computer process and an execution component *executing* within a second computer process." Ex. 1001, 31:50–53 (emphases added).

b. Written Description

As Patent Owner points out, the written description of the '560 patent does not use the term "computer process." PO Resp. 45. Instead, it describes a facilitator agent with functionality "distributed across several different computing platforms." *Id.* (quoting Ex. 1001, 6:31–33). Patent Owner cites a passage describing an embodiment allegedly corresponding to dependent claims 20 and 21 that explains some benefits of separating the facilitator agent's planning and execution components. *Id* at 45–46 (quoting Ex. 1001, 29:8–38). As with the claim language, Patent Owner does not persuasively show how this description informs the construction of "computer process."

c. Extrinsic Evidence

Petitioner's proposed construction is based directly on a computer dictionary definition of a "process" as "[a] program or part of a program; a coherent sequence of steps undertaken by a program." Ex. 1034, 383. Patent Owner and Dr. Medvidovic cite an electronics dictionary providing one definition of a "process" as "[t]he basic unit of computation within an operating system." Ex. 2070, 590; *see* PO Resp. 46; Ex. 2032 ¶ 69. They

also cite a general purpose dictionary defining "process" in the context of computers as "to carry out operations on (data or programs)." Ex. 2071, 1542; *see* PO Resp. 46; Ex. 2032 ¶ 69. Dr. Medvidovic explains that a process is not the same thing as a program because, for example, a process can run many programs or parts of programs. Ex. 2032 ¶¶ 71–72.

d. Analysis

In the context of the claim language, the only intrinsic evidence that sheds light on the meaning of "computer process," we find Patent Owner's extrinsic evidence in the form of Dr. Medvidovic's testimony and dictionary definitions to be more persuasive than Petitioner's proffered dictionary definition. Thus, we agree with Patent Owner that a "computer process" is a process that runs or executes one or more computer programs. We are not persuaded that the other portions of Patent Owner's proposed construction are necessary or materially affect the meaning of the claim term.

For these reasons, based on the complete record, including the intrinsic and extrinsic evidence of record, we construe the term "computer process" as "a process that runs or executes one or more computer programs."

3. "hierarchical topology"

The claim term "hierarchical topology" is recited in dependent claims 14 and 39 in the limitation "wherein the distributed facilitator agent is formed in a hierarchical topology." Ex. 1001, 31:24–26, 33:49–51. Claims 15 and 40 further recite "wherein the hierarchical topology includes a top level facilitator agent and at least one other facilitator agent registered within the top level facilitator agent." *Id.* at 31:27–30, 33:52–55.

Petitioner asserts that the ordinary meaning of "hierarchical topology" is "a type of organization that, like a tree, branches into more specific units."

Pet. 61 (citing Ex. 1034, 232 (computer dictionary defining "hierarchy" as "[a] type of organization that, like a tree, branches into more specific units, each of which is 'owned' by the higher-level unit immediately above")). Patent Owner disagrees and asserts that the claim term "hierarchical topology" should be construed as "an arrangement of constituent parts according to their rank." PO Resp. 47.

a. Claim Language

Beginning with the claim language, Patent Owner argues that "[t]he existence of a 'top level' facilitator [in claim 15] makes it clear that there are multiple levels to the hierarchy where at least one facilitator has ownership over another." PO Resp. 48. Petitioner contends that a "tree-like shape would . . . allow for 'multiple levels' of facilitators." Pet. Reply 8 (citing Ex. 1141, 1). Petitioner also contends that Patent Owner's argument that "one facilitator has ownership over another" is inconsistent with the claims. *Id.* In its Sur-reply, Patent Owner does not further urge that the claim term has an "ownership" aspect. *See* PO Sur-reply 11–14.

Both parties appear to agree that a "hierarchical topology" includes multiple levels. *See* PO Resp. 48; Pet. Reply 8. We agree that in view of the language of claim 15 in which a hierarchical topology includes a "top level" facilitator agent and another facilitator agent, the claim term "hierarchical topology" contemplates multiple levels. The claim language, however, does not suggest that one facilitator agent must have "ownership" over another.

b. Written Description

Turning to the written description of the '560 patent, Patent Owner cites a description of Figure 15 as a "hierarchical topology" in which "a top level Facilitator manages collections of both client agents 1508 and other

Facilitators, 1504 and 1506." PO Resp. 48 (quoting Ex. 1001, 28:60–65). Figure 15 of the '560 patent is reproduced below:

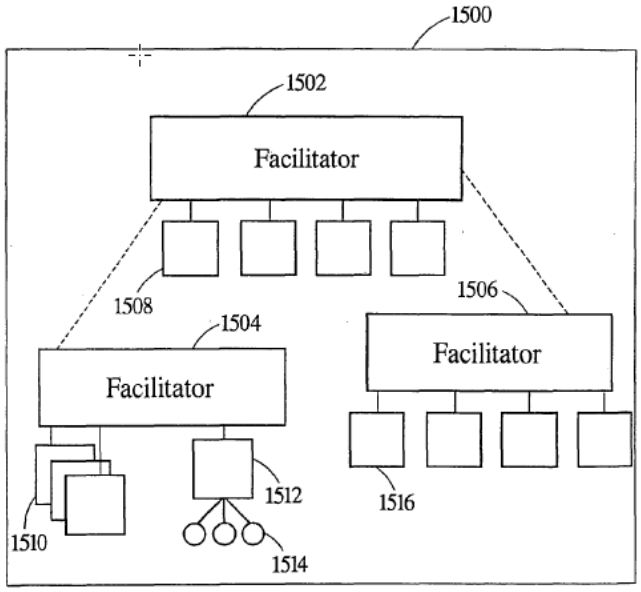


Fig. 15

Ex. 1001, Fig. 15. As shown in Figure 15 above, Facilitator 1502 is a top level facilitator and manages client agents 1508 and other facilitators 1504 and 1506. *Id.* at 28:60–65. Consistent with the claim language, Figure 15 illustrates a hierarchical topology of facilitator agents at multiple levels.

c. Extrinsic Evidence

Each party submits one or more dictionary definitions in support of its respective proposed construction. As noted above, Petitioner cites a definition of "hierarchy" but omits the portion providing that each unit "is 'owned' by the higher-level unit immediately above." Pet. 61 (citing Ex. 1034, 232). Patent Owner combines definitions of "hierarchical" and "topology" to obtain its proposed construction. PO Resp. 49 (citing Exs. 2070–72). Patent Owner argues that its construction is consistent with the patent's references to a top level facilitator "because it allows varying

levels or rank among the facilitators." *Id.* (citing Ex. 2032 ¶ 79). Thus, Patent Owner equates "level" with "rank."

d. Analysis

Ultimately, the parties' proposed constructions of "hierarchical topology" do not differ significantly. Both parties agree that the term encompasses the concept of units or parts at different levels. Patent Owner's use of the word "arrangement" takes into account the "topology" aspect of "hierarchical topology." Based on the intrinsic evidence (claims and written description) and extrinsic evidence (dictionary definitions), and combining relevant portions of the parties' proposed constructions, we construe the claim term "hierarchical topology" as "an arrangement of units or parts having multiple levels."

D. Prior Art Overview

We provide an overview of Kiss and FIPA97, the main prior art references asserted against the challenged claims, to provide context for the discussion that follows.

1. Kiss (Ex. 1005)

Kiss describes "a knowledge management system that supports inquiries of distributed knowledge resources," in which "[i]nteraction between a user and the knowledge resources is mediated by a collection of cooperative intelligent agents." Ex. 1005, 2:44–45, 2:46–48. Figure 1,

reproduced below, is a conceptual overview of one embodiment of a knowledge management system described in Kiss:

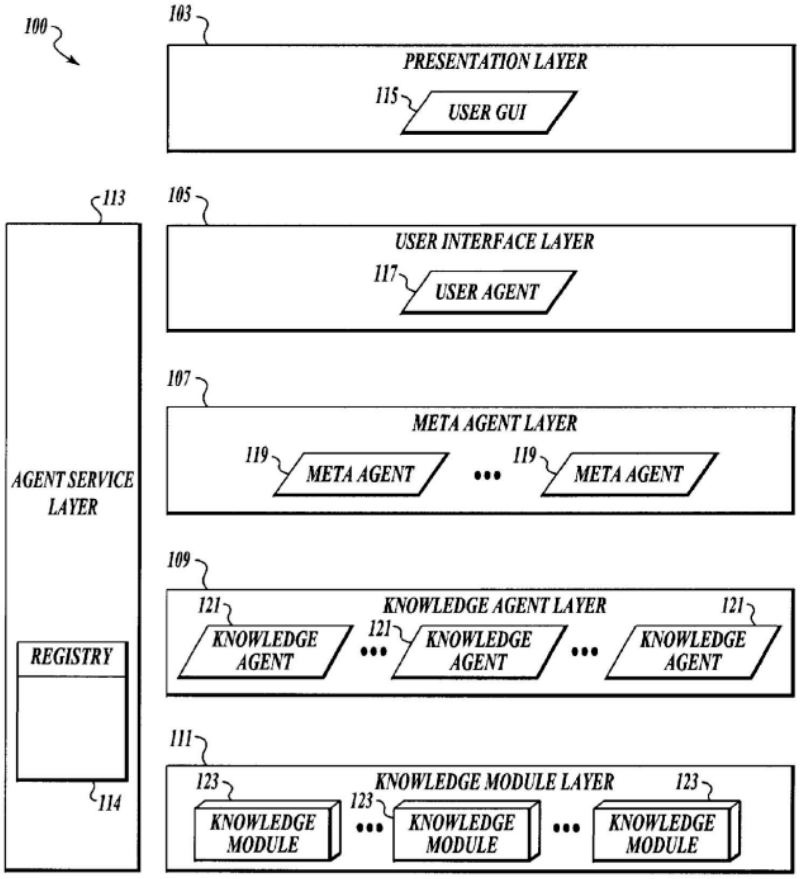


Fig. 1

Id. at 5:1–3. As shown in Figure 1 above, Kiss's knowledge management system 100 includes presentation layer 103, user interface layer 105, meta agent layer 107, knowledge agent layer 109, knowledge module layer 111, and agent service layer 113. *Id.* at 5:3–7. Each of user interface layer 105, meta agent layer 107, and knowledge agent layer 109 in Kiss's hierarchical knowledge management system includes one or more intelligent agents responsible for one portion of the distributed problem-solving inferencing process. *Id.* at 3:17–22.

Meta agent layer 107 includes one or more meta agents 119 that are responsible for analyzing queries or problem formulations provided by user interface layer 105 and constructing a plan for finding a solution to the problem. *Id.* at 5:20–24. Each meta agent 119 contains knowledge of problem solving methodologies and distributed inferencing procedures. *Id.* at 5:24–26. More specifically, "meta agent 119 is responsible for formulating a dynamic 'solution plan' for the distributed inferencing to be performed by the system 100, and allocates tasks to the knowledge agent layer 109 in furtherance of the solution plan." *Id.* at 5:33–37. "The meta agent dynamically assesses the problem and its solution states (between users and the knowledge agents 121), divides the problem, and assigns the appropriate knowledge agents 121 to work on the solution." *Id.* at 8:37–40.

Knowledge agent layer 109 includes multiple knowledge agents 121, each of which may be associated with one or more knowledge modules 123 in knowledge module layer 111. *Id.* at 6:31–35. Each knowledge agent 121 is configured to accept from meta agent 119 a problem statement and convert that problem statement into a format appropriate for the knowledge module 123 associated with the knowledge agent 121. *Id.* at 6:35–38. Knowledge agents register their capabilities and interests with registry 114 in agent service layer 113. *Id.* at 3:37–42, 12:18–20.

Kiss describes various distributed inferencing schemes that may be used to address problems to be solved. *Id.* at 7:20–8:19. One scheme uses a "planner-based dynamic inferencing approach." *Id.* at 7:29–30. In this scheme, "inferencing proceeds within an agent until an intermediate goal is achieved." *Id.* at 7:30–32. The next step of the inferencing process begins after the intermediate goal is achieved, and inferencing continues in a stepwise manner until the initial problem is solved. *Id.* at 7:35–37. "[M]eta

agent 119 manages the dynamic distributed inferencing scheme, using an agenda mechanism or commitment table to assign and schedule portions of the inferencing procedures to the participating agents during execution." *Id.* at 7:37–41.

Other distributed inferencing schemes disclosed by Kiss include a "problem-specific rule network," as well as "linear," "partitioned," "replicated," "real time," "preemptive," and "qualitative" inferencing modes. *Id.* at 7:23–28, 7:47–8:16. In the partitioned inference scheme, for example, the "user query or problem domain is easily divided into distinct subfields, phases or sub-problems that share limited initial data." *Id.* at 7:53–55.

Figures 8–20 of Kiss (not reproduced herein) illustrate an example of using distributed inferencing to solve the problem "what is the effect of increasing sales by 20%?" *Id.* at 12:21–14:30. As shown in Figure 9, the meta agent begins formulating a solution plan by asking the agent service layer to identify a knowledge agent that has registered a capability to answer a question related to "sales." *Id.* at 12:29–32. Once the service layer identifies a sales agent, the meta agent pushes a task onto an agenda to query the sales agent for the effect of increasing sales by 20% and then issues that query. *Id.* at 12:32–36. Distributed inferencing proceeds with the meta agent pushing tasks associated with agent queries onto the agenda and removing them after they are completed, until the sales agent has enough information to address the user's original query. *Id.* at 12:37–14:30.

2. FIPA97 (Exs. 1006–1012)

FIPA97 (Exs. 1006–1012) is a specification created by the Foundation for Intelligent Physical Agents (FIPA) beginning in 1996 with an official release date in October 1997. Ex. 1006, Cover, iv (identifying specification as FIPA 97 Version 1.0 issued on October 10, 1997). FIPA97 is a

"specification of basic agent technologies that can be integrated by agent systems developers to make complex systems with a high degree of interoperability." *Id.* at v. The specification comprises seven parts: three parts for basic agent technologies (Parts 1–3 relating to agent management, agent communication language, and agent/software integration) and four informative applications providing examples of how the technologies can be applied (Parts 4–7 describing personal travel assistance, personal assistant, audio-visual entertainment, and broadcasting and network management and provisioning applications). *Id.* at v–vii; *see generally* Exs. 1006–1008 (Parts 1–3); Exs. 1009–1012 (Parts 4–7).

Part 1 of FIPA97, the FIPA Agent Management specification (FIPA AMS) "provides a normative framework within which FIPA compliant agents can exist, operate and be managed." Ex. 1006, vi. The FIPA AMS model is defined through the intersection of Agent Platforms (APs) and Agent Domains (ADs), as illustrated in Figure 2 below. *Id.* at 10, Fig. 2.

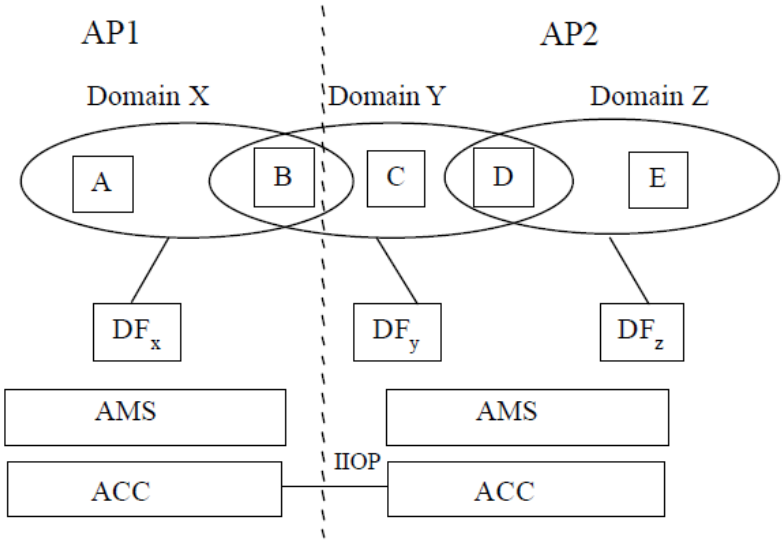


Figure 2 — Agent Platform Reference Model Fragment

Each AD in Figure 2 of FIPA Part 1, above, is defined by a Directory Facilitator (DF). *Id.* at 6. Agents register their services with DFs. *Id.* For

example, agents A and B have registered their services with DF_x, agents B, C, and D have registered their services with DF_y, and agents D and E have registered their services with DF_z. *Id.* at 10.

Part 2 of FIPA97 describes an "Agent Communication Language (ACL)" that "is based on speech act theory: messages are actions, or communicative acts, as they are intended to perform some action by virtue of being sent." Ex. 1007, ix. The ACL specification "consists of a set of message types and the description of their pragmatics, [i.e.,] the effects on the mental attitudes of the sender and receiver agents." *Id.* The ACL specification "also provides the normative description of a set of high-level interaction protocols, including requesting an action, contract net and several kinds of auctions." *Id.*

Part 2 of FIPA97 discloses a "simple abstract model of inter-agent communication" including ACL messages having components as illustrated in Figure 1 below. *Id.* at 7, 12.

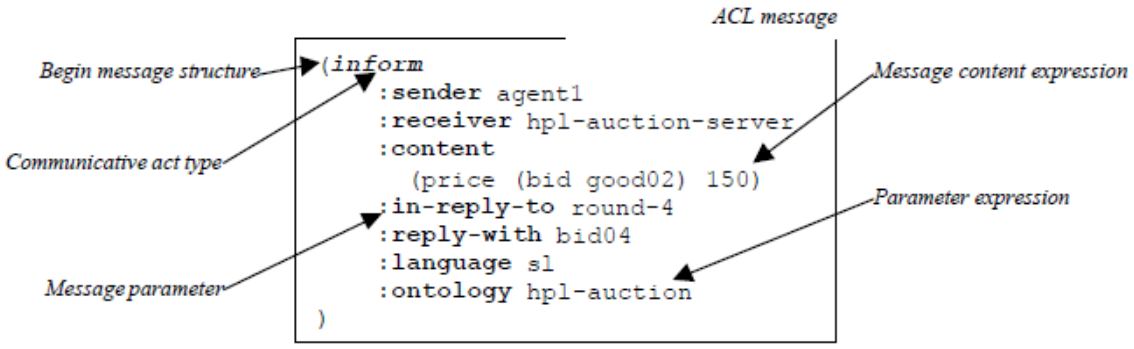


Figure 1 — Components of a message

Figure 1, above, illustrates the main structural elements of an ACL message in FIPA97. *Id.* at 12. "The first element of the message is a word which identifies the communicative act being communicated, which defines the principal meaning of the message." *Id.* Each ACL message contains a set of

one or more parameters, including a mandatory "*:receiver*" parameter that identifies the intended recipient of the message. *Id.* at 13.

Petitioner asserts that FIPA97 was made publicly available as a single document and relies on FIPA97 as a single printed publication for purposes of 35 U.S.C. § 102(a). *See* Pet. 21; Pet. Reply 26. As discussed below in the section addressing the status of FIPA97 as a printed publication, FIPA approved and released FIPA 97 Version 1.0 as a single specification. *See infra* § II.F; Ex. 1026, 5; Ex. 1050 ¶ 165. Thus, although sometimes the seven parts are referred to as "documents," a person of ordinary skill in the art would have considered FIPA97 to be a single reference. *See* Ex. 1050 ¶¶ 164–165. Patent Owner does not dispute that FIPA97 is one reference for purposes of §§ 102 and 103. *See* PO Resp. 138–140.[6] Because FIPA and skilled artisans considered FIPA97 to be a single specification, we agree that FIPA97 constitutes a single prior art reference, and we treat it as such for purposes of our unpatentability analysis.

E. Prior Art Status of Kiss

Before reaching the merits of Petitioner's obviousness contentions, we address as a threshold issue whether Kiss (Ex. 1005) qualifies as prior art in this proceeding. Petitioner has the burden of persuasion to prove unpatentability by a preponderance of the evidence. *Dynamic Drinkware,* 800 F.3d at 1378. Petitioner has the initial burden of production to show that a reference is prior art to the challenged claims under a relevant section

[6] Contrary to Patent Owner's argument (PO Resp. 138–140), Petitioner did not argue in another case, and the Board did not find, that FIPA97 is seven separate prior art references. *See Microsoft Corp. v. IPA Techs. Inc.*, IPR2019-00838, Paper 13 at 3–5 (PTAB Apr. 3, 2020) (Decision Denying Petitioner Request for Rehearing), Paper 10 at 4–9 (Petitioner's Request for Rehearing, filed Dec. 6, 2019).

of 35 U.S.C. § 102. *See id.* at 1379. Once Petitioner has met that initial burden, the burden of production shifts to Patent Owner to argue or produce evidence that the asserted reference is not prior art to the claims. *Id.* at 1380. Once Patent Owner has met that burden of production, the burden of production returns to Petitioner. *Id.*

The effective filing date of the '560 patent is January 5, 1999, the filing date of the '115 patent, which is the parent of the '560 patent. Ex. 1001, code (63). Kiss is a United States patent that arose from an application filed July 21, 1999, claiming the benefit of priority to a provisional application filed July 21, 1998. Ex. 1005, codes (22), (60).

Petitioner asserts that Kiss is prior art to the '560 patent under 35 U.S.C. § 102(e) because Kiss is entitled to the benefit of priority to the filing date of its provisional application (Ex. 1036, "Kiss Provisional Application"). Pet. 14–18. "A reference patent is only entitled to claim the benefit of the filing date of its provisional application if the disclosure of the provisional application provides support for the claims in the reference patent in compliance with § 112, ¶ 1." *Dynamic Drinkware*, 800 F.3d at 1381.

In *Ex parte Mann*, the Board determined that "under *Dynamic Drinkware*, a non-provisional child [application] can be entitled to the benefit of a provisional application's filing date if the provisional application provides sufficient support for *at least one claim* in the child." 2016 WL 7487271, at *6 (PTAB Dec. 21, 2016) (emphasis added) (discussing whether *Dynamic Drinkware* requires "support in the provisional . . . for all claims, any claim, or something in between"). In addition, the Board determined that a "subject matter test" is also required—that is, "the [party claiming priority] also must show that the subject matter relied upon in the non-

provisional is sufficiently supported in the provisional application [and that t]his subject matter test is in addition to the comparison of claims required by *Dynamic Drinkware*." *Id*. at *5.

Recognizing these requirements, Petitioner asserts that "each element of [claim 1 of Kiss] has written description support in the Kiss Provisional," providing detailed citations to the supporting disclosures from the Kiss Provisional Application for each limitation of claim 1 of Kiss. Pet. 14–16. Addressing the "subject matter test," Petitioner asserts that "the teachings that Petitioner relies upon were carried forward from the Kiss Provisional to Kiss" and provides a detailed mapping of the relied-upon portions of Kiss to the corresponding portions of the Kiss Provisional Application. *Id.* at 16-18.

In its Preliminary Response, Patent Owner asserted that Kiss is not entitled to the priority date of its provisional application. Prelim. Resp. 65. In the Institution Decision, we determined, based on the preliminary record, the argument and evidence presented by Patent Owner were insufficient to shift the burden of production back to Petitioner. Inst. Dec. 25. We noted, however, that a final determination on this particular issue would be made based on a full record developed during the course of trial. *Id.*

During the trial, Patent Owner did not present any argument or evidence on this issue, nor did it dispute that Kiss qualifies as prior art in this proceeding. *See generally* PO Resp.

Based on the complete record, we determine that Petitioner has established by a preponderance of the evidence that Kiss is prior art to the '560 patent under 35 U.S.C. § 102(e) because Kiss is entitled to the benefit of priority to the filing date of its provisional application.

F. Status of FIPA97 as a Prior Art Printed Publication

We also must determine as a threshold matter whether FIPA97 (Exs. 1006–1012) is a prior art printed publication under 35 U.S.C. § 102(a) or § 102(b). *See* Pet. 21–23; PO Resp. 59–78. Petitioner bears the burden of establishing by a preponderance of the evidence that FIPA97 is a printed publication. *See* 35 U.S.C. § 316(e); *Nobel Biocare Servs. AG v. Instradent USA, Inc.*, 903 F.3d 1365, 1375 (Fed. Cir. 2018); *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29 at 11 (PTAB Dec. 20, 2019) (precedential) (citing *Nobel Biocare*, 903 F.3d at 1375). For purposes of instituting an *inter partes* review we accepted Petitioner's contention, unchallenged in Patent Owner's Preliminary Response, that FIPA97 was available as prior art as of October 1997, more than one year before January 5, 1999, the effective filing date of the '560 patent. Inst. Dec. 8 n.3 (citing Pet. 21–23 (citing Ex. 1049 ¶¶ 6, 11, 12, 20–34; Ex. 1050 ¶¶ 143, 146–149)). Patent Owner, however, challenges that contention in its Patent Owner Response, and the parties further address the issue in Petitioner's Reply and Patent Owner's Sur-reply. *See* PO Resp. 59–78; Pet. Reply 15–21; PO Sur-reply 20–31.

The determination of whether a document is a "printed publication" under 35 U.S.C. § 102 "involves a case-by-case inquiry into the facts and circumstances surrounding the reference's disclosure to members of the public." *In re Klopfenstein*, 380 F.3d 1345, 1350 (Fed. Cir. 2004). "Because there are many ways in which a reference may be disseminated to the interested public, 'public accessibility' has been called the touchstone in determining whether a reference constitutes a 'printed publication' . . . ." *Jazz Pharm., Inc. v. Amneal Pharm., LLC*, 895 F.3d 1347, 1355 (Fed. Cir. 2018) (quoting *In re Hall*, 781 F.2d 897, 898–99 (Fed. Cir. 1986)). A

reference is considered publicly accessible if it was "disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art, exercising reasonable diligence, can locate it.'" *Id.* at 1355–56 (quoting *In re Wyer*, 655 F.2d 221, 226 (CCPA 1981)).

In the discussion below, we begin with background information regarding FIPA and an overview of the evidence submitted by Petitioner in support of its contention that FIPA97 was publicly accessible in October 1997. The evidence includes extensive testimony from Dr. Finin, a professor who has personal knowledge of FIPA's activities and the development process of FIPA97. *See* Ex. 1049 ¶¶ 1–55 (Finin Decl.). Dr. Finin was one of the first two FIPA Fellows invited to provide "high quality and independent advice to FIPA." *Id.* ¶ 18 (quoting Ex. 1076, 1); Ex. 1025, 1; Ex. 1062, 1. The evidence also includes testimony from Petitioner's expert witness, Dr. Lieberman, and more than sixty documentary exhibits on which Petitioner relies to show that FIPA97 was publicly accessible in late 1997 and early 1998. *See* Ex. 1050 ¶¶ 142–149 (Lieberman Decl.); Exs. 1021–33, 1047, 1051–1105.

After providing an overview of the evidence, we consider the parties' arguments as to whether FIPA97 was publicly accessible before the January 5, 1999, critical date. For the reasons explained below, we determine that Petitioner has met its burden to show that FIPA97 was publicly accessible before the critical date.

1. FIPA

FIPA was a non-profit association based in Geneva, Switzerland, created to promote agent-based technology and develop open standards. Ex. 1006, iv (FIPA 97 Specification Version 1.0, Part 1, Foreword);

Ex. 1049 ¶ 3. Founded in 1996, FIPA's membership included numerous technology companies, educational institutions, and governmental entities. Ex. 1049 ¶ 3. As of October 1997, FIPA had thirty-five corporate members representing twelve countries.[7] Ex. 1006, iv. According to FIPA documentation, membership was "open to any corporation and individual firm, partnership, governmental body or international organi[z]ation without restriction." *Id.* FIPA stated its intent "to make the results of its activities available to all interested parties." *Id.* Throughout its tenure, FIPA produced standards designed to promote and advance agent-based technology. Ex. 1049 ¶ 3. In 2005, FIPA was incorporated into the Institute of Electrical and Electronics Engineers (IEEE) as one of its standards committees. *Id.*

2. Development of FIPA97

The process of drafting the FIPA 97 specification began with FIPA's first meeting in London in April 1996. Ex. 1049 ¶ 6; Ex. 1058 (Main results of London meeting); Ex. 1066 (Resolutions of London meeting). Representatives from twenty-six companies and organizations attended. Ex. 1066, 1. At the meeting, the members agreed on FIPA's mission, drafted statutes and operational principles, and produced a work plan for a specification that would become FIPA 97. Ex. 1058, 1; Ex. 1066, 1–3; Ex. 1049 ¶ 6. The work plan set a December 1997 target for producing a first completed specification. Ex. 1066, 2–3; Ex. 1049 ¶ 7.

FIPA subsequently held several meetings in 1996 and 1997. At the second meeting in June 1996 in Yorktown Heights, NY, FIPA approved

[7] The corporate members included Alcatel, British Telecommunications, Deutsche Telekom, France Telecom, Hitachi, Hewlett-Packard, IBM, NEC, NTT, Nortel, Siemens, and Toshiba. *See* Ex. 1095, 22.

several documents, including a framework for FIPA activity and a list of requirements for FIPA-specified agent capabilities. Ex. 1067, 1 (Resolutions of Yorktown meeting); Ex. 1060, 1 (Results of Yorktown meeting); Ex. 1049 ¶ 9. At the third meeting in October 1996 in Tokyo, FIPA approved a final work plan calling for production of a FIPA specification in October 1997. Ex. 1049 ¶ 11; Ex. 1070, 1 (work plan); Ex. 1023 (Results of Tokyo meeting). Also at the Tokyo meeting, FIPA produced its First Call for Proposals, which outlined in detail three technology parts (corresponding to Parts 1–3 of FIPA 97) and four application parts (corresponding to Parts 4–7 of FIPA 97). Ex. 1069, 1–27 (First Call for Proposals); Ex. 1049 ¶ 12.

In 1997, FIPA began to produce draft specifications. At the fourth meeting in January 1997 in Turin, Italy, FIPA publicly released drafts of Parts 1–4 and posted them on the FIPA home page (http://drogo.cselt.stet.it/fipa). Ex. 1021, 1 (Results of Turin meeting); Ex. 1049 ¶ 13. Additionally, FIPA released a Second Call for Proposals at the Turin meeting. Ex. 1071, 1–3 (Second Call for Proposals); Ex. 1049 ¶ 13. At the fifth meeting in April 1997 in Reston, VA, FIPA produced drafts of Parts 1–7, which were publicly released and posted on the FIPA home page. Ex. 1024 (Results of Reston meeting); Ex. 1061 (Resolutions of Reston meeting); Ex. 1049 ¶ 17. At the sixth meeting in June 1997 in Cheju Island, South Korea, FIPA publicly released revised drafts of Parts 1–7 and posted them on the FIPA home page. Ex. 1025, 1 (Results of Cheju meeting); Ex. 1062, 5 (Resolutions of Cheju meeting); Ex. 1049 ¶ 19. According to Dr. Finin, the Reston Draft and Cheju Draft were substantially complete versions of what would become FIPA 97. Ex. 1049 ¶¶ 17, 19.

Dr. Finin testifies that news of FIPA and its standardization efforts "spread quickly throughout the relatively small community of software agent researchers." Ex. 1049 ¶ 8. For instance, the AgentWeb website, "a meeting place for researchers in agent-based technology from 1995–2000," was home to a "Software Agents" mailing list and a newsletter that had more than 1,300 subscribers in 1996. *Id.*; Ex. 1089, 5. Dr. Finin was "the founder, author, and a subscriber" of the AgentWeb newsletter. Ex. 1049 ¶ 8. The widely distributed AgentWeb newsletters announced upcoming FIPA meetings, reported results of previous meetings, including calls for proposals, and provided links to the specification drafts posted on the FIPA home page. *See id.* ¶¶ 8, 10, 12, 14, 17, 19.

For example, the AgentWeb newsletter dated May 11, 1996, announced the upcoming FIPA June 1996 Yorktown meeting, described as the "FIPA Opening Forum." Ex. 1090, 5; Ex. 1049 ¶ 8. The purpose of the meeting, as stated in the newsletter, was to "refine the list of basic agent capabilities candidate for FIPA specification; compile a first list of agent capabilities intended for specification by end 1997; and establish the first working groups." Ex. 1090, 5. Likewise, the AgentWeb newsletter dated August 12, 1996, advertised the FIPA October 1996 Tokyo meeting. Ex. 1088, 1; Ex. 1049 ¶ 10. Thereafter, the AgentWeb newsletter dated October 14, 1996, publicized the Call for Proposals issued at the October 1996 Tokyo meeting and provided the deadline for submission of proposals to be considered at the Turin meeting in January 1997. Ex. 1087, 1; Ex. 1049 ¶ 12. FIPA had decided that respondents who submitted proposals would be invited to the January 1997 meeting to present their proposals even if they were not FIPA members. Ex. 1023, 1; *see* Ex. 1069, 27.

Once FIPA began to produce drafts of the specification, AgentWeb newsletters announced those drafts and provided links to access them. The AgentWeb newsletter dated February 2, 1997, reported that "[i]nitial specifications for three technology parts (Agent Management, Agent Communication and Agent/Software Interaction) and one application part (Personal Travel Assistance) have been produced" at the recent Turin meeting. Ex. 1091, 1; Ex. 1049 ¶ 14. The newsletter included a freely accessible and public link to access the draft. Ex. 1049 ¶ 14 (citing Ex. 1091, 1–2). It also indicated that drafts of the remaining three specification parts would be generated at the FIPA meeting to be held in April 1997 in Reston. Ex. 1091, 1–2. A subsequent AgentWeb newsletter dated April 13, 1997, advertised the upcoming Reston meeting and contained links to information about the meeting on the FIPA website. Ex. 1092, 3; Ex. 1049 ¶ 17.

On May 5, 1997, following the Reston meeting, an AgentWeb newsletter reported that attendees of that meeting produced a revised draft including all seven parts of the specification. Ex. 1093, 2; Ex. 1049 ¶ 17. The newsletter contained individual public links to the seven parts and invited "both members and non-members" to comment, providing an email address for submission. Ex. 1093, 2; Ex. 1049 ¶ 17. Additionally, the newsletter announced the dates and locations of the next two meetings—the June 1997 Cheju meeting and the seventh meeting to take place in Munich on October 6–10, 1997. Ex. 1093, 2. Similarly, the AgentWeb newsletter dated June 30, 1997, announced that the Cheju meeting resulted in revised versions of the FIPA specification documents and provided direct links to the seven parts. Ex. 1094, 1–2; Ex. 1049 ¶ 19. Again, the newsletter stated that FIPA invited comments and that non-members making substantial

comments would be invited to attend the October 1997 Munich meeting. Ex. 1094, 2. Dr. Finin was among those who submitted comments on the Cheju draft. Ex. 1073; Ex. 1049 ¶ 20.

Meanwhile, the AgentWeb Software Agents mailing list also provided information regarding FIPA's efforts to the community of software agent researchers. *See* Ex. 1049 ¶ 8. Dr. Finin was an organizer of and contributor to the Software Agents mailing list. *Id.* On May 2, 1996, a posting to the mailing list referenced the upcoming June 1996 FIPA meeting in Yorktown Heights, New York. Ex. 1079, 1; Ex. 1049 ¶ 8. Members of the Software Agents mailing list posted comments regarding the Turin draft after it was released publicly. Exs. 1078, 1081, 1082; *see* Ex. 1049 ¶¶ 14–15. Dr. Finin was among those who shared their thoughts. *See* Ex. 1082; Ex. 1049 ¶ 15. A posting after the Reston meeting included a public and open link to access the Reston draft and invited comments from the mailing list. Ex. 1083, 1; Ex. 1049 ¶ 17.

3. Public Release of FIPA97

FIPA's seventh meeting took place in Munich on October 6–10, 1997. Ex. 1026 (Resolution of Munich meeting); Ex. 1049 ¶ 20. At this meeting, FIPA incorporated final edits and comments and approved the FIPA 97 specification for publication. Ex. 1026, 1, 5; Ex. 1049 ¶ 20. The specification as approved at the meeting was called "FIPA 97 ver. 1.0," or FIPA 97 Version 1.0. Ex. 1026, 5. Working groups for various parts of the specification were given about one month to check for consistency and make minor edits. *Id.* at 2; Ex. 1049 ¶ 20.

An "initial" version of FIPA 97 Version 1.0, approved at the Munich meeting and dated October 10, 1997, was posted to the FIPA website, housed at the time at http://drogo.cselt.stet.it/fipa. Ex. 1049 ¶¶ 20–21.

According to Dr. Finin, the specification documents were available online and free for anybody to access by sometime in October 1997. *Id.* ¶ 21. On November 18, 1997, an AgentWeb newsletter announced completion of FIPA 97 Version 1.0 and its publication on the FIPA website. Ex. 1086, 1–2; Ex. 1049 ¶ 21. The newsletter provided individual, direct links to the seven parts of the specification on the FIPA website. Ex. 1086, 1–2. The links were not password protected and were open to the public without a requirement for secrecy or confidentiality. Ex. 1049 ¶ 21. As with the earlier AgentWeb newsletters, the newsletter containing links to FIPA 97 Version 1.0 was sent to more than 1,300 subscribers. *Id.*

Dr. Finin testifies that in late 1997, "a few weeks after the Munich meeting," he accessed the approved FIPA 97 Version 1.0 posted on the FIPA website. *Id.* ¶¶ 20–21. He specifically recalls accessing the documents in late 1997 to review the first major work product of FIPA and to prepare for FIPA's upcoming January 1998 meeting in Palo Alto, which he attended. *Id.* ¶ 21 (citing Ex. 1074). Dr. Lieberman also testifies that he recalls FIPA 97 Version 1.0 being publicly available on the FIPA website throughout late 1997 and early 1998 and that he accessed it in late 1997 as a member of the interested public. Ex. 1050 ¶ 146.

The release of FIPA 97 Version 1.0 was well publicized in the weeks after the Munich meeting. Ex. 1049 ¶ 22. For example, on October 20, 1997, the EETimes featured an article reporting FIPA's approval of the FIPA 97 specification. Ex. 1095, 22; *see* Ex. 1049 ¶ 22. The article was based on an interview with Leonardo Chiariglione, the president of FIPA. Ex. 1095, 22. The article described the seven parts of the specification: "The first three parts cover different aspects of agent behavior: agent management; agent communication; and agent-software interaction. The

four remaining parts, which cover application areas, . . . are: personal travel assistance; personal assistant; audio-visual entertainment and broadcast; and network provision and management." *Id.* After describing FIPA's plans for 1998, including testing of FIPA 97 Version 1.0 to provide input for a further round of standardization, the article referred readers to the FIPA website for information regarding the released specification: "CSELT[8] maintains extensive information on FIPA's activities at www.cselt.stet.it/fipa."[9] *Id.* (emphasis omitted). It concluded with a quote from Dr. Chiariglione regarding the specification's public availability: "'It is our policy to make the standard freely available over the Internet,' Chiariglione said. 'FIPA will retain the copyright but it will be free for others to use.'" *Id.*

The November-December 1997 issue of IEEE Internet Computing also announced the release of the FIPA 97 specification: "The Foundation for Intelligent Physical Agents, a non-profit organization established to promote emerging agent-based applications, has released its first specification. Named FIPA 97, the specification will provide a benchmark for interoperable products." Ex. 1096, 93; Ex. 1049 ¶ 22. The news brief directed readers to the FIPA website for the text of the specification. Ex. 1096, 93 ("The text is available at http://drogo.cselt.stet.it.fipa/."[10]); Ex. 1049 ¶ 22.

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[8] Centro Studi e Laboratori Telecommunicazioni, Dr. Chiariglione's employer at the time. *See* Ex. 1095, 22.

[9] The record suggests this website (http://www.cselt.stet.it/fipa) was a mirror of the FIPA website (http://drogo.cselt.stet.it/fipa) in 1997. *See* Ex. 1049 ¶ 22; Ex. 1095, 22; Tr. 94:11–14.

[10] The URL provided in the article contains a typographical error. *See* Ex. 1049 ¶ 22 (correcting the URL to http://drogo.cselt.stet.it[/]fipa/).

Sometime after the Munich meeting, FIPA also produced a hardcopy book version of the FIPA 97 Version 1.0 specification to be sent to FIPA members and various institutions and standards groups. Ex. 1049 ¶ 24; *see* Ex. 1026, 1; Ex. 1063, 1 (Resolution of the Palo Alto meeting, Jan. 29, 1998). At least two copies of the book were available in libraries in January 2019. Ex. 1049 ¶ 24; Ex. 1057, 1 (WorldCat catalog entry for "Fipa specification : Version 1.0"); Ex. 1055 (cover page and table of contents of each part in copy at library in Italy); Ex. 1056 (cover page and table of contents of Part 1 in copy at library in Switzerland). Dr. Finin testifies that the books contain the November 28, 1997, edited version of FIPA 97 Version 1.0, which "only made minor edits (mostly spelling and formatting) over the October 10, 1997 version." Ex. 1049 ¶ 25 (citing Ex. 1055, 5 (Part 2 "publication date" of November 28, 1997); Ex. 1056).

4. Publications and Patents Referring to FIPA97 and FIPA Activities

In late 1997 and 1998, several papers reviewing and outlining the FIPA 97 specification were published and presented at meetings. *See* Ex. 1049 ¶¶ 26–30. A paper dated December 1997 memorializes a presentation made to a meeting on Intelligent Agent Technology organized by the EPSRC[11] Community Club in Advanced Computing Techniques. Ex. 1097, Cover ("Dickinson");[12] *see* Ex. 1049 ¶ 26. This paper outlines the background and rationale for the creation of an agent interoperability standard. Ex. 1097, 1–3. It also describes the development history of the

[11] "The Engineering and Physical Sciences Research Council (EPSRC) is the main funding body for engineering and physical sciences research in the UK." Engineering and Physical Sciences Research Council, epsrc.ukri.org/about (last visited Sept. 28, 2020).
[12] Ian J. Dickinson, *Agent Standards*, HP Laboratories Bristol, HPL-97-156 (Dec. 1997).

FIPA 97 specification, noting that FIPA's work program "culminated in the publication of an initial draft standard, FIPA 97, at the Munich meeting on October 1997." *Id.* at 3. Dickinson further provides that "[a]ll FIPA documents and meeting outputs are publicly available on the web" at "http://drogo.cselt.stet.it/fipa/," and "comments and review have been sought at each stage of the process." *Id.* at 3, 7 n.9. The paper then describes the features of the specification's three substantive technical sections, Parts 1–3. *Id.* at 3–6.

Similarly, a 1998 paper titled "Industrial Applications of Multi-Agent Technology" summarizes FIPA's background and presents an overview of the three technical parts (i.e., Parts 1–3) of FIPA 97 Version 1.0 released in October 1997. Ex. 1099, 12–13 ("Steiner");[13] *see* Ex. 1049 ¶ 28. The Steiner paper provides the FIPA website address and explains that the four application parts (i.e., Parts 4–7) will be used in field trials to gather information to be incorporated into a revised version of FIPA 97. Ex. 1099, 13 & n.1.

Likewise, a paper titled "FIPA — towards a standard for software agents" appearing in the July 1998 issue of the BT Technology Journal explains the motivation for an agent standard and provides an overview of FIPA's background and activities. Ex. 1100, 51–52 ("O'Brien");[14] *see* Ex. 1049 ¶ 29. It then describes the different parts of the FIPA 97 Version 1.0 specification issued in October 1997. Ex. 1100, 51–52.[15]

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[13] Donald Steiner, Siemens AG, *Industrial Applications of Multi-Agent Technology* (IEEE 1998).
[14] P.D. O'Brien & R.C. Nicol, *FIPA — towards a standard for software agents*, BT Tech. J. Vol. 16, No. 3 (July 1998).
[15] Dr. Finin testifies that O'Brien provides public links to FIPA97. Ex. 1049 ¶ 29. The copy of O'Brien entered into the record, however, appears to be

Dr. Finin cites several other publications that reference FIPA's development of an agent communication standard in the 1997–98 timeframe. Ex. 1049 ¶ 31 (citing Exs. 1027–29). Dr. Finin also identifies several patent applications in the same timeframe that refer to FIPA's agent communication language. *Id.* ¶ 32 (citing Exs. 1030–33).

5. The FIPA Website and Exhibits 1006–1012

Sometime in 1998, the FIPA website migrated from its original site (http://drogo.cselt.stet.it/fipa) to fipa.org. Ex. 1049 ¶ 23; *see also* Ex. 1026 (Resolution of Munich meeting indicating FIPA's plans for the "redesign of a new FIPA home page"); Ex. 1065, 4 (Resolutions of the Durham meeting in October 1998 indicating the website will be transferred to www.fipa.org). The fipa.org website still exists today even though FIPA is no longer active as a standalone organization. *See* Ex. 1049 ¶¶ 23, 48–49. The current FIPA website maintains a repository of past FIPA documents, including meeting notes, press releases, FIPA resolutions, and different versions of the FIPA specification. *Id.* ¶ 49.

Dr. Finin testifies that the "initial" version of FIPA 97 Version 1.0 (i.e., the specification posted on the FIPA website on October 10, 1997) "remained publicly accessible during all of FIPA's future activities and is still available on FIPA's home page today." *Id.* ¶ 21. According to Dr. Finin, Exhibits 1006–1012 (collectively referred to as FIPA97) are Parts 1–7 of FIPA 97 Version 1.0 as found on the current fipa.org website. *Id.* Based on his personal knowledge, Dr. Finin further testifies that

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missing several pages, including one containing endnotes 10–12 that might provide links to the FIPA website. *See* Ex. 1100, 52 ("FIPA97 (issued in October 1997) [10–12] is the first output from FIPA covering part of the requirements for an agent standard.").

Exhibits 1006–1012 are the "same version" and contain "the same disclosures, content and information" as Parts 1–7 of FIPA 97 Version 1.0 that were publicly available on the FIPA website (http://drogo.cselt.stet.it/fipa) on October 10, 1997, and which Dr. Finin himself accessed in late 1997. *Id.* ¶¶ 21, 34. He also notes that although Exhibit 1006 has a typographical error relating to the version number in the header of its odd pages,[16] Exhibit 1006 is identical to the version of Part 1 of FIPA 97 Version 1.0 that was released on October 10, 1007. *Id.* ¶ 21. Additionally, as evidence that FIPA 97 Version 1.0 has been continuously available on fipa.org since the website migration, Dr. Finin cites a set of Internet Archive records beginning in 2000 showing where each part of that version of the specification could be accessed. *Id.* (citing Ex. 1054).

Dr. Finin testifies that the original FIPA website, http://drogo.cselt.stet.it/fipa, remained live for several years after the website transitioned to fipa.org. Ex. 1049 ¶ 23. The Internet Archive Wayback Machine contains an archived screen capture of the website http://drogo.cselt.stet.it/fipa from December 1, 1998. *See* Ex. 1051; Ex. 1049 ¶¶ 23, 54. According to Dr. Finin, the archived page shows that the FIPA 97 specification was live and freely available on the FIPA website home page at that time. Ex. 1049 ¶ 23; Ex. 1051, 1 ("FIPA has already developed a seven-part specification called FIPA 97. Implementations of FIPA 97 are undergoing field trials that will last until October 1998 when version 2 of FIPA 97 will be produced."); Ex. 1049 ¶ 23. The home page provided links (i.e., "FIPA 97") to actual specification documents, but those

[16] The header on odd pages reads "FIPA 1997 Part 1: Version 2.4." *E.g.*, Ex. 1006, 3.

links have not been maintained in the archive. Ex. 1049 ¶ 23. Dr. Finin testifies that the screen capture from the Internet Archive is consistent with the mirror of the former FIPA site hosted by Leonardo Chiariglione. *Id.* ¶ 51 (citing Ex. 1103 (http://leonardo.chiariglione.or/standards/fipa/)). Dr. Chiariglione's mirror is still available, and documents hosted on the mirror are "accurate and complete copies of FIPA documents that were available to FIPA members." *Id.*

6. Analysis

Petitioner argues that FIPA97 was a publicly accessible printed publication as of October 10, 1997, when it was posted on the FIPA website. Pet. 22; Pet. Reply 15–21. More specifically, Petitioner argues that (1) FIPA 97 Version 1.0 was publicly accessible on October 10, 1997, and (2) the version of the FIPA specification found in Exhibits 1006–1012, referred to herein as FIPA97, is the same specification that was posted on the FIPA website on October 10, 1997, and named FIPA 97 Version 1.0. *See, e.g.*, Pet. 22 (arguing FIPA 97 Version 1.0 was publicly accessible in late 1997); Pet. Reply 15–17 (arguing that Exhibits 1006–1012 are the same documents that were made public as FIPA 97 Version 1.0). Patent Owner addresses the first contention when it argues the evidence does not show any version of FIPA 97 Version 1.0 was available on the FIPA website. *See, e.g.*, PO Resp. 69. It also challenges the second contention when it argues Petitioner has failed to show that Exhibits 1006–1012 are identical to the version of the FIPA specification that allegedly was publicly accessible before the critical date. *See, e.g.*, *id.* at 62–63. In our analysis below, we address the two questions in turn.

Considering all the facts and circumstances surrounding the development of FIPA 97 Version 1.0 and its publication on the FIPA

website, we find that FIPA 97 Version 1.0 was disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the art, exercising reasonable diligence, could locate it. *See Jazz Pharm.*, 895 F.3d at 1355–56. First, the uncontested evidence shows that members of the relevant public (i.e., persons of ordinary skill in the field of software agent-based technology) knew of the release of FIPA 97 Version 1.0 in late 1997, prior to the critical date. As detailed above, FIPA was open to corporations and educational and governmental organizations without restriction. Ex. 1006, iv. FIPA's members included many industry leaders whose employees attended FIPA meetings, including the October 1997 meeting in Munich where FIPA 97 Version 1.0 was approved for publication. *See id.*; Ex. 1095, 22. FIPA meetings and activities were publicized among the larger community of software agent researchers via the AgentWeb website and its associated Software Agents mailing list and AgentWeb newsletter, which had more than 1,300 subscribers. Ex. 1090, 5; Ex. 1088, 1; Ex. 1087, 1; Ex. 1091, 1–2; Ex. 1092, 3; Ex. 1093, 2; Ex. 1094, 1–2; Ex. 1086, 1–2; *see* Ex. 1049 ¶¶ 8, 10, 12, 14, 17, 19. The newsletter in particular informed subscribers of the development of the FIPA specification during 1996 and 1997 and provided detailed information regarding the release of FIPA 97 Version 1.0 in a November issue. Ex. 1086, 1–2. News articles in periodicals published in late 1997 also announced that FIPA had released and published FIPA 97 Version 1.0. Ex. 1095, 22; Ex. 1096, 93; *see* Ex. 1049 ¶ 22. In addition, the record contains several papers published in late 1997 and 1998, prior to the critical date, describing FIPA 97 Version 1.0 and its release in October 1997. *See* Ex. 1097, 1–7; Ex. 1099, 12–13; Ex. 1100, 51–52; Ex. 1049 ¶¶ 26–30; *see also* Ex. 1049 ¶¶ 31–32

(citing Exs. 1027–33 (other publications and patents referring to FIPA specification)).

The evidence of record also demonstrates that members of the relevant public, exercising reasonable diligence, could have located FIPA 97 Version 1.0 in late 1997 on the FIPA website, housed at the time at http://drogo.cselt.stet.it/fipa. FIPA published FIPA 97 Version 1.0 on its website at the conclusion of the Munich meeting on October 10, 1997, or shortly thereafter. *See* Ex. 1049 ¶ 20. In the several months leading up to the Munich meeting, persons of ordinary skill in the art would have known about the FIPA website through the widely distributed AgentWeb newsletters and the Software Agents mailing list, which provided website information or direct links to drafts of the specification and meeting announcements and reports. *See* Ex. 1091, 1–2; Ex. 1092, 3; Ex. 1093, 2; Ex. 1094; Ex. 1082, 1; Ex. 1083, 1. Therefore, people working in the field would have been sufficiently familiar with FIPA's activities and its website to look for FIPA 97 Version 1.0 on the FIPA website when it was posted after the Munich meeting. Indeed, both Dr. Finin, who was affiliated with FIPA, and Dr. Lieberman, who worked in the software agent field, testify that they accessed FIPA 97 Version 1.0 on the FIPA website in late 1997. Ex. 1049 ¶ 21; Ex. 1050 ¶ 146.

Moreover, the AgentWeb newsletter dated November 18, 1997, provided a link to the FIPA website and individual links to the seven parts of FIPA 97 Version 1.0 published on the website. Ex. 1086, 1–2; *see* Ex. 1049 ¶ 21. Thus, that issue of the newsletter provided more than 1,300 interested members of the public with direct access to FIPA 97 Version 1.0 at least as of November 18, 1997.

News articles and papers published in late 1997 also provided readers with the website address where FIPA 97 Version 1.0 could be found. *See* Ex. 1095, 22; Ex. 1096, 93; Ex. 1097, 7 n.9. The news articles in particular likely reached a very wide audience because they appeared in publications directed to subject matter broader than agent-based technology. *See* Ex. 1095 (EETimes); Ex. 1096 (IEEE Internet Computing). The EETimes article was dated October 20, 1997, suggesting that FIPA 97 Version 1.0 was available on the FIPA website at least as of that date.

The undisputed evidence also demonstrates that FIPA 97 Version 1.0 was freely available on the FIPA website without a password or any other restrictions and access was not subject to any requirement or expectation of secrecy or confidentiality. *See* Ex. 1049 ¶ 21; Ex. 1095, 22; *see also* Ex. 1006, iv (stating FIPA intended to make its results available to all interested parties). This evidence further supports our finding that FIPA 97 Version 1.0 was publicly accessible in late 1997. *See Jazz Pharm.*, 895 F.3d at 1358–59; *Voter Verified, Inc. v. Premier Election Solutions, Inc.*, 698 F.3d 1374, 1380–81 (Fed. Cir. 2012); *MIT v. AB Fortia*, 774 F.2d 1104, 1109 (Fed. Cir. 1985).

Patent Owner's arguments, many of which attack pieces of evidence individually, do not persuade us that Petitioner has failed to show that FIPA 97 Version 1.0 was publicly accessible. First, Patent Owner argues that no evidence shows the original FIPA website (http://drogo.cselt.stet.it/fipa) existed prior to a December 1, 1998, Internet Archive capture. PO Resp. 68 (citing Ex. 1051). To the contrary, much of the documentary evidence from late 1997 and testimonial evidence identifies that website or its mirror as the FIPA website during the relevant time period. *See* Ex. 1049 ¶ ¶ 20–23; Ex. 1092, 3; Ex. 1093, 2; Ex. 1095, 22;

Ex. 1096, 93; Ex. 1097, 7 n.9. Notwithstanding the absence of an Internet Archive capture for the website from a date prior to December 1998, we find that, based on the totality of evidence in the record, the original FIPA website existed in late 1997.

Patent Owner also argues that none of the documents cited by Petitioner provide active links to FIPA 97 Version 1.0 and therefore are insufficient proof of public accessibility. PO Resp. 69; PO Sur-reply 30. Again, based on the totality of evidence in the record, including but not limited to the testimony of Dr. Finin that he accessed FIPA 97 Version 1.0 on the FIPA website in late 1997, we find that FIPA 97 Version 1.0 was available on the FIPA website at that time, notwithstanding the lack of active links today, more than twenty years later. Patent Owner finds fault with Dr. Finin's testimony on this point because he does not claim to have used any of the links in the AgentWeb newsletters to access FIPA 97 Version 1.0. PO Sur-reply 30 (citing Ex. 1049 ¶ 21). Patent Owner, however, overlooks Dr. Finin's testimony that he was the founder and author of the AgentWeb newsletter, implying that he created the links in the newsletter. *See* Ex. 1049 ¶ 8. Therefore, based on Dr. Finin's personal knowledge regarding the links in the AgentWeb newsletter dated November 18, 1997, and the other evidence corroborating his testimony, we find that FIPA 97 Version 1.0 was available on the FIPA website in late 1997.

Patent Owner further asserts that, to the extent the Internet Archive capture from December 1998 provides an operable download link, it links to Version 2.0 of the FIPA 97 specification. PO Resp. 69 (citing Ex. 1051). It is not surprising, however, that FIPA's website in December 1998 provided links to FIPA 97 Version 2.0, which FIPA released in October 1998 to provide minor updates to two parts of the specification. *See* Ex. 1049 ¶ 35;

Ex. 1053, vi. In any event, the December 1998 Internet Archive capture at least shows that the FIPA website was live at that time, which was prior to the critical date. *See* Ex. 1049 ¶ 23 (citing Ex. 1051, 1).

In its Sur-reply, Patent Owner argues for the first time that Petitioner has not demonstrated that a person of ordinary skill in the art in 1997 could have found FIPA 97 Version 1.0 using search tools or that the FIPA website was indexed so the specification could be located. PO Sur-reply 27–28. Further, Patent Owner argues that the existence of different FIPA websites at various times would have made it even more difficult to find the correct version of the FIPA specification without sufficient indexing or search tools. *Id.* at 29.

Even if we consider this late argument, we find it unpersuasive. As detailed above, the uncontested evidence shows that the address of the FIPA website itself was widely known among those skilled in the art and that FIPA routinely provided links to the FIPA specification on the website's home page. *See* Ex. 1095, 22; Ex. 1096, 93; Ex. 1097, 7 n.9; Ex. 1051, 1; Ex. 1021, 1; Ex. 1025, 1. The November 1997 AgentWeb newsletter also provided direct links to FIPA 97 Version 1.0. Ex. 1086, 1–2. Under these circumstances, we find that a member of the interested public could have found FIPA 97 Version 1.0 without search tools or indexing by using the links in the AgentWeb newsletter or navigating to the well-known FIPA website home page. We also find that the record, including Dr. Finin's testimony, satisfactorily explains the various FIPA websites and website addresses over time and clearly identifies the FIPA website that was being used in late 1997. *See* Ex. 1049 ¶¶ 22–23, 48–49, 51.

Having determined that FIPA 97 Version 1.0 was publicly accessible on the FIPA website in late 1997, as early as October 10 and no later than

November 18, we turn to whether Exhibits 1006–1012 (collectively referred to as FIPA97) contain the same version of the FIPA specification that was available on the FIPA website during that timeframe. Dr. Finin testifies that Exhibits 1006–1012, documents available on the current FIPA website (fipa.org) and identified as FIPA 97 Version 1.0, are the same version with the same content as Parts 1–7 of FIPA 97 Version 1.0 that were released at the FIPA Munich meeting on October 10, 1997, and were publicly available on the FIPA website (http://drogo.cselt.stet.it/fipa) in late 1997. Ex. 1049 ¶¶ 21, 34.

As an initial matter, the October 10, 1997, date on the cover pages of several parts of FIPA97 supports Dr. Finin's testimony that FIPA97 is the same as FIPA 97 Version 1.0 as published on the FIPA website in late 1997. *See* Ex. 1006, Cover; Ex. 1007, Cover; Ex. 1008, Cover; Ex. 1010, Cover; Ex. 1012, Cover; *see also* Ex. 1009, Cover (Part 4 identifying a 1997 copyright date); Ex. 1011, Cover (Part 6 identifying a 1997 copyright date). Patent Owner contends that Petitioner cannot rely on the date stamps or copyright notices on Exhibits 1006–1012 to establish public accessibility because they are hearsay. PO Resp. 61; PO Sur-reply 22–24. We agree with Petitioner that Patent Owner has waived this argument because it did not raise an objection on evidentiary grounds pursuant to 37 C.F.R. § 42.64(b)(1). *See* Pet. Reply 15–16. Furthermore, we agree with Petitioner that the dates on the cover pages are not hearsay because they are evidence tending to show that FIPA97 is identical to FIPA 97 Version 1.0, not statements offered to show Exhibits 1006–1012 were published on a certain date. *See id.* at 16 (citing *Apple Inc. v. VirnetX Inc.*, IPR2016-01585, Paper 32 at 58 (PTAB Feb. 20, 2018)).

Patent Owner also argues that Petitioner cannot rely on the cover page dates alone as proof of the documents' public accessibility. PO Sur-reply 23. The date stamps, however, are only part of the totality of evidence offered by Petitioner to establish public accessibility. As such, they are relevant evidence supporting a finding that FIPA97 was publicly accessible. *See Hulu*, Paper 29 at 17–18 (citing *Nobel Biocare*, 903 F.3d at 1377).

Patent Owner argues that the existence of multiple versions of FIPA 97 Version 1.0 undercuts Petitioner's position and Dr. Finin's testimony that Exhibits 1006–1012 are the version of FIPA 97 Version 1.0 that was publicly accessible in late 1997. *See* PO Resp. 62–65; PO Sur-reply 25. For example, Patent Owner points to Dr. Finin's description of the version released on October 10, 1997, as an "initial" version, after which final minor edits were to be made. PO Resp. 63–64 (citing Ex. 2068, 86:11–15, 88:9–89:25); *see* Ex. 1049 ¶ 21. Patent Owner cites an Internet Archive capture in the record referring to "FIPA 97 specification ver. 1.0 (Reston meeting)." PO Resp. 64–65 (citing Ex. 1105, 27). Patent Owner also cites evidence, including Dr. Finin's testimony, that a different version of FIPA 97 Version 1.0 was published in hardcopy books. *Id.* at 65 (citing Exs. 1055, 1056; Ex. 1049 ¶ 25 (stating that "FIPA printed the November 28, 1997, edited version of the specification" in the books)).

Patent Owner argues that because these various versions of FIPA 97 Version 1.0 have not been substantively introduced into evidence so that the differences can be ascertained, Petitioner has not shown that Exhibits 1006–1012 are the version that was publicly accessible on the FIPA website in late 1997. *See* PO Resp. 66–67. We disagree. Dr. Finin testifies that Exhibits 1006–1012 are the same documents that were released at the conclusion of the FIPA meeting in Munich on October 10, 1997, and were

made publicly available at the time. Ex. 1049 ¶¶ 21, 34. Other evidence of record corroborates Dr. Finin's testimony and adequately explains the multiple versions of the specification. *See* Pet. Reply 17–18. As set forth in detail above, FIPA released a version of FIPA 97 Version 1.0 on October 10, 1997, and made it available on the FIPA website soon thereafter. *See* Ex. 1049 ¶ 21; Ex. 1086, 1–2; Ex. 1095, 22; Ex. 1096, 93. It is clear from the record that any earlier versions of the specification, such as the version made available after the Reston meeting six months before FIPA 97 Version 1.0, were drafts made available for public comment. *See* Pet. Reply 17; Ex. 1049 ¶¶ 16–18; Ex. 1024; Ex. 1061.

The record also shows that the version published in book form is a later version, dated November 28, 1997, containing minor formatting and clerical edits. *See* Ex. 1049 ¶ 25; Ex. 1055, 5. Petitioner does not rely on the book version as a prior art reference or assert that it was publicly accessible. *See* Pet. 22; Pet. Reply 17–18. The hardcopy book excerpts in the record merely corroborate Dr. Finin's testimony that FIPA's activities and release of the FIPA specification were known in the art. *See* Ex. 1049 ¶ 24.

Patent Owner also points to the erroneous header on odd pages in Exhibit 1006 as calling into question which version of the specification is in Exhibits 1006–1012. PO Resp. 66. We credit Dr. Finin's unrebutted testimony that the header on some pages in Exhibit 1006 is a typographical error. *See* Ex. 1049 ¶ 21. Patent Owner has not cited, nor do we see, evidence in the record suggesting a FIPA 97 Version 2.4 was made publicly available. *See* PO Resp. 66.

Patent Owner finds fault with Exhibits 1006–1012 because they were obtained after the critical date and could not have been obtained from a

website prior to the critical date. *See* PO Resp. 61–62; PO Sur-reply 21. In his declaration, Dr. Finin testifies that Exhibits 1006–1012 are available on the FIPA website today (i.e., fipa.org), and the earliest Internet Archive record of the relevant website pages shows the documents were posted in 2000. Ex. 1049 ¶ 21 (citing Ex. 1054). Patent Owner contends that in his deposition Dr. Finin acknowledged that Exhibits 1006–1012 could have been obtained from files saved in the Internet Archive between 2003 and 2004. PO Resp. 61–62 (citing Ex. 2068, 93:12–94:2, 96:7–20). In either case, Patent Owner argues, the dates are after the critical date of the '560 patent. *Id.* at 62; PO Sur-reply 21. We agree with Petitioner, however, that the date Exhibits 1006–1012 were obtained is immaterial if they are digital copies of documents that are shown to have been publicly accessible before the critical date. *See* Pet. Reply 16 (citing *In re Wyer*, 655 F.2d at 226–27).

Finally, Patent Owner argues that the testimony of Dr. Finin and Dr. Lieberman is conclusory, unreliable, and uncorroborated and therefore insufficient to establish public accessibility. PO Resp. 71–74; PO Sur-reply 20–22. "[C]orroboration is required of any witness whose testimony alone is asserted to invalidate a patent, regardless of his or her level of interest." *Nobel Biocare*, 903 F.3d at 1377–78 (quoting *Finnigan Corp. v. ITC*, 180 F.3d 1354, 1369 (Fed. Cir. 1999)). This corroboration requirement applies when relying on witness testimony to establish public accessibility of a prior art reference. *See id.* at 1377–81; *Typeright Keyboard Corp. v. Microsoft Corp.*, 374 F.3d 1151, 1158–60 (Fed. Cir. 2004). Corroborating evidence may include documentary or testimonial evidence, and circumstantial evidence may provide sufficient corroboration. *Nobel Biocare*, 903 F.3d at 1378. Determining whether testimony has been

corroborated "involves an assessment of the totality of the circumstances including an evaluation of all pertinent evidence." *Id.*

We are not persuaded by Patent Owner's argument regarding the testimony of Dr. Finin and Dr. Lieberman. Dr. Finin's testimony is based on his personal knowledge as someone who was directly involved in FIPA's activities by submitting comments on draft specifications and attending meetings, for example, and providing independent advice as a FIPA Fellow. His testimony that FIPA approved FIPA 97 Version 1.0 at the Munich meeting on October 10, 1997, and posted it to the FIPA website so that it was publicly accessible is corroborated by the evidence in the record of the facts and circumstances surrounding the development and release of the specification as analyzed above. Dr. Lieberman's testimony that as a member of the interested public he accessed FIPA 97 Version 1.0 in late 1997 is corroborated by the same evidence.

As for Dr. Finin's testimony, based on his personal knowledge, that Exhibits 1006–1012 are the same as the version of FIPA 97 Version 1.0 that was publicly accessible on the FIPA website in late 1997, we find it to be credible and corroborated by other evidence of record. We are not persuaded that Dr. Finin's inability to recall many of the details of a 300-page specification more than twenty years after it was created undermines his testimony. *See* PO Resp. 72–73. Furthermore, we find that the evidence discussed above, including the identification of Exhibits 1006–1012 on their cover pages or elsewhere as FIPA 97 Version 1.0 with a date of October 10, 1997, corroborates Dr. Finin's testimony that the version of the specification in Exhibits 1006–1012 is the version that was publicly accessible on the FIPA website in late 1997, and not some other version of the FIPA specification.

For these reasons, we find that a preponderance of the evidence shows that Exhibits 1006–1012 are the version of FIPA 97 Version 1.0 released on October 10, 1997, and posted on the FIPA website in late 1997. As discussed above, a preponderance of the evidence shows that the October 10, 1997 version of FIPA 97 Version 1.0 was publicly accessible in late 1997. Accordingly, we find that Petitioner has met is burden to show that FIPA97, submitted as Exhibits 1006–1012 and relied on by Petitioner in its unpatentability challenges, was publicly accessible prior to the critical date of January 5, 1999, and therefore is available as prior art to the '560 patent under 35 U.S.C. § 102(a).

G. Asserted Obviousness over Kiss and FIPA97

Petitioner contends that claims 1–4, 14–19, 26, and 36–44 of the '560 patent are unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of Kiss and FIPA97. Pet. 30–76. We have reviewed the parties' arguments in the Petition, Patent Owner Response, Reply, and Sur-reply, as well as the relevant evidence discussed in those papers and other record papers, including the declarations of Dr. Lieberman and Dr. Medvidovic. For the reasons that follow, we determine Petitioner has shown by a preponderance of the evidence that claims 1–4, 14–19, 26, and 36–44 are unpatentable as obvious over the combined teachings of Kiss and FIPA97.

1. Proposed Combination of Kiss and FIPA97

In its proposed combination of Kiss with FIPA97, Petitioner relies on Kiss for teaching electronic agents and their general functions and operations, including agent collaboration, agent registry, and inter-agent messaging. Pet. 26. Petitioner acknowledges, however, that Kiss does not disclose an inter-agent communication language and relies on FIPA97 to

teach a common communications protocol and language (FIPA ACL), which is combined with the teachings of Kiss to provide a communication language for inter-agent communication between the agents of Kiss and add administrative functionality and exemplary practices to the Kiss system. *Id.* Petitioner explains that "[FIPA97's] techniques are used to implement the functionality described in Kiss, including facilitating agent collaboration, agent registry, and inter-agent messaging, as well as adding functionality that is disclosed in FIPA97." *Id.* (citing Ex. 1005, 3:32–36, 3:67–4:1, 6:67–7:1). Petitioner asserts that "[w]here the two systems disclose analogous functionality, such as facilitating cooperation and agent registry, their techniques are combined." *Id.* (citing Ex. 1050 ¶¶ 204–206).

In identifying a reason that would have prompted a person of ordinary skill in the relevant field to combine the prior art teachings, Petitioner "must show some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *KSR*, 550 U.S. at 418. A reason to combine teachings from the prior art "may be found in explicit or implicit teachings within the references themselves, from the ordinary knowledge of those skilled in the art, or from the nature of the problem to be solved." *WMS Gaming Inc. v. Int'l Game Tech.*, 184 F.3d 1339, 1355 (Fed. Cir. 1999) (*citing In re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir. 1998)).

Petitioner argues the proposed combination of Kiss and FIPA97 would have been obvious for several reasons. First, Petitioner argues that Kiss, FIPA97, and the '560 patent are analogous art, because "each is directed to the same field of endeavor, *i.e.*, distributed computing environments generally and architectures for communication and cooperation among distributed electronic agents specifically." Pet. 26–27 (citing Ex. 1001, 1:17–21; Ex. 1005, Abstract; Ex. 1007, Foreword, 1;

Ex. 1050 ¶ 207). Petitioner also argues that FIPA97 and Kiss are reasonably pertinent to the problem addressed by the '560 patent—"the need for 'flexible, fault-tolerant, distributed problem solving' using 'agent-based technologies.'" *Id.* at 27 (citing Ex. 1001, 4:30–36; Ex. 1005, 2:33–40; Ex. 1007, 1; Ex. 1050 ¶ 208).

> Next, Petitioner argues the combination of Kiss and FIPA97
>
> would have been the arrangement of old elements (*i.e.*, the functionality of FIPA97, and the system of Kiss) with each performing the same function it had been known to perform (communication between distributed agents (FIPA97)); cooperative task competition and problem solving (Kiss)) and yielding no more than what one would expect from such an arrangement (a system of distributed agents, able to communicate to conduct cooperative task completion and problem solving).

Id. (citing Ex. 1020, 2; Ex. 1046, 50; Ex. 1050 ¶ 209).

> Petitioner also argues that a skilled artisan
>
> would have known that agents, such as in Kiss, must use a common communications protocol, i.e., an inter-agent communication language, and related management functionality, and therefore would have been motivated to consider and employ one of the available inter-agent communications languages and its related functionality, and because doing so would have been a convenient and efficient way to facilitate effective communication between agents.

Id. at 27–28 (citing Ex. 1020, 2; Ex. 1046, 50; Ex. 1050 ¶ 210).

Petitioner further argues that a skilled artisan would have been motivated based on earlier descriptions of KQML's similar use of an inter-agent communication language to use FIPA ACL in a system like Kiss. *Id.* at 28 (citing Ex. 1016, Abstract, 4, 29, 30; Ex. 1006, 7; Ex. 1007, 40–42; Ex. 1005, Abstract; Ex. 1050 ¶¶ 211–213). According to Petitioner, a skilled artisan "would have been further motivated to make the combination

because of the known advantages of FIPA97, including that it specifies, 'key agents necessary for the management of an agent system, the ontology necessary for the interaction between systems, and it defines also the transport level of the protocols.'" *Id.* (citing Ex. 1035, 1; Ex. 1050 ¶ 217).

Additionally, Petitioner argues that "FIPA97 represented a substantial attempt to formulate an industry standard designed to encourage interoperability and uniformity amongst agent systems" and a person of ordinary skill in the art "would have understood that agent systems that complied with such a standard would be more likely to be interoperable with other systems and would likely have more resources available." *Id.* at 29 (citing Ex. 1007, vii; Ex. 1047; Ex. 1050 ¶ 218). Moreover, Petitioner argues, the description of the administrative functionality and exemplary practices in FIPA97 "suggests that their use with the FIPA ACL would be advantageous and workable," and a person of ordinary skill in the art would have been motivated to employ such additional functionality and practices in the combined system "in order to obtain the full benefit of using FIPA ACL." *Id.* (citing Ex. 1050 ¶ 219).

Finally, Petitioner argues that a skilled artisan could have made the combination without undue experimentation because by January 1999 the component parts of the combination were well-known, conventional technology and because others had combined FIPA97 technology with agent systems. *Id.* (citing Ex. 1007; Ex. 1016; Ex. 1030; Ex. 1050 ¶ 216).

In response, Patent Owner asserts that "Petitioner utterly defaults in offering any reason to combine" Kiss and FIPA97 and that Petitioner's arguments contain boilerplate language. PO Resp. 137; PO Sur-reply 51. Patent Owner argues that Petitioner's motivation to combine Kiss and FIPA97 suffers from "hindsight bias" and that Petitioner "offers no reason or

explanation that a person of skill in the art looking at Kiss would be motivated to find a particular language with the characteristics of FIPA97's ACL." PO Resp. 137. Patent Owner also argues that Petitioner fails to identify how the combination of Kiss and FIPA97 could be achieved. *Id.* at 138. Specifically, Patent Owner argues that the FIPA97 and Kiss protocols are "different" and "mutually exclusive" and that FIPA97 "discouraged interoperability between different and incompatible systems." PO Sur-reply 51–54. Patent Owner also argues that the Kiss and FIPA97 architectures "look quite different" and "Petitioner offers no articulation of how to add the [FIPA97 Directory Facilitator (DF)] to any of the Kiss layers." PO Resp. 95.

We agree with Petitioner that Patent Owner "ignores the several pages of analysis supported by expert testimony (including citations to evidence in the prior art) articulating the rational underpinning of the combination" of Kiss and FIPA97. Pet. Reply 22; *see* Pet. 26–29. As summarized above, Petitioner provides ample reasoning and explanation for why person of ordinary skill in the art would have combined the teachings of FIPA97 and Kiss in the manner Petitioner describes. Thus, Patent Owner's argument that Petitioner fails to offer *any reason* to combine *Kiss* and FIPA97 is directly contrary to the evidence of record and is unpersuasive. *See* PO Resp. 137.

We also agree with Petitioner that a showing of obviousness does not require a person of ordinary skill in the art to have been motivated to find the particular ACL language in FIPA97, as Patent Owner contends. *See* Pet. Reply 22 (citing PO Resp. 137). Under the correct obviousness analysis, "any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed." *KSR*, 550 U.S. at 420. Here, Petitioner provides

persuasive evidence and argument that FIPA97 and Kiss are reasonably pertinent to the problem addressed by the 560 patent—"the need for 'flexible, fault-tolerant, distributed problem solving' using 'agent-based technologies.'" Pet. 27 (citing Ex. 1001, 4:30–36; Ex. 1005, 2:33–40; Ex. 1007, 1; Ex. 1050 ¶ 208). For instance, Kiss observes that "a need exists for a knowledge management system for dynamic, distributed problem-solving systems." Ex. 1005, 2:39–40. And as Dr. Lieberman notes, the FIPA97 specification "defines a language and supporting tools, such as protocols, to be used by intelligent software agents to communicate with each other," and "the terms used and the mechanisms used [by FIPA97] support such a higher-level, often task based, view of interaction and communication." Ex. 1050 ¶ 208 (emphasis omitted). This evidence support's Petitioner's position that a person of ordinary skill in the art at the time of the claimed invention would have combined FIPA97 and Kiss in the manner described in the Petition to provide a flexible, fault-tolerant, distributed problem solving system using agent-based technologies.

Petitioner further argues, and we agree, that Patent Owner's criticism that Petitioner fails to identify how the combination could be achieved "ignores the detailed description in the Petition (supported by Dr. Lieberman) that demonstrates how the combination would work." Pet. Reply 23 (quoting PO Resp. 138); *see* Pet. 26–29; Ex. 1050 ¶¶ 204–206. For example, the Petition explains that "FIPA97 provides a common communications protocol and language (FIPA ACL) between the agents of Kiss, and also adds its administrative functionality and exemplary practices to the Kiss system." Pet. 26. The Petition also explains that "[t]hese techniques are used to implement the functionality described in Kiss, including *facilitating agent collaboration*, agent registry, and inter-agent

messaging . . . as well adding functionality that is disclosed in FIPA97." *Id.* (citing Ex. 1005, 3:32–36, 3:67–4:1, 6:67–7:1) (emphasis added).

Petitioner's proffered combination of FIPA97 and Kiss is amply supported by Dr. Lieberman's testimony. For instance, Dr. Lieberman explains that:

> in the combination of Kiss with FIPA97, the "interagent abstract communications facilities" of Kiss, [Ex. 1005], 3:32-36, would use the inter-agent communication language of FIPA97 to, for example, "negotiate with each other, conduct joint planning, and to collaborate in the execution of planned tasks," [Ex. 1005], 3:32-36. Additionally, the Agent Service Layer and meta-agent of Kiss would be implemented using the FIPA97 Agent Management System ("FIPA-AMS") and the functionality of the FIPA Directory Facilitator, described in [Exhibit 1006]. Thus, the "capabilities, interests, and attributes for the knowledge modules," [Ex. 1005], 6:67-7:1, as stored in the agent registry of Kiss, and the meta agent of Kiss, would be implemented with the directory facilitator functionality of FIPA97. Therefore, FIPA-AMS would be used to provide a "scalable and modular" inter-agent management system and agent registry for the distributed agents of Kiss. [Ex. 1005, 3:67-4:1]. Further, the combination of FIPA97 and Kiss would be informed by and include the exemplary practices described in the informative sections of FIPA97 (*i.e,* Parts 4-7).

Ex. 1050 ¶ 206. Dr. Lieberman provides annotated versions of several of Kiss's figures representing exemplary depictions of the combined Kiss/FIPA97 system. *Id.* at ¶¶ 205–206 (presenting annotated Figures 4–6, 8, and 21 of Kiss).

In one example, Dr. Lieberman provides an annotated version of Kiss's Figure 8 showing how FIPA97's communications protocol (FIPA

ACL) and Directory Facilitator would be incorporated into Kiss in the combined Kiss/FIPA97 system:

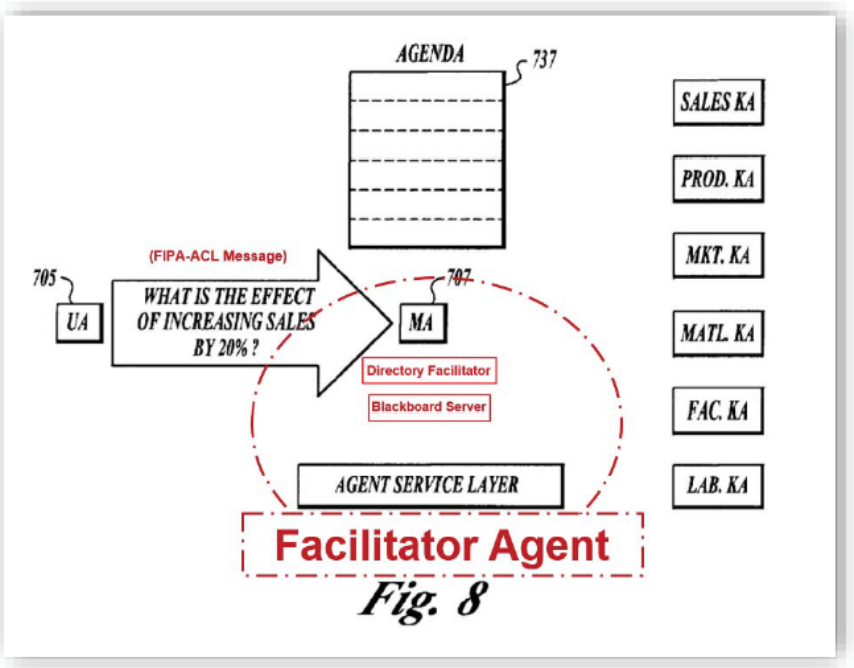


Fig. 8

Ex. 1050 ¶¶ 205–206. In annotated Figure 8 above, Dr. Lieberman illustrates how Kiss's agents would use FIPA ACL to "negotiate with each other, conduct joint planning, and . . . collaborate in the execution of planned tasks." *Id.* ¶ 206 (quoting Ex. 1005, 3:32–36). Annotated Figure 8 also shows at a high level how Kiss's Agent Service Layer and meta-agent (MA) would include the functionality of FIPA97's Directory Facilitator. *Id.*

In another example, Dr. Lieberman provides an annotated version of Kiss's Figure 21, shown below, illustrating how FIPA97's Directory

Facilitator (DF) would be incorporated into Kiss's knowledge management system:

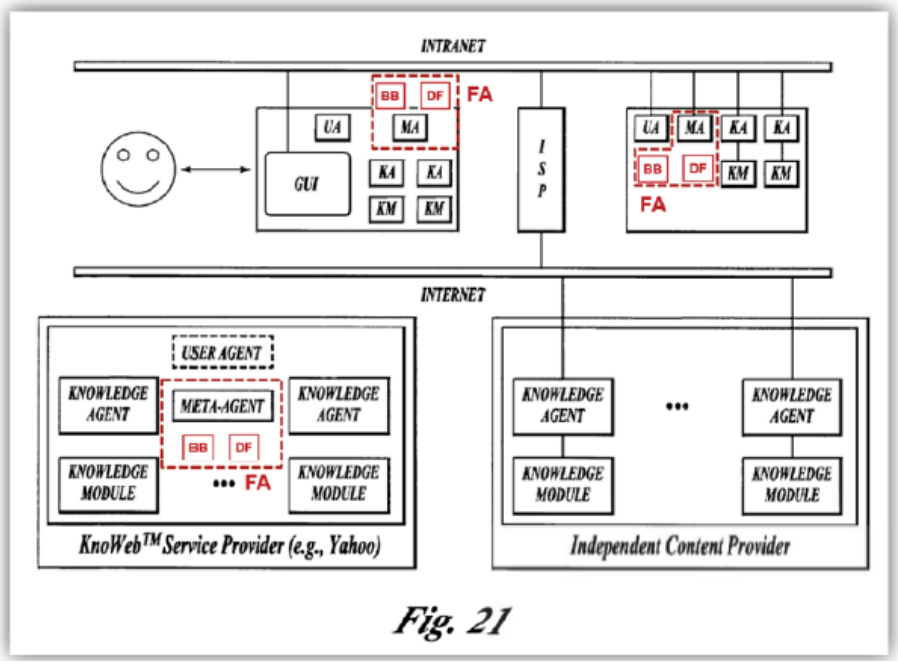


Fig. 21

Ex. 1050 ¶ 206. Petitioner's annotated version of Kiss's Figure 21, shown above, depicts how FIPA97's Directory Facilitator (DF) would be incorporated into the user interface layer, meta-agent layer, and knowledge agent layer of Kiss's knowledge management system connected to a distributed environment such as the Internet. *See* Ex. 1050 ¶¶ 204–206; Ex. 1005, 10:55–12:28, 14:31–36, Figs. 4–6, 8, 21.

In view of Dr. Lieberman's testimony, we find Patent Owner's arguments that the Petition says nothing about how to combine FIPA97's Directory Facilitator and Kiss's meta-agent and offers "no articulation" of how to add a Directory Facilitator to any of the Kiss layers to be contrary to the evidence of record. *See* PO Resp. 94–95. Similarly, Patent Owner's arguments that the FIPA97 and Kiss protocols are "mutually exclusive" and that FIPA97 "discouraged interoperability" between systems are unavailing and not supported adequately by the record. *See* PO Sur-reply 51–54.

Finally, Patent Owner argues Petitioner's combination of references "is emblematic of hindsight bias" because Dr. Lieberman "picks and chooses elements" and "superimposes them into one figure in an attempt to 'show' the combination." PO Resp. 98. In particular, Patent Owner argues that "simply drawing in block diagrams with terminology from other references into one cobbled diagram is insufficient as a matter of law without any explanation of how such a combination could be achieved or, indeed, why." *Id.* at 98–99.

We note that "[a]ny judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning, but so long as it 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." *In re McLaughlin*, 443 F.2d 1392, 1395 (CCPA 1971).

Here, Petitioner provides persuasive evidence that a person of ordinary skill in the art at the time of the invention would have had reason to use FIPA97's communications protocol and inter-agent communication language (FIPA ACL) between the agents of Kiss, adding FIPA97's administrative functionality and practices to the Kiss system. *See, e.g.*, Pet. 26–29; Ex. 1050 ¶¶ 204–219. This is not evidence of hindsight bias. Patent Owner does not identify, and we do not discern, any particular knowledge used by Petitioner in its combination of FIPA97 and Kiss that was gleaned from the '560 patent's disclosure and was not within the level of ordinary skill in the art at the time of the invention.

For the reasons discussed, we find that Petitioner has articulated sufficient reasoning with rational underpinning for why a person of ordinary

skill in the art at the time of the invention would have combined the teachings of Kiss and FIPA97 in the manner proffered by Petitioner.

2. Independent Claim 1

Claim 1 is directed to a software-based, flexible computer architecture for communication and cooperation among distributed electronic agents, the architecture contemplating a distributed computing system comprising service-providing electronic agents and a distributed facilitator agent including an agent registry and a facilitating engine, the service-providing electronic agents and the distributed facilitator agent communicating using an interagent communication language (ICL) including a layer of conversational protocol. Ex. 1001, 29:57–30:23. Claim 1 also requires the facilitating engine to be operable to interpret a service request as a base goal for generating a goal satisfaction plan, where the goal satisfaction plan involves using reasoning to determine sub-goal requests and to coordinate and schedule efforts by the service-providing electronic agents for fulfilling the sub-goal requests. *Id.* at 30:5–15.

In its proposed combination of Kiss with FIPA97, Petitioner relies on Kiss to teach electronic agents and their general communication and collaboration functions as recited in claim 1, FIPA97 to teach the recited ICL, and a combination of Kiss and FIPA97 to teach the claimed distributed facilitator agent. Pet. 30–50. Patent Owner argues that the proposed combination of Kiss and FIPA97 does not teach the "distributed facilitator agent functionally distributed across at least two computer processes" or the "goal satisfaction plan" recited in the claim. PO Resp. 78–102, 111–118. Patent Owner also asserts that FIPA97 does not teach the "inter-agent language" (or Interagent Communication Language (ICL)) and related limitations. *Id.* at 118–133. In the following discussion, we analyze the

limitations of claim 1 in more detail, addressing Petitioner's contentions and, where applicable, Patent Owner's responsive arguments.

a. Preamble

The preamble of claim 1 recites: "A software-based, flexible computer architecture for communication and cooperation among distributed electronic agents, the architecture contemplating a distributed computing system."[17] Ex. 1001, 29:57–60. Petitioner contends that Kiss teaches a "software-based, flexible computer architecture" because it discloses a computerized knowledge management system in which interaction between a user and knowledge resources is mediated by a collection of cooperative intelligent agents. Pet. 30 (citing Ex. 1005, 2:43–49, 3:1–3, Fig. 1). Petitioner further contends that Kiss's agents are "distributed" in a "hierarchical" architecture. *Id.* (citing Ex. 1005, Abstract, 2:50–55, 4:57–59). Petitioner also contends that Kiss teaches the recited "communication and cooperation among distributed electronic agents" in the form of "cooperative intelligent agents [that] incorporate generalized automated negotiation and distributed inference (i.e. problem-solving) processes," analyze "problem statements," and reorganize them as "sets of tasks." *Id.* at 31 (citing Ex. 1005, 2:50–55).

Patent Owner does not specifically dispute that Kiss teaches the preamble of claim 1. *See generally* PO Resp. Based on the complete record and for the reasons explained by Petitioner, we are persuaded that Petitioner has demonstrated sufficiently that Kiss teaches the preamble of claim 1.

[17] Because Petitioner has shown that Kiss teaches the recitations in the preamble, we need not determine whether the preamble is limiting. *See Vivid Techs.*, 200 F.3d at 803.

b. "plurality of service-providing electronic agents"

Petitioner contends that Kiss teaches "a plurality of service-providing agents," as recited in claim 1, because Kiss discloses a plurality of agents responding to requests for service by providing information such as market price and cost information. Pet. 31 (citing Ex. 1005, 12:21–14:30, Figs. 8–20). Patent Owner does not specifically dispute that Kiss teaches this limitation. *See generally* PO Resp. Based on the complete record and for the reasons explained by Petitioner, we are persuaded that Petitioner has demonstrated sufficiently that Kiss teaches a "plurality of service-providing electronic agents," as recited in claim 1.

c. "distributed facilitator agent"

Claim 1 recites "a distributed facilitator agent functionally distributed across at least two computer processes." Ex. 1001, 29:63–67. Petitioner contends that Kiss and FIPA97 teach a "facilitator agent" that is "functionally distributed across at least two computer processes." Pet. 32–34. Patent Owner disputes Petitioner's contentions. PO Resp. 78–102. We address both parts of this limitation below.

(i) "facilitator agent"

Petitioner contends that the agent service layer of Kiss combined with Kiss's meta-agent constitutes a "facilitator agent" because it is responsible for matching requests from users and agents with descriptions of the capabilities of other agents. Pet. 32 (citing Ex. 1005, 12:21–14:30, Figs. 8–20). Petitioner argues that FIPA97 also discloses a Directory Facilitator, which provides analogous functionality, so that in the combined system FIPA97's Directory Facilitator would be implemented in Kiss's meta-agent. *Id.* (citing Ex. 1006, 6–7; Ex. 1050 ¶ 233).

Patent Owner argues that Kiss and FIPA97 either alone or in combination do not disclose "the specialized functionality and operation" of the claimed "facilitator agent." PO Resp. 86. Patent Owner first argues that Kiss's meta-agent is not a facilitator. *Id.* Patent Owner argues that "meta-agents are described in the '560 Patent itself as part of the [Open Agent Architecture] architecture and distinct from facilitator agents," and the facilitator agent and meta-agents are shown separately in Figure 4 of the '560 patent. *Id.* at 86–87 (citing Ex. 1005, Fig. 4). Patent Owner argues that meta-agents in the '560 patent are "client agents as opposed to facilitating agents." *Id.* at 87 (citing Ex. 1001, 6:54–56 ("All agents that are not facilitators are referred to herein generally as client agents . . . ."); *id.* at 6:60–62 ("Some typical categories of client agents would include . . . meta-agents . . . ."). Thus, Patent Owner argues, Kiss's meta-agent is similar to the meta-agent of the '560 patent and does not perform the role of the claimed facilitator. *Id.* at 88 (citing Ex. 2032 ¶ 117). Patent Owner asserts that Kiss's meta-agent is at best "a controller that routes queries through the system and presents results, and it lacks the sophistication and intelligent planning that the claimed facilitator performs." *Id.* (citing Ex. 1001, 20:11–12; Ex. 2032 ¶ 119).

Patent Owner further argues that Kiss does not disclose a meta-agent capable of the three types of processing performed by the claimed facilitator in the '560 patent—delegation, optimization, and interpretation. *Id.* at 89 (citing Ex. 1001, 19:27–29). First, Patent Owner Patent Owner argues that although Kiss's meta-agent "breaks down queries into questions and passes them to knowledge agents," it "does not apply 'selective application of global and local constraint and advice parameters onto the specific sub-goals.'" *Id.* (quoting Ex. 1001, 19:34–35). Second, Patent Owner argues

that Kiss "contains no disclosure of optimization—'result[ing] in a goal whose interpretation will require as few exchanges as possible, between the facilitator and the satisfying agents, and can exploit parallel efforts of the satisfying agents.'" *Id.* (quoting Ex. 1001, 19:40–43). Third, Patent Owner argues that Kiss's meta-agent "does not use an intelligent method or its own knowledge resources to interpret capabilities or use strategies or advice in the coordination of requests to and assembly of results from satisfying agents." *Id.* at 90 (citing Ex. 1001, 19:49–52).

With regard to FIPA97's Directory Facilitator, Patent Owner argues it "is no more than a directory of agent capabilities." *Id.* at 92. Patent Owner argues that while FIPA97's Directory Facilitator "may provide agent registry-type functions within a facilitator, FIPA97 does not disclose any of the robust facilitator functions described in the '560 Patent and which are missing from Kiss's meta-agent." *Id.* (citing Ex. 1001, Fig. 7; Ex. 2032 ¶¶ 132–136).

In its Reply, Petitioner argues that Patent Owner "ignores the actual Kiss/FIPA97 combination and instead attacks the references individually." Pet. Reply 27; *see id.* at 30. Responding to Patent Owner's argument that Kiss's meta-agent is similar to the meta-agent of the '560 patent and thus cannot be the claimed facilitator agent, Petitioner argues "the combined system of Kiss/FIPA97 discloses all the claimed features of a facilitator agent, so what Kiss chose to name his facilitator is plainly immaterial." *Id.* at 27 (emphasis omitted).

Petitioner also argues Patent Owner's "list of the various optional features of the facilitator agent are simply not relevant to the '*facilitator agent*' as claimed—and in fact, the record evidence suggests a much broader understanding of that term." *Id.* (citing PO Resp. 84–93). Petitioner points

out that Patent Owner's expert, Dr. Medvidovic, defined a "facilitator agent" as "a specialized server agent that is responsible for coordinating agent communications and cooperative problem solving." *Id.* at 28 (quoting Ex. 1129, 79:7–9).

Petitioner further argues that the "delegation, optimization, and interpretation" functionalities Patent Owner claims are missing from the Kiss meta-agent are limited to a preferred embodiment in the '560 patent, and therefore are not relevant to an obviousness analysis. *Id.* (citing PO Resp. 88). Petitioner contends that Dr. Medvidovic confirmed these were functionalities of a preferred embodiment. *See id.* (citing Ex. 1129, 54:2–9). In any event, Petitioner argues, the Kiss/FIPA97 combination teaches delegation under the ordinary meaning of that term. *Id.* at 28–29 (citing Ex. 1005, 3:25–27, 5:24–27, 12:21–14:30, Figs. 8–20). Petitioner takes similar positions with respect to "optimization" and "interpretation." *See id.* at 29–30 (citing Ex. 1005, 7:8–11, 7:65–8:8, 9:17–23).

In its Sur-reply, Patent Owner argues it is not attacking the prior art references individually, but rather it "addresses the disclosures within each reference, matching what the Petition does." PO Sur-reply 31. With respect to Patent Owner's argument that Kiss's meta-agent is not a facilitator, Patent Owner argues that "none of Patent Owner's arguments rest on the fact that the same words are or are not used in the asserted references and the '560 Patent." *Id.* at 31–32 (citing Pet. Reply 27). Patent Owner argues that Dr. Lieberman relies on similar portions of the specification to describe his interpretation of the "facilitator agent" as Patent Owner uses to show facilitator agent functionality in the '560 patent. *Id.* at 33.

We are persuaded that Petitioner has shown sufficiently that the combination of Kiss and FIPA97 teaches a "facilitator agent." Petitioner

asserts that it is "[t]he agent service layer [of Kiss] combined with the meta-agent of Kiss [that] constitutes 'a facilitator agent' because it is responsible for matching requests, from users and agents, with descriptions of the capabilities of other agents." Pet. 32 (citing Ex. 1005, 12:21–14:30, Figs. 8–20). Kiss also provides that its meta-agent layer "analyzes user queries or problem formulations from the user interface layer, allocates tasks to the knowledge agent layer, resolves conflicts arising from the knowledge agent layer, and consolidates (including fusing and deconflicting) results provided by the knowledge agent layer." Ex. 1005, 3:25–29. Kiss's meta-agent also operates with an agent service layer to identify relevant capabilities of service providing agents in the system. *See id.* at 3:36–47, 12:1–14:30.

Given Petitioner's articulation that the *combination* of the agent service layer and the meta-agent of Kiss constitutes a "facilitator agent," Patent Owner's argument that Kiss's meta-agent is not a facilitator is unavailing because it fails to respond to Petitioner's assertion that the recited "facilitator agent" includes the combination of the Kiss agent service layer and the Kiss meta-agent. *See* PO Resp. 86. Similarly, Patent Owner's argument that the Kiss meta-agent cannot be part of a "facilitator agent" in the combined Kiss/FIPA97 system because the '560 patent identifies a meta-agent as a separate component from the facilitator agent is unavailing for at least the same reason, i.e., that Patent Owner does not address the functionality of Kiss's meta-agent and agent service layer combined. *See id.* at 87. Moreover, with respect to Petitioner's showing how FIPA97's Director Facilitator would be implemented in Kiss in the combined Kiss/FIPA97 system that uses FIPA ACL, we determined above that Petitioner has presented sufficient rationale for combining the references in the manner asserted. *See* § II.G.1.

As for Patent Owner's arguments that Kiss does not teach a facilitator agent capable of performing delegation, optimization, and interpretation, we disagree with Patent Owner's arguments because they improperly attempt to read exemplary characteristics from preferred embodiments of the '560 patent into the claims. *See* PO Resp. 89–91. Indeed, as the '560 patent makes clear, "[a] further *preferred embodiment of the present invention incorporates* facilitator handling of compound goals, preferably involving *three types of processing: delegation, optimization and interpretation.* Ex. 1001, 19:26–29.

Also helpful in understanding the nature of a "facilitator agent" is the observation of Patent Owner's expert, Dr. Medvidovic, in reference to Figure 4 of the '560 patent that "facilitator agent 402" is "a specialized server agent that is responsible for coordinating agent communications and cooperative problem-solving." Ex. 2032 ¶ 32 (citing Ex. 1001, 6:46–48, Fig. 4).[18] Indeed, at his deposition, Dr. Medvidovic confirmed that this was his understanding of a "facilitator agent." There, Dr. Medvidovic testified, "if you were asking me [to] define a facilitator agent, I might say it's a specialized server agent responsible for coordinating agent communications and cooperative problem solving. That is a definition." Ex. 1129, 79:15–19.

Based on this understanding of a facilitator agent, Petitioner's proposed combination of Kiss's meta-agent and agent service layer is a "facilitator agent" that is responsible for analyzing user queries or problem formulations, allocating tasks to knowledge agents, resolving conflicts that

[18] We also note for the record that neither party has proposed a construction for the term "facilitator agent."

arise, and consolidating (including fusing and deconflicting) results. *See* Ex. 1005, 12:21–14:30, Figs. 8–20.

(ii) "functionally distributed across at least two computer processes"

As discussed above in § II.C.2, we construe the term "computer process" as "a process that runs or executes one or more computer programs" for this Final Written Decision.

Petitioner contends that Kiss discloses a facilitator agent distributed across at least two computer processes because Figure 21 of Kiss shows meta-agents on multiple systems remotely located from each other and provides that meta-agents can accept problem inputs from other meta-agents. Pet. 32 (citing Ex. 1005, Fig. 21). Figure 21 of Kiss is reproduced below:

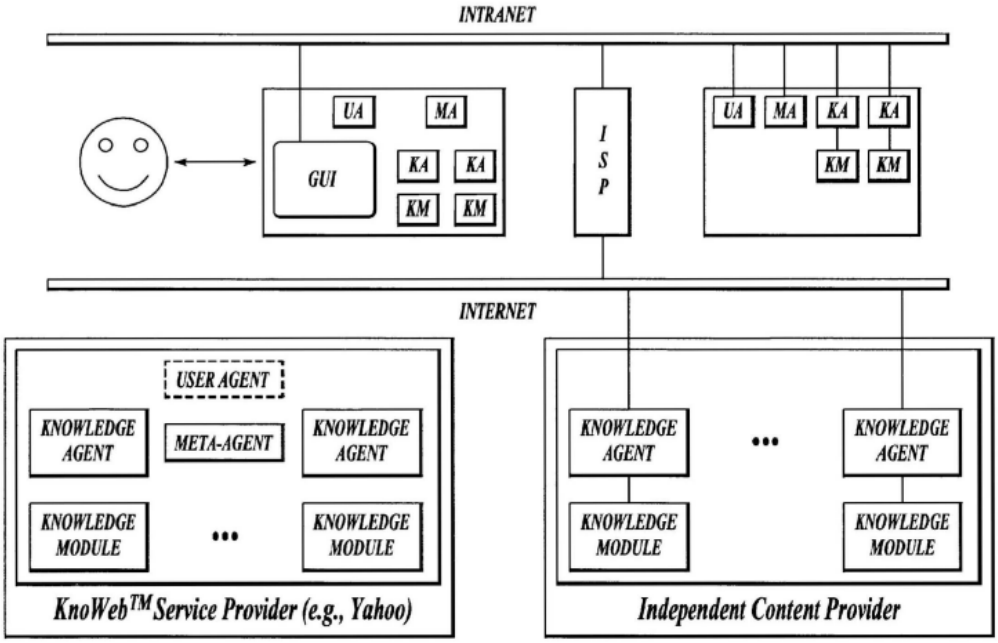


Fig. 21

Figure 21 above shows Kiss's meta-agents (MAs) on multiple systems remote from each other.

Petitioner contends that a person of ordinary skill in the art would have understood that two meta-agents on separate systems operate together as part of a "facilitator agent" to facilitate the cooperative satisfaction of goals. Pet. 33 (citing Ex. 1005, 5:20–64; Ex. 1050 ¶ 235). Petitioner contends "Kiss further discloses that a meta-agent 'adaptively and dynamically synthesizes problem-specific knowledge interfaces' over multiple distributed knowledge sources." *Id.* (citing Ex. 1005, 2:61–67, Fig. 1). Therefore, Petitioner concludes, the two meta-agents divided on separate and remote systems operate cooperatively as a "distributed facilitator agent functionally distributed across at least two computer processes" to achieve the goals of the system. *Id.* at 33–34 (citing Ex. 1050 ¶¶ 235–236).

Petitioner argues that FIPA97 likewise teaches that its Directory Facilitator "can manage distributed agent[s] over multiple computer processes." *Id.* at 34 (citing Ex. 1006, 10, Fig. 2; Ex. 1050 ¶ 237). According to Petitioner, a person of ordinary skill in the art would have understood the agent platforms shown in Figure 2 to be separate computer processes because each agent platform provides the physical infrastructure in which agents can be deployed, and therefore represents a distinct program. *Id.* (citing Ex. 1006, 10, Fig. 2; Ex. 1050 ¶¶ 238–239).

Patent Owner argues the combination of Kiss and FIPA97 does not teach a facilitator agent "distributed across at least two computer processes." PO Resp. 100–102. Patent Owner asserts there is no support for Petitioner's "assumption" that distributed agents must be distributed across separate computer processes. *Id.* at 101 (citing Ex. 2032 ¶ 160). Rather, Patent Owner argues, a distributed facilitator could use a single computer process. *Id.* (citing Ex. 2032 ¶ 161). Patent Owner also argues that Petitioner's

citation to Figure 2 of FIPA97 does not disclose any information about what agents are involved. *Id.* at 101–102 (citing Ex. 2032 ¶ 41).

We are persuaded that Petitioner, with support from Dr. Lieberman, has shown sufficiently that Kiss teaches or at least suggests that its meta-agents on separate and remote systems, operating together as part of a facilitator agent, are "functionally distributed across at least two computer processes," as recited in claim 1. As Petitioner points out, the '560 patent provides no detail as to what computer processes may be running. Pet. Reply 36. Dr. Lieberman's testimony supports Petitioner's contention that a person of ordinary skill in the art generally would have understood Kiss to teach at least one computer process running on each separate host computer. Pet. 34–36; Ex. 1050 ¶¶ 235–36; Pet. Reply 36. Indeed, Patent Owner itself acknowledges that a person of ordinary skill in the art would have recognized that meta-agents distributed on different systems are executing on "separate processes." PO Resp. 105.

As for Petitioner's reliance on FIPA97, we are not persuaded that Petitioner's analysis of claim 1 explains in sufficient detail how or why FIPA97's disclosure of a Directory Facilitator that allegedly "can manage distributed agent[s] over multiple computer processes" shows that the Directory Facilitator is itself "distributed across at least two computer processes," as recited in the claim. *See* Pet. 34. Nevertheless, we find Petitioner's reliance on Kiss sufficient to teach or suggest a facilitator agent "functionally distributed across at least two computer processes."

In summary, based on the complete record and for the reasons explained by Petitioner, we are persuaded that Petitioner has demonstrated sufficiently that the combination of Kiss and FIPA97 teaches or suggests "a

distributed facilitator agent functionally distributed across at least two computer processes," as recited in claim 1.

d. "bi-directional communications"

Claim 1 also requires the facilitator agent to be "capable of bi-directional communications with the plurality of service-providing electronic agents." Ex. 1001, 29:65–67. For this limitation, Petitioner points to Figure 10 of Kiss (not reproduced herein), which shows a meta-agent receiving a question from a knowledge agent and then communicating the question to a different knowledge agent. Pet. 34–35 (citing Ex. 1005, Fig. 10).

Patent Owner does not specifically dispute that Kiss teaches this limitation. *See generally* PO Resp. Based on the complete record and for the reasons explained by Petitioner, we are persuaded that Petitioner has demonstrated sufficiently that Kiss teaches "the facilitator agent capable of bi-directional communications with the plurality of service-providing electronic agents," as recited in claim 1.

e. "agent registry"

Claim 1 requires the facilitator agent to include "an agent registry that declares capabilities for each of the plurality of service-providing electronic agents currently active within the distributed computing environment." Ex. 1001, 30:1–4. Petitioner asserts that Kiss teaches this limitation because Kiss describes a "registry of agents," which is constructed through "registering a description of each active client agent's functional capabilities as corresponding registered functional capabilities." Pet. 36 (citing Ex. 1005, 3:37–45, 6:66–7:19, 8:41–48, 10:32–35, 12:18–20, Fig. 1).

Patent Owner does not specifically dispute that Kiss teaches this limitation. *See generally* PO Resp. Based on the complete record and for

the reasons explained by Petitioner, we are persuaded that Petitioner has demonstrated sufficiently that Kiss teaches this "agent registry" limitation of claim 1.

f. "facilitating engine" limitations

Claim 1 recites "a facilitating engine operable to interpret a service request as a base goal [and] further operable for generating a goal satisfaction plan associated with the base goal." Ex. 1001, 30:5–8. The claimed "goal satisfaction plan" involves "using reasoning to determine sub-goal requests based on non-syntactic decomposition of the base goal and using said reasoning to co-ordinate and schedule efforts by the service-providing electronic agents for fulfilling the sub-goal requests in a cooperative completion of the base goal." *Id.* at 30:10–15. Petitioner contends that Kiss teaches each of these limitations. Pet. 36–44.

(i) "facilitating engine"

Petitioner contends that the meta-agent in Kiss "includes a 'facilitating engine' because it is capable of analyzing user queries, allocating tasks, resolving conflicts, and consolidating results" and applying various inferencing methods to allocate tasks to knowledge agents in order to solve problems. Pet. 37 (citing Ex. 1005, 3:25–30). Patent Owner does not specifically dispute that Kiss teaches this limitation. *See generally* PO Resp. Based on the complete record and for the reasons explained by Petitioner, we are persuaded that Petitioner has demonstrated sufficiently that Kiss teaches a "facilitating engine," as recited in claim 1.

(ii) "operable to interpret a service request as a base goal"

As set forth above in § II.C, we have construed "goal" as "a request for service." Petitioner contends that Kiss's meta-agent (the claimed "facilitating engine") receives a query (a "service request") via a user agent

requesting "either a solution to a problem, such as predicting the outcome of a course of treatment, or the retrieval of information, such as the side effects of a medication." Pet. 37–38 (citing Ex. 1005, 8:26–29). Petitioner asserts that the meta-agent interprets the request as a "base goal" because "it is the basic request initiated by the user that the system seeks to satisfy and which inspired a number of additional, more particular requests in order to be satisfied." *Id.* at 38 (citing Ex. 1005, 12:21–14:20, Figs. 8–20). Patent Owner does not specifically dispute that Kiss teaches this limitation. *See generally* PO Resp. Based on the complete record and for the reasons explained by Petitioner, we are persuaded that Petitioner has demonstrated sufficiently that Kiss teaches a facilitating engine "operable to interpret a service request as a base goal," as recited in claim 1.

(iii) "goal satisfaction plan"

Petitioner asserts that Kiss teaches "generating a goal satisfaction plan" because Kiss describes that the meta-agent "formulates a goal statement for the problem-solving phase of the process," then "formulates a solution plan for the problem." Pet. 38–39 (citing Ex. 1005, 8:32–34, 5:33–64, 12:29–64, Figs. 8–20). Petitioner contends that Figures 8–20 of Kiss illustrate adding tasks to an agenda, i.e., constructing a plan, to satisfy the user request (i.e., a "goal") "what is the effect of increasing sales by 20%?" *Id.* at 38 (citing Ex. 1005, 13:27–29, Figs. 8–20).

Patent Owner contends that Kiss does not teach the claimed "goal satisfaction plan" because Kiss does not disclose "the use of any reasoning, optimization, or taking into account any advice parameters or constraints." PO Resp. 115. Patent Owner also argues that Kiss "does not have the capability of formulating an 'optimal or near-optimal' 'goal satisfaction plan' utilizing reasoning as described in the '560 patent." *Id.* at 117 (citing

Ex. 2032 ¶ 212). These arguments are predicated on Patent Owner's proposed construction of "goal satisfaction plan" to mean "a plan for the satisfaction of a complex goal expression in an optimal or near-optimal manner that is consistent with any advice parameters or constraints." *See id.* at 32. As discussed above in § II.C.1, we disagree with Patent Owner that the claim term "goal satisfaction plan" is limited as Patent Owner contends. Thus, for the reasons explained above, we disagree with Patent Owner's argument that Kiss does not disclose the "goal satisfaction plan" recited in claim 1.

Based on the complete record, we determine that Petitioner has shown sufficiently that Kiss teaches "constructing a goal satisfaction plan," as recited in claim 1.

(iv) "sub-goal requests based on non-syntactic decomposition of the base goal"

The "goal satisfaction plan" recited in claim 1 involves "using reasoning to determine sub-goal requests based on non-syntactic decomposition of the base goal." Ex. 1001, 30:10–12. As set forth above in § II.C, we have construed "non-syntactic decomposition" as "generation of a sub-request (sub-goal/sub-delegation) based on factors other than the syntax of how the goal was received or made." For this limitation, Petitioner cites Kiss's disclosure of a meta-agent responding to the user's request of "what is the effect of increasing sales by 20%?" by generating sub-requests based on the registered capabilities of agents active in the system. Pet. 39 (citing Ex. 1005, 12:54–56, 13:25–27, 13:37–39, 13:56–57, 14:3–5). Because the tasks or sub-requests are formulated based on knowledge of the capabilities of underlying knowledge systems, Petitioner asserts, they are not based on the syntax of the request. *Id.* at 40 (citing Ex. 1005, 8:32–48). As an

example, Petitioner points out that the sub-request asking for confirmation that "the cost per unit at the specified number of units does not exceed the market price plus an acceptable profit" does not relate to the syntax of the base goal ("what is the effect of increasing sales by 20%?"). *Id.* (citing Ex. 1005, 13:25–27).

Patent Owner does not specifically dispute that Kiss teaches this limitation. *See generally* PO Resp. Based on the complete record and for the reasons explained by Petitioner, we are persuaded that Petitioner has demonstrated sufficiently that Kiss teaches this limitation.

(v) "co-ordinate and schedule efforts by the service-providing agents"

The "goal satisfaction plan" in claim 1 also involves "using said reasoning to co-ordinate and schedule efforts by the service-providing electronic agents for fulfilling the sub-goal requests in a cooperative completion of the base goal." Ex. 1001, 30:12–15. For this limitation, Petitioner refers to the example in Figures 8–20 of Kiss. Pet. 42–43. For instance, Petitioner asserts that Kiss's meta-agent coordinates and schedules efforts by the service-providing agents when it pushes a task onto an agenda to query a sales agent. *Id.* at 42 (citing Ex. 1005, 12:29–36; Fig. 9). Petitioner also asserts that Kiss teaches "fulfilling the sub-goal requests in a cooperative completion of the base goal" because Kiss's meta agent asks the agent registry to identify a knowledge agent that has registered a capability to answer a question related to sales. *Id.* (citing Ex. 1005, 12:29–36).

Patent Owner does not specifically dispute that Kiss teaches this limitation. *See generally* PO Resp. Based on the complete record and for the reasons explained by Petitioner, we are persuaded that Petitioner has demonstrated sufficiently that Kiss teaches this limitation.

(vi) "using reasoning"

In claim 1, both aspects of the goal satisfaction plan—determining sub-goal requests and coordinating and scheduling efforts by agents—must be accomplished "using reasoning." Ex. 1001, 30:10–15. In addition to citing the example in Figures 8–20 of Kiss, Petitioner contends that the various inferencing schemes disclosed in Kiss to formulate dynamic solution plans and to allocate tasks to agents constitute "reasoning" to determine and fulfill sub-goal requests. Pet. 42–44 (citing Ex. 1005, 5:29–40, 7:20–41, 7:53–56, 7:65–8:4, 12:29–36).

Patent Owner contends that the "solution plan" of Kiss is not constructed by "using reasoning" because Kiss's inferencing schemes are used only "[a]fter the solution plan is formulated . . . to perform the search and execution phases." PO Resp. 115 (citing Ex. 1005, 8:58–60). In response, Petitioner persuasively argues that the Petition additionally relies on several other ways in which Kiss utilizes reasoning to formulate a solution plan "using various types of reasoning and allocating tasks to different agents." Pet. Reply 56 (citing Pet. 40; Ex. 1005, 5:33–64; Ex. 1050 ¶¶ 266–267). For example, Kiss describes how the meta-agent can "formulate parallel sub-plans and perform iterative and recursive procedures." *Id.* (quoting Ex. 1005, 5:37–39); *see* Pet. 38–39, 42–44; Ex. 1050 ¶¶ 266–267.

Based on the complete record, we determine that Petitioner has shown sufficiently that Kiss teaches "using reasoning to determine sub-goal requests based on non-syntactic decomposition of the base goal and using said reasoning to co-ordinate and schedule efforts by the service-providing electronic agents for fulfilling the sub-goal requests in a cooperative completion of the base goal," as recited in claim 1.

g. "interagent communication language" limitations

Claim 1 recites that "the plurality of service-providing electronic agents and the distributed facilitator agent communicate using an interagent Communication Language (ICL)." Ex. 1001, 30:16–19. The ICL includes "a layer of conversational protocol defined by event types and parameter lists associated with one or more of the events, wherein the parameter lists further refine the one or more events." *Id.* at 30:19–23. Petitioner asserts that Kiss teaches communication among agents, and that communication in the proposed combination of references occurs via the Agent Communication Language of FIPA97 (FIPA ACL). Pet. 44 (citing Ex. 1007, vii, ix, 51, Fig. 10). Specifically, Petitioner contends that FIPA ACL employs multi-layer messaging for communication between distributed agents. *Id.* (citing Ex. 1007, 51).

Patent Owner asserts that FIPA97 does not teach "refin[ing] . . . events" as recited in claim 1. PO Resp. 121–130. Patent Owner does not dispute that FIPA97 teaches the rest of the limitations relating to an interagent communication language as recited in clam 1. *See id.* at 121–133.

As we explain below, Petitioner has demonstrated sufficiently that FIPA97 teaches these limitations reciting elements of the claimed ICL.

(i) "layer of conversational protocol"

Petitioner asserts that FIPA97 teaches "a layer of conversational protocol" recited in claim 1 because FIPA ACL "defines the semantics of *messages* between agents as including a communicative act, followed by various parameters and parameter expressions," as shown in Figure 1 of Part 2 of FIPA97 reproduced above in § II.D.2. Pet. 45 (emphasis added) (citing Ex. 1007, 12; Ex. 1050 ¶ 291). Petitioner also argues that FIPA97 "discloses a number of different performatives and rules governing FIPA

ACL messages and the meaning of the different parts" and, therefore, discloses "a layer of conversational protocol." *Id.* (citing Ex. 1007, 11–22; Ex. 1050 ¶¶ 292–295).

(ii) "events" and "event types"

As discussed above in § II.C, we construe "event" to mean "a message or goal communicated between agents" and "event type" to mean "a type of an event" for this Final Written Decision.

Petitioner maps the "event" of claim 1 to FIPA ACL's "message" and asserts that FIPA ACL's "message type" teaches an "event type" recited in claim 1. Pet. 46–47 (citing Ex. 1007, 3, 4, 11–13, 18). Petitioner argues that FIPA ACL's "message" is an "event" recited in claim 1 because the FIPA ACL communicative acts "are performed by an agent sending a *message* to another agent." *Id.* at 46 (emphasis added) (citing Ex. 1007, 3, 4, 11).

Referencing Figure 1 of Part 2 of FIPA97 reproduced above, Petitioner asserts that in FIPA ACL, "[t]he first element of the message is a word which identifies the communicative act being communicated, which defines the principal meaning of the message," and "the message's communicative act *type* corresponds to that which in KQML is called the performative." *Id.* (emphasis added) (citing Ex. 1007, 12, 13). Petitioner argues that FIPA97 further defines "message type" as corresponding to the "communicative acts/performatives of the FIPA ACL." *Id.* at 46–47 (citing Ex. 1007, 18).

As discussed above, Petitioner asserts that FIPA97 teaches "a layer of conversational protocol" because FIPA ACL "defines the *semantics of messages* between agents as including a communicative act." Pet. 45 (emphasis added) (citing Ex. 1007, 2). Petitioner contends that FIPA97 teaches that the layer of conversational protocol in FIPA ACL is "defined by

event types," as recited in claim 1, because in FIPA97, "[t]he *message types* are a reference to *the semantic acts* defined in this specification." *Id.* at 46 (emphases added) (citing Ex. 1007, 11).

(iii) "parameter list"

Claim 1 recites that "a layer of conversational protocol" is also "defined by . . . parameter lists associated with one or more of the events." Petitioner asserts that in FIPA97, FIPA ACL messages may include multiple different parameters ("parameter lists associated with one or more of the events") that can "help the message transport service to deliver the message correctly" or "the receiver to interpret the meaning of the message," or "to respond co-operatively," as shown in Figure 1 of Part 2 of FIPA97 (reproduced above). Pet. 47–48 (citing Ex. 1007, 12, 14, Fig. 1). Petitioner contends that FIPA97 discloses additional parameters in Table 1. *Id.* at 48 (citing Ex. 1007, 13–14).

(iv) "refining events"

Claim 1 recites that "the parameter lists further refine the one or more events." Petitioner asserts that this phrase should be construed to mean that "a list of parameters associated with an event can refine the event by affecting the meaning of the event." Pet. 11. Petitioner discusses the disclosures in the Specification and the prosecution history of the '560 patent in support of its proposed construction. *Id.* at 11–14 (citing Ex. 1001, 11:16–48; Ex. 1002, 13–14, 51, 55; Ex. 1020, 5, 6; Ex. 1050 ¶¶ 111–118).

Although Patent Owner discusses constructions for several terms in the Patent Owner Response, Patent Owner does not discuss Petitioner's proposed construction for the claim term "refine . . . events" or propose its own construction. *See* PO Resp. 29–52. Instead, Patent Owner argues that

FIPA97 does not teach parameters that "refine . . . events" under Petitioner's proposed construction. *See id.* at 121 ("the cited parameters in FIPA97 do not, contrary to Petitioner's assertion, affect the meaning of the message"), 124 ("this parameter **does not** affect the **meaning** of the message"), 125 ("In contrast, the FIPA97 'receiver' parameter **does not affect the meaning of the 'inform' communicative act**."). Based on the arguments and evidence presented by Patent Owner, we understand Patent Owner not to dispute Petitioner's proposed construction for the term "the parameter lists further refine the one or more events."

Upon considering the complete record, we agree with Petitioner that the claim term "refine . . . events" encompasses "affecting the meaning of the events." As discussed above, during prosecution, the limitation "wherein the parameter lists further refine the one or more events" was added to claim 1 of the parent '115 patent in an amendment to distinguish the claim from the combination of Nwana/KQML and Kiss cited by the Examiner. *See* Ex. 1002, 13–14, 18, 28, 51; Pet. 13–15 (citing Ex. 1002, 13–14, 51). Citing the disclosures of Nwana/KQML discussed by the Examiner, Petitioner persuasively argues that the parameters of Nwana's KQML "tell" message (i.e., the claimed "event") do not change the meaning of the message, whereas the parameters of an event in the '560 patent change the meaning of the event by "refin[ing] the event." Pet. 11–14 (citing Ex. 1002, 13–14, 51, 55; Ex. 1020, 5, 6).

The following passage from the Specification distinguishes the '560 patent's ICL (i.e., the recited "interagent communication language") from KQML:

> For example, in KQML, a request to satisfy a query can employ either of the performatives ask_all or ask_one. In ICL, on the

> other hand, this type of request preferably is expressed **by the event type ev_post_solve, together with the solution_limit(N) parameter--where N can be any positive integer**. (A request for all solutions is indicated by the omission of the solution limit parameter.) The request can also be accompanied by other parameters, which combine to further refine its semantics. In KQML, then, this example forces one to choose between two possible conversational options, neither of which may be precisely what is desired. In either case, the performative chosen is a single value that must capture the entire conversational characterization of the communication.

Ex. 1001, 11:38–53. Petitioner argues that a message having the KQML performative "ask_all" always has the same meaning, requesting all solutions to the request, just as the KQML performative "ask_one" always requests one solution. Pet. 12. According to Petitioner, in contrast, the meaning of the '560 patent's event "ev_post_solve" depends on the value of its parameter "solution_limit(N)"—e.g., an agent may request the identity of three agents capable of translating a document by including "solution_limit(N)" in the message and setting the value of N to 3. *Id.* Thus, Petitioner argues that the parameters of an event of the '560 patent affect the meaning of the event. *Id.* at 12–14.

We are persuaded by Petitioner's argument and evidence that the "parameterized approach" of the '560 patent (Ex. 1001, 11:38–53) can refine an event by changing the meaning of the event. As discussed above in § II.C, we construe "event" to mean "a message or goal communicated between agents" and "goal" to mean "a request for service." The '560 patent describes that "[i]n one embodiment, a request for one of an agent's services normally arrives in the form of an *event* from the agent's facilitator." *Id.* at 12:61–63 (emphasis added). In a section titled "Refining Service Requests," the '560 patent describes as follows:

> In a preferred embodiment of the present invention, *parameters* associated with a goal (or sub-goal) can draw on useful features to *refine the request's meaning*. For example, it is frequently preferred to be able to specify whether or not solutions are to be returned synchronously; this is done using the reply parameter, which can take any of the values synchronous, asynchronous, or none. As another example, when the goal is a non-compound query of a data solvable, the cache parameter may preferably be used to request local caching of the facts associated with that solvable.

Id. at 16:5–15 (emphases added). Thus, the '560 patent describes that in an embodiment, parameters of a request for service, i.e., an event, can refine the "meaning" of the request or event.

Nonetheless, we note that this passage and all of the disclosures of the '560 patent cited by Petitioner describe exemplary embodiments. *See id.* at 11:42–45 ("In ICL . . . this type of request *preferably* is expressed by the event type ev_post_solve, together with the solution_limit(N) parameter--where N can be any positive integer." (emphasis added)), 16:6–8 ("In a *preferred embodiment* of the present invention, *parameters* associated with a goal (or sub-goal) can draw on useful features to *refine the request's meaning*." (emphases added)). Thus, the term "refine . . . events" recited in claim 1 may encompass but is not necessarily limited to "affecting the meaning of events." *See SuperGuide*, 358 F.3d at 875 ("a particular embodiment appearing in the written description may not be read into a claim when the claim language is broader than the embodiment"); *WesternGeco*, 889 F.3d at 1323–24 ("It is well established that claims are not limited to preferred embodiments, unless the specification clearly indicates otherwise."). Indeed, Petitioner's proposed construction of the term "the parameter lists further refine the one or more events" expresses the meaning

of the term in a permissive fashion—"an event *can* refine the event by affecting the meaning of the event." Pet. 11 (emphasis added).

Based on the complete record, we determine that the term "the parameter lists further refine the one or more events" encompasses parameters "affecting the meaning of the events."

Petitioner asserts that FIPA97 teaches "the parameter lists further refine the one or more events" because several of the conversational layer parameters disclosed in FIPA97 affect the meaning of the performative included within the message, and therefore affect the meaning of the message, or event. Pet. 49. According to Petitioner, FIPA97 discloses a parameter ":receiver," which "can alter the meaning [of] an event, such as 'inform,' to be 'inform one'" or "inform a number' of agents, depending on the value of the parameter." *Id.* (citing Ex. 1007, 13). Citing the testimony of Dr. Lieberman, Petitioner asserts that naming a tuple "corresponds to the action of multicasting the message" such that "semantics of this multicast" is refined so that "the message is sent to each agent named in the tuple." *Id.* (citing Ex. 1007, 13; Ex. 1050 ¶ 314). Petitioner argues that "[t]his 'tuple naming' functionality is analogous to the example provided in the ['560 patent] of 'solution_limit(N),' in which 'N' modifies how many solutions are requested, and is not found in the KQML Nwana reference that was before the examiner." *Id.* (citing Ex. 1001, 11:32–48; Ex. 1020; Ex. 1050 ¶ 314). Petitioner also asserts that FIPA97 discloses two other parameters—":protocol" (when used with the "call for proposals" performative) and ":conversation-id"—that affect the meaning of a message. *Id.* at 49–50 (citing Ex. 1007, 13–14, 46–49; Ex. 1050 ¶¶ 316–321).

Patent Owner asserts that FIPA97 does not teach parameters "refin[ing] . . . events," as recited in the claim, because the parameters of

FIPA97 cited by Petitioner do not affect the meaning of the message. PO Resp. 121. In particular, Patent Owner contends that FIPA97's ":receiver" parameter of the FIPA97 "inform" message relied upon by Petitioner is no different from KQML's ":receiver" parameter for the KQML "tell" message in that both modify the message but do not affect the meaning of the message. *Id.* at 122 (citing Ex. 1007, 12; Ex. 1020, 5). Patent Owner asserts that FIPA97's ":receiver" parameter does not affect the meaning of the FIPA97 "inform" message because "the result of this parameter is only that the message is multicast; i.e., it is 'sent to each agent named in the tuple.'" *Id.* at 124. According to Patent Owner, "the content of the message is unchanged; the only thing that changes is who (as in, recipient) receives the message." *Id.*

The portion of FIPA97 cited by Petitioner is reproduced below:

Message Parameter:	**Meaning:**
:sender	Denotes the identity of the sender of the message, i.e. the name of the agent of the communicative act.
:receiver	Denotes the identity of the intended recipient of the message. Note that the recipient may be a single agent name, or a tuple of agent names. This corresponds to the action of multicasting the message. Pragmatically, the semantics of this multicast is that the message is sent to each agent named in the tuple, and that the sender intends each of them to be recipient of the CA encoded in the message. For example, if an agent performs an inform act with a tuple of three agents as receiver, it denotes that the sender intends each of these agent to come to believe the content of the message.

Ex. 1007, 13. Pointing to this disclosure in FIPA97, Petitioner asserts that the "receiver" parameter affects the meaning of the event by affecting "whether the performative communicates the message to a single agent, a

selection of agents, or if [the message is] broadcast to every agent." Pet. Reply 62 (citing Ex. 1007, 13). According to Petitioner, "in FIPA97, an event using 'inform' can *mean three or more different things* (i.e., inform (1) one person, (2) a select group of people, (3) everybody) depending on the value of just that parameter." *Id.* at 63.

We agree with Petitioner's argument and disagree with Patent Owner's argument. As shown above in the portion of FIPA97 relied on by Petitioner, FIPA97 describes the "meaning" of the message affected by the ":receiver" parameter (under the column heading "Meaning:") as follows:

> Note that the recipient may be a single agent name, or a tuple of agent names. This corresponds to the action of multicasting the message. Pragmatically, the semantics of this multicast is that the message is sent to each agent named in the tuple, and that the sender *intends* each of them to be recipient of the CA encoded in the message. For example, if an agent performs an inform act with a tuple of three agents as receiver, it denotes that the sender *intends* each of these agent to come to believe the content of the message.

Ex. 1007, 13 (emphases added). We agree with Petitioner this passage describes, under the column heading "Meaning," the meaning of the message modified or affected by the ":receiver" parameter.

Patent Owner argues that the FIPA97 ":receiver" parameter does not change "the content of the message" and that "the only thing that changes is who (as in, recipient) receives the message." PO Resp. 124. Patent Owner contends that, in contrast, the solution_limit(N) parameter of the '560 patent "modifies the actual request/communicative act/performative itself—i.e., [**ev_post_solve**], because it imposes a modification on the limits of **solutions** presented in response to a request." *Id.* at 125 (citing Ex. 2032 ¶ 262).

We disagree with Patent Owner's argument. First, we disagree with Patent Owner that the FIPA97 ":receiver" parameter changes only "who (as in, recipient) receives the message." As described in FIPA97, the ":receiver" parameter does not merely specify "who receives the message," e.g., agent A as opposed to agent B. Rather, as persuasively explained by Petitioner, the ":receiver" parameter affects the qualitative aspect of the message—i.e., whether to inform (1) one agent, (2) a select group of agents, or (3) every known agent. *See* Pet. Reply 63.

In addition, Patent Owner does not explain adequately why the solution_limit(N) parameter of the '560 patent specifying the number of agents to be queried "modifies the actual request/communicative act/performative itself" but the ":receiver" parameter of FIPA97 specifying the number of agents to which to send a message does not. *See* PO Resp. 125. We agree with Petitioner that Patent Owner does not identify "a practical distinction between limiting the number of agents to be queried (solution_limit(N)), and querying a selection of agents (:receiver)." Pet. Reply 63.

Next, Patent Owner contends that FIPA97 does not teach parameters "refin[ing] . . . events," as recited in the claim, because FIPA97's ":receiver" parameter is the same as or similar to the KQML ":receiver" parameter, which does not modify the meaning of a message. PO Resp. 122 (citing Ex. 1007, 12; Ex. 1020, 5). In support of its argument, Patent Owner cites a page from Dr. Finin's presentation slides at an unidentified meeting or class, which compares "KQML tell and FIPA ACL inform." *Id.* at 123 (citing Ex. 2019, 15; Ex. 2068, 132:6–22.). Patent Owner also cites the testimony from Dr. Finin at his deposition that "the general idea of agent

communication language that was embodied in KQML is similar to the one that is embodied in FIPA." *Id.* (citing Ex. 2068, 32:10–17).

Patent Owner, however, does not discuss the disclosure of KQML/Nwana (Ex. 1020) sufficiently (other than pointing to the similarity of the format between the ":receiver" parameter of KQML and FIPA97) or explain adequately why KQML's ":receiver" parameter is similar to the FIPA97 ":receiver" parameter. *See* PO Resp. 122–124. For example, Patent Owner does not explain whether KQML's ":receiver" parameter specifies, similar to FIPA97, that "the recipient may be a single agent name, or a tuple of agent names," that "the message is sent to each agent named in the tuple," and that "the sender *intends* each of them to be recipient of the message." *See id.*; Ex. 1007, 13 (emphasis added). The general statements from Dr. Finin (or a slide purportedly from his unidentified presentation) cited by Patent Owner (PO Resp. 123 (citing Ex. 2019, 15; Ex. 2068, 132:6–22, 32:10–17)) regarding the alleged similarity between KQML and FIPA97 at a general level are simply insufficient to override the specific disclosures in FIPA97 cited by Petitioner regarding the meaning of the message modified or affected by the FIPA97 ":receiver" parameter.

Patent Owner also cites testimony from Petitioner's declarant, Dr. Lieberman, as "confirm[ing]" that the FIPA97 ":receiver" parameter does not change "the content of the message" and that "the only thing that changes is who (as in, recipient) receives the message." PO Resp. 124 (citing Ex. 2069, 110:14–111:16, 168:5–12). The cited testimony of Dr. Lieberman, however, discusses FIPA97's messages and multicasting in general (responding to general questions from Patent Owner's counsel) and does not discuss the specific disclosure in FIPA97 cited by Petitioner regarding the meaning of the message modified or affected by the FIPA97

":receiver" parameter. *See* Ex. 2069, 108:4–111:16, 168:5–12. Thus, we disagree with Patent Owner that the testimony of Dr. Lieberman cited by Patent Owner "confirm[s]" that the FIPA97 ":receiver" parameter does not change "the content of the message" and that "the only thing that changes is who (as in, recipient) receives the message." *See* PO Resp. 124.

Next, Patent Owner cites 23 paragraphs from the Declaration of Dr. Cohen (Ex. 2033) to argue that "FIPA97 does not contain any conversational layer parameters that affect the semantics of FIPA97 messages." PO Resp. 127 (citing Ex. 2033 ¶¶ 70–92). Patent Owner, however, does not discuss Dr. Cohen's testimony in the Patent Owner Response or explain how Dr. Cohen's testimony supports its contention. *See id.* Thus, to the extent Patent Owner purports to rely on Dr. Cohen's testimony, this amounts to improper incorporation by reference in violation of 37 C.F.R. § 42.6(a)(3). Accordingly, we decline to consider the cited paragraphs from the Cohen Declaration.[19]

Lastly, Patent Owner contends that the limitation "the parameter lists further refine the one or more events" requires "the parameters of an event (or message) can refine the message or goal itself" (PO Resp. 121) or "change the nature of the communicative act itself" (*id.* at 126). Although it is not entirely clear what Patent Owner argues,[20] to the extent Patent Owner argues "refin[ing]" a message or goal requires changing the message or goal

[19] Nonetheless, we note that Dr. Cohen's testimony appears to dwell in generalities, e.g., citing the works of logicians/philosophers Tarski and Frege (*see* Ex. 2033 ¶¶ 84–85), and discusses tuples and multicasting in general terms (*see id.* ¶¶ 88–92).

[20] As discussed above, Patent Owner does not dispute Petitioner's proposed construction of the term "the parameter lists further refine the one or more events." *See* PO Resp. 29–52.

itself, we disagree with Patent Owner's argument. As discussed above, in a section titled "Refining Service Requests," the '560 patent describes examples of "parameters" associated with a request or goal that "refine the request's meaning," including the "reply parameter" that specifies whether solutions are to be returned synchronously or asynchronously, and the "cache parameter" that specifies local caching of facts related to the request. *See* Ex. 1001, 16:5–15. These parameters do not appear to change the request itself but, rather, specify how the request should be handled—e.g., synchronous response, local caching, etc. Thus, we disagree with Patent Owner's argument that the claim requires the recited "parameters" "refine the message or goal itself" (PO Resp. 121) or "change the nature of the communicative act itself" (*id.* at 126). Such an interpretation, which "excludes a [disclosed] embodiment from the scope of the claim is rarely, if ever, correct." *Broadcom Corp. v. Emulex Corp.*, 732 F.3d 1325, 1333 (Fed. Cir. 2013) (quoting *Accent Pkg., Inc. v. Leggett & Platt, Inc.*, 707 F.3d 1318, 1326 (Fed. Cir. 2013)) (citing *Phillips*, 415 F.3d at 1312–13).

Based on the foregoing and upon considering the complete record, we determine that Petitioner has shown sufficiently that FIPA97 teaches "wherein the parameter lists further refine the one or more events," as recited in claim 1. Based on the complete record and for the reasons explained by Petitioner, we determine that Petitioner has shown sufficiently that FIPA97 teaches "a layer of conversational protocol defined by event types and parameter lists associated with one or more of the events, wherein the parameter lists further refine the one or more events," as recited in claim 1.

h. Conclusion for Claim 1

On the full record now before us, we are persuaded that Petitioner has shown sufficiently that the combination of Kiss and FIPA97 teaches or suggests all the limitations of claim 1 and that a person of ordinary skill in the art would have combined the references in the manner asserted in the Petition. We weigh this evidence of obviousness together with Patent Owner's evidence of objective indicia of nonobviousness, *infra* § II.G.14, before reaching our final determination as to patentability of claim 1.

3. Dependent Claim 2

Claim 2 depends from claim 1 and further recites "wherein the distributed facilitator agent includes a plurality of single process facilitator agents each executing within a separate computer process, each of the single process facilitator agents being bi-directionally coupled with at least one other single process facilitator agent." Ex. 1001, 30:24–30.

Petitioner contends that a "single process facilitator agent" within the context of the '560 patent is a "facilitator agent executing within a single computer process." Pet. 10 (citing Ex. 1050 ¶¶ 99–100). The term "single process facilitator agent" appears only in the claims of the '560 patent and is not substantively discussed in the prosecution history. *See* Ex. 1050 ¶ 100. *See generally* Ex. 1001; Ex. 1120. Patent Owner does not address Petitioner's proposed construction or propose its own. *See* PO Resp. 29–52, 102–104. Upon considering the complete record, we adopt Petitioner's proposed construction because it is consistent with the language of claim 1 requiring "a distributed facilitator agent functionally distributed across at least two computer processes" and the language of claim 2 reciting that this "distributed facilitator agent includes a plurality of single process facilitator

agents *each executing within a separate computer process*." Ex. 1001, 29:63–64, 30:25–27 (emphasis added).

As discussed in connection with claim 1, Petitioner adequately shows that Kiss's meta-agents may be functionally distributed across multiple computer processes. Petitioner contends that each of Kiss's meta-agents is additionally a "single process facilitator agent," as recited in claim 2, because each is responsible for matching requests with agent capabilities and is executing on a separate system, and thus executing within a separate computer process. Pet. 51–52 (citing Ex. 1005, 6:66–7:4, Fig. 21). Petitioner argues that Figure 21 of Kiss shows multiple meta-agents distributed across the Internet on separate systems. *Id.* (citing Ex. 1005, Fig. 21; Ex. 1050 ¶ 336). Petitioner argues that Kiss describes a knowledge management system that can be networked across the Internet with other similar systems to create a large scale, global system and that Kiss's meta-agent layer supports scalability such that multiple independent meta-agents (i.e., "single process facilitator agents") can coordinate and solve problems over distributed systems (i.e., "each executing within a separate computer process"). *Id.* at 52 (citing Ex. 1005, 14:30–35, Fig. 21; Ex. 1050 ¶ 337). Petitioner also contends that Kiss's distributed meta-agents are "bi-directionally coupled," as recited in claim 2, because they are interconnected over the Internet, allowing them to communicate with each other. *Id.* at 54 (citing Ex. 1005, 14:32–33; Ex. 1050 ¶ 342).

In its response to Petitioner's analysis of claim 2, Patent Owner argues that the disclosures of Kiss relied on by Petitioner merely establish that Kiss's system can have multiple meta-agents. PO Resp. 103. Patent Owner, however, acknowledges elsewhere that a person of ordinary skill in the art would have recognized that two of Kiss's meta-agents on separate systems

are different instances of the same agent with the same capabilities, each operating within separate computer processes. *Id.* at 105 (citing Ex. 2032 ¶ 174). Therefore, we are persuaded that Petitioner has shown sufficiently, with support from Dr. Lieberman, that Kiss teaches or suggests "a plurality of single process facilitator agents each executing within a separate computer process" and each "being bi-directionally coupled with at least one other single process facilitator agent," as recited in claim 2.

Petitioner also argues that FIPA97 teaches its Directory Facilitator may be distributed over multiple computer processes and is further operable to be "executing within a separate computer process." Pet. 53 (citing Ex. 1006, Fig. 2). Patent Owner disagrees with Petitioner's argument. PO Resp. 103. As explained above with respect to claim 1, we find Petitioner's reliance on Kiss sufficient to teach or suggest a "distributed facilitator agent functionally distributed across at least two computer processes." *See supra* § II.G.2.c.ii. Similarly, we find Petitioner's reliance on Kiss sufficient to teach or suggest that the distributed facilitator agent further includes a plurality of single process facilitator agents, as required by claim 2.

Based on the foregoing and upon considering the complete record, we determine that Petitioner has shown sufficiently that Kiss teaches or suggests that the distributed facilitator agent of claim 1 further includes "a plurality of single process facilitator agents each executing within a separate computer process" and each "being bi-directionally coupled with at least one other single process facilitator agent," as recited in claim 2.

4. Dependent Claim 3

Claim 3 depends directly from claim 2 and further requires "each single process facilitator agent" to have "any necessary facilitating functionality." Ex. 1001, 30:34–35. Claim 3 also recites:

a specific single process facilitator including:

a specific agent registry that declares capabilities for each of the plurality of service-providing electronic agents currently active within the process wherein the specific single process is executing, the specific agent registry further declaring capabilities made available to the specific single process facilitator agent through the at least one other single process facilitator agent bi-directionally coupled with the specific single process facilitator agent; and

a specific facilitating engine operable to interpret a service request as a base goal, the specific facilitating engine further operable to determine sub goals required to complete the base goal; the specific facilitating engine further operable to select service providing agents best capable of completing the sub goal and assigning the sub goals thereto.

Ex. 1001, 3:36–51. We address these limitations in turn.

(i) "necessary facilitating functionality"

Petitioner asserts that the facilitator agents identified in Kiss and FIPA97 in its analysis of claim 1 "are operable to manage agent registries, conduct collaborative task completion, generate solution[] plans, delegate tasks, and conduct distributed inferencing and utilize problem solving techniques—along with other facilitator functionality." Pet. 56. Therefore, although the '560 patent provides little guidance as to what the claim language means, Petitioner contends that the combination of Kiss and FIPA97 teaches a facilitator agent with any "necessary facilitating functionality."

(ii) "specific agent registry"

Petitioner asserts that, as discussed with respect to claims 1 and 2, the combination of Kiss's meta-agent and agent service layer is a "single process facilitator" that includes an "agent registry." Pet. 56 (citing

Ex. 1050 ¶ 352). Petitioner also asserts that the claim language "service-providing electronic agents currently active within the process" refers to the process in which the associated "single process facilitator" is executing. *Id.* (citing Ex. 1050 ¶ 351). Petitioner further cites Kiss's description of knowledge agents in a system registering its capabilities and interests with the agent service layer. *Id.* at 56–57 (citing Ex. 1005, 6:45–7:9, 12:1–17 (Table 1), 12:18–20; Ex. 1050 ¶ 353). Therefore, according to Petitioner, Kiss's agent registry maintains a list of the capabilities of all service-providing agents active within a given specific single process. *Id.* at 57. Thus, Petitioner argues, Kiss teaches "a specific agent registry that declares capabilities for each of the plurality of service-providing electronic agents currently active within the process wherein the specific single process is executing," as recited in claim 3. *Id.* at 56.

(iii) "capabilities made available" between "bi-directionally coupled" facilitator agents

Petitioner relies on the FIPA97 directory performative "search" for teaching that a Directory Facilitator (part of a facilitator agent in the combined Kiss/FIPA97 system) "make[s] available" the capabilities of an agent in its agent registry to another Directory Facilitator (i.e., another facilitator agent) that is requesting information. Pet. 59 (citing Ex. 1006, 18, 25; Ex. 1050 ¶ 362). Petitioner contends that the Directory Facilitators are "bi-directionally coupled" facilitator agents because they communicate over FIPA97's Agent Communication Channel using FIPA ACL. *Id.* (citing Ex. 1050 ¶ 362); *see* Ex. 1006, 2. We find Petitioner has shown sufficiently that the asserted combination of Kiss and FIPA97, with Kiss's single process facilitator agents communicating via FIPA ACL and using FIPA97's "search" performative, teaches or suggests "the specific agent registry

further declaring capabilities made available to the specific single process facilitator agent through the at least one other single process facilitator agent bi-directionally coupled with the specific single process facilitator agent," as recited in claim 3.

(iv) "determine sub goals"

Petitioner contends that in the combination of Kiss and FIPA97, Kiss teaches a "specific facilitating engine operable to interpret a service request as a base goal . . . and further operable to determine subgoals required to complete the base goal," as recited in claim 3, for the same reasons it teaches "a facilitating engine operable to interpret a service request as a base goal . . . and using reasoning to determine sub-goal requests," as recited in claim 1. Pet. 60; *see supra* §§ II.G.2.f.ii, iv.

(v) "assigning sub goals"

Referring to the examples in Figures 8–20 of Kiss, Petitioner contends that Kiss's meta-agent dispatches queries (i.e., "sub goals") to various specialized agents based on a determination that the targeted agent has a knowledge module appropriate for the query (i.e., "operable to select service providing agents best capable of completing the sub goal and assigning the sub goals thereto"). Pet. 60 (citing Ex. 1050 ¶ 275).

(vi) Conclusion for Claim 3

Patent Owner does not specifically dispute that the combination of Kiss and FIPA97 teaches or suggestions the limitations of claim 3 beyond its arguments advanced with respect to claim 2 discussed above. *See* PO Resp. 102–103. Based on the complete record, and for the reasons explained by Petitioner, we determine that Petitioner has demonstrated sufficiently that the combination of Kiss and FIPA97 teaches all the limitations of claim 3.

5. Dependent Claim 4

Claim 4 depends directly from claim 3 and further recites "wherein at least two of the plurality of single process facilitator agents reside upon separate computer systems." Ex. 1001, 30:53–55. Petitioner contends that Kiss teaches this limitation for the same reasons it teaches "a plurality of single process facilitator agents each executing within a separate computer process," as recited in claim 2. Pet. 61. As discussed in in § II.G.3, Kiss shows two meta-agents distributed across separate computer processes on "separate computer systems."

Patent Owner does not specifically dispute that the combination of Kiss and FIPA97 teaches or suggestions the limitations of claim 4 beyond its arguments advanced with respect to claim 2 discussed above. *See* PO Resp. 102–103. Based on the complete record, and for the reasons explained by Petitioner, we determine that Petitioner has demonstrated sufficiently that the combination of Kiss and FIPA97 teaches all the limitations of claim 4.

6. Dependent Claim 14

Claim 14 depends from claim 1 and further recites "wherein the distributed facilitator agent is formed in a hierarchical topology." Ex. 1001, 31:24–26. As discussed above in § II.C.3, we construe the term "hierarchical topology" as "an arrangement of units or parts having multiple levels."

Under this asserted ground of obviousness, Petitioner relies on FIPA97 for teaching the limitations of claim 14. Pet. 61–63. Petitioner asserts that FIPA97 describes Directory Facilitators (DFs) "formed in a

hierarchical topology." Pet. 61–62 (citing Ex. 1006, 18; Ex. 1050 ¶ 456). Figure 4 of Part 1 of FIPA97 is reproduced below:

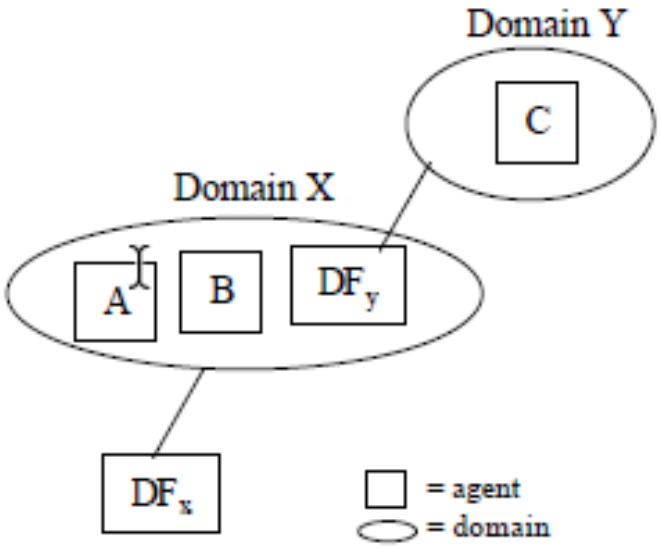


Figure 4 — Agent Domains

Figure 4 above illustrates agent domains in FIPA97. Ex. 1006, 18. As shown in Figure 4, DF_x is the Directory Facilitator for Domain X, which includes agents A and B and DF_y, which is the Directory Facilitator for Domain Y. *Id.* FIPA97 provides that "[a]gent domains can be structured where a DF registers with other DFs[, and] [a]gents can query information on agents in other domains through its DF *escalating the query to a level* at which it can be resolved." *Id.* (emphasis added). In such a case, FIPA97 explains, "the response to the query is passed through the *hierarchy* to the agent which originated the query." *Id.* (emphasis added). Petitioner contends that FIPA97 teaches a "distributed facilitator agent . . . formed in a hierarchical topology" because DF_x supports connections to DF_y, a lower level directory. PO Resp. 62.

Petitioner additionally cites details of the Personal Travel Assistance application in Part 4 of FIPA97, a specific implementation of FIPA97's agent management architecture. *Id.* at 63. Figure 3 of Part 4 of FIPA97 is reproduced below:

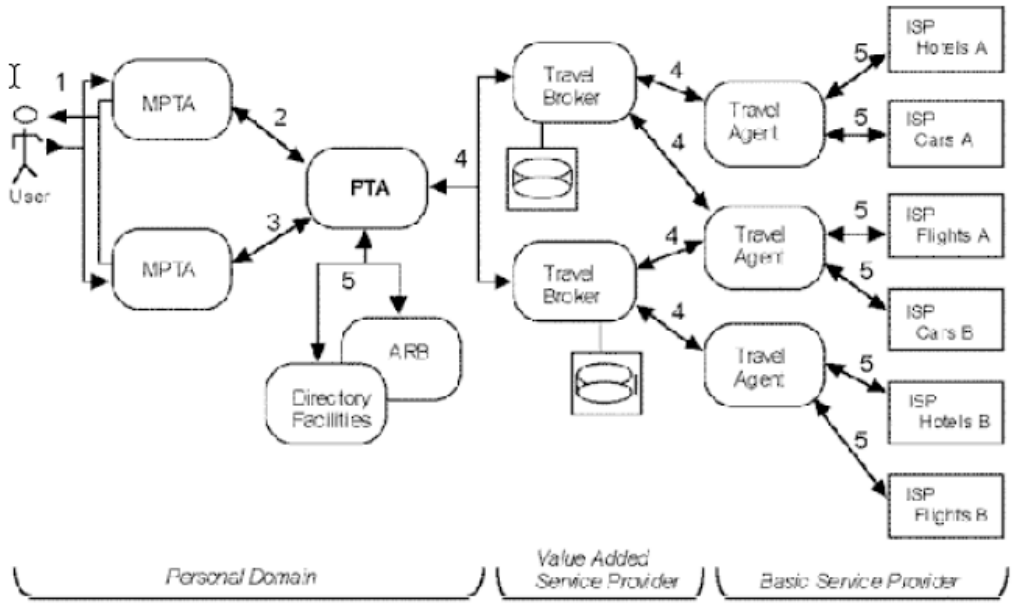


Figure 3. PTA Architecture

Figure 3 above depicts the architecture of FIPA97's Personal Travel Assistance application. Ex. 1009, 10. Petitioner contends that in this example, the Personal Travel Assistant (PTA) contains the functionality of a facilitator agent, as it includes a DF named "CompanyXYZ.df." Pet. 63 (citing Ex. 1009, 13). Petitioner also contends that the PTA's capability of using "Dutch auctions as well as contract net for conversation – with brokers or with service providers directly" demonstrates facilitator functionality. *Id.*; Ex. 1009, 11. Petitioner contends that travel broker agents are also facilitators. Pet. 64. Petitioner argues that Figure 3 shows a "distributed facilitator agent . . . formed in a hierarchical topology." *Id.* at 63.

Patent Owner argues that Petitioner "purports to stitch . . . together" "two completely different disclosures" within FIPA97—Part 1 (Agent Management) and Part 4 (Personal Travel Assistance)—without any explanation of how or why the combination would work. PO Resp. 108–109 (citing Pet. 62–63). We disagree with Patent Owner. The Petition makes clear that Part 4 of FIPA97 describes an *application* of FIPA97's agent management system, and that the PTA architecture in Figure 3 of FIPA97 Part 4 is an *example* showing how the hierarchical topology of Figure 4 of FIPA97 Part 1 is implemented in the PTA application. *See* Pet. 63; *see also* Ex. 1006, v (explaining that FIPA97's informative application descriptions, including the Personal Travel Assistance application, are "examples" of how the normative specifications (i.e., Parts 1–3) can be applied). Thus, Petitioner cites FIPA97's Personal Travel Assistance disclosure as an alternative example of a "hierarchical topology," not as something to be combined with Figure 4 of FIPA97 Part 1. *See* Pet. 63; Pet. Reply 48.

Patent Owner also argues that Petitioner fails to show "any true hierarchy within the system whereby one facilitator agent out-ranks another." PO Resp. 109 (citing Pet. 62–63; Ex. 2032 ¶ 188). As indicated in § II.C.3, Patent Owner equates "rank" with "level" in its claim construction argument. Moreover, FIPA97 describes the topology in Figure 4 as a "hierarchy" and explains how one Directory Facilitator (e.g., DF_x) "escalate[s]" a query to a different "level." Ex. 1006, 18. Accordingly, we disagree with Patent Owner's argument and find that the FIPA97 figures cited by Petitioner show a "hierarchical topology" as claimed.

Based on the foregoing and upon considering the complete record, we determine that Petitioner has shown sufficiently that in the combined system

of Kiss and FIPA97, FIPA97 teaches or suggests a distributed facilitator agent "formed in a hierarchical topology," as recited in claim 14.

7. Dependent Claim 15

Claim 15 depends from claim 14 and further recites:

> wherein the hierarchical topology includes a top level facilitator agent and at least one other facilitator agent registered within the top level facilitator agent, the top level facilitator agent operable to directly manage those service-providing agents registered within the top level facilitator agent and indirectly manage those service-providing agents registered within the at least one other agent registered with the top level facilitator agent.

Ex. 1001, 31:27–35. Petitioner contends that in Figure 4 of FIPA97 Part 1, reproduced in the previous section, Directory Facilitator DF_x is a "top level facilitator agent" and DF_y is "at least one other facilitator agent registered within the top level facilitator agent." Pet. 64–65 (citing Ex. 1006, 18; Ex. 1050 ¶ 464). Petitioner contends that DF_x is "operable to directly manage those service-providing agents registered within the top level facilitator agent" (e.g., agents A and B in Figure 4) and to "indirectly manage those service-providing agents registered within the at least one other agent registered within the top level facilitator agent" (e.g., agent C in Figure 4 registered with DF_y). *Id.* at 65–66 (citing Ex. 1006, 18; Ex. 1050 ¶ 469).

Petitioner alternatively contends that in Figure 3 of FIPA97 Part 4, reproduced in the previous section, the PTA is a "top level facilitator agent" and a travel broker is "at least one other facilitator agent registered within the top level facilitator agent" as required by claim 15. *Id.* at 64 (citing Ex. 1050 ¶ 464). Petitioner contends that the PTA manages travel broker agents (i.e., other facilitators) and services such as location and web servers

(i.e., client agents). *Id.* Petitioner also contends that the PTA satisfies the limitations of claim 15 because it "is a specific implementation of the general FIPA97 directory facilitator [and] likewise contains this functionality." *Id.* at 66 (citing Ex. 1050 ¶ 470).

As Petitioner points out, Patent Owner does not dispute that DF_x in Figure 4 is a "top level facilitator agent" that meets all the limitations of claim 15. *See* PO Resp. 108–110; *see* Pet. Reply 50. For the reasons presented by Petitioner and discussed above, Petitioner has shown sufficiently that DF_x in Figure 4 of FIPA97 Part 1 meets all the requirements of a "top level facilitator agent" set forth in claim 15.

Patent Owner argues that Petitioner fails to show that the PTA in Figure 3 of FIPA97 Part 4 is a "top level facilitator agent" as recited in claim 15. PO Resp. 109–110. Although Petitioner relies on the PTA example as an alternative for teaching the limitations of claim 15, we address the parties' arguments because Petitioner cites that disclosure for teaching the limitations of claims 16–19, which depend from claim 15. *See* Pet. 66–70.

Patent Owner argues that the PTA does not manage travel brokers because a table in FIPA97 listing capabilities of different agent types "contains no hint of PTA managing 'travel broker agents,' as Petitioner suggests." PO Resp. 109 (citing Ex. 1009, 9; Ex. 2032 ¶ 191). But that table provides "internal" capabilities of different agent types and does not purport to describe the PTA's interactions with other agents. *See* Ex. 1009, 9. Patent Owner also contends that the PTA does not manage travel brokers when it conducts Dutch auctions. PO Resp. 109–110. In its Reply, Petitioner points out that the "PTA handle[s] the PTA ontology for making regular travel arrangements" and reiterates that the PTA interacts with travel

brokers through Dutch auctions and contract net. Pet. Reply 53 (citing Pet. 64; Ex. 1009, 11; Ex. 1148, 2; Ex. 1050 ¶¶ 464, 466). PO also argues that a travel broker is not a facilitator agent. PO Resp. 110. We agree with Petitioner, however, that a travel broker operates as a facilitator when it negotiates and consolidate services. *See* Pet. Reply 53 (citing Ex. 1009, 8, 9 ("Travel Broker Agents are probably the most complex agents.")).

For the reasons provided by Petitioner, and upon considering the complete record, we determine that Petitioner has shown sufficiently that in the combined system of Kiss and FIPA97, FIPA97 teaches or suggests a "top level facilitator agent" meeting the limitations of claim 15.

8. Dependent Claims 16–19

Claims 16–19 each depend directly from claim 15 and place further limitations on the "top level facilitator agent" or the "at least one other facilitator agent." Ex. 1001, 31:36–48. For each of these claims, Petitioner relies on the PTA example in FIPA97 Part 4 discussed above. Pet. 66–70.

Claim 16 requires the "top level facilitator agent" and the "at least one other facilitator agent" to be "executing on different computer systems." Ex. 1001, 31:36–39. Petitioner asserts that the PTA (i.e., the top level facilitator agent) and the travel broker (i.e., the other facilitator agent) execute within different domains and have physical addresses indicating they reside on different servers. Pet. 66–67 (citing Ex. 1009, 10–11).

Claim 17 requires the "other facilitator agent" to be "installed for a specific computer user." Ex. 1001, 31:40–42. Petitioner points to the Mini-PTA (MPTA) in Figure 2 as a smaller, compact implementation of the PTA, and therefore a facilitator agent, that is implemented for a small company or single user. Pet. 68–69 (citing Ex. 1009, 11).

Claim 18 requires the "other facilitator agent" to be "installed for a specific group of users." Ex. 1001, 21:43–45. Petitioner contends that a person of ordinary skill in the art would have understood multiple instances of the PTA could be installed for multiple users, e.g., a company's entire staff. Pet. 69–70.

Claim 19 requires the "other facilitator agent" to be "installed for a specific computer application." Ex. 1001, 31:46–48. Petitioner contends that the PTA system is operable to install a Flight Service Provider that maintains a number of agents for domestic and international travel and makes reservations or accepts purchases for flights. Pet. 70 (citing Ex. 1009, 12). Petitioner contends the Flight Service Provider is a facilitator agent because it is responsible for matching requests from users and agents with descriptions of other agents' capabilities. *Id.* (citing Ex. 1009, 12). Petitioner further contends the Flight Service Provider is for a specific computer application because it is installed to provide a specific task—making and accepting reservations for flights. *Id.* (citing Ex. 1009, 12).

Patent Owner does not specifically dispute that FIPA97 teaches or suggests the limitations of claims 16–19 beyond its arguments advanced with respect to claims 14 and 15 discussed above. *See* PO Resp. 108–110. Based on the complete record, and for the reasons explained by Petitioner, we determine that Petitioner has demonstrated sufficiently that in the combined system of Kiss and FIPA97, FIPA97 teaches or suggests the additional limitations of claims 16–19.

9. Independent Claim 26

Independent claim 26 is directed to a "distributed facilitator agent" and contains many limitations that are the same as or similar to those in independent claim 1. For those limitations, Petitioner refers back to its

analysis for claim 1. Pet. 71–73. For the reasons discussed above, notwithstanding Patent Owner's arguments, Petitioner has shown sufficiently that the combination of Kiss and FIPA97 teaches or suggests those limitations.

Claim 26 additionally requires the facilitating engine to be "operable to parse a service request in order to interpret a compound goal." Ex. 1001, 32:35–36. As set forth in § II.C, a "compound goal" is a single goal expression that specifies multiple sub-goals to be performed. Petitioner provides a detailed explanation and specific citations showing that FIPA ACL allows the expression of multiple sub-goals. Pet. 71–72 (citing Ex. 1007, 15–17, 31, 40, 41, 53, 69, 75, 78). Petitioner also contends FIPA97's Directory Facilitator and Kiss's meta-agent both are facilitators that include internal mechanisms for parsing a service request in order to interpret a compound goal. *Id.* at 72 (citing Ex. 1005, 12:21–14:30; Ex. 1007, 15). Patent Owner does not specifically dispute that Kiss teaches this limitation. *See generally* PO Resp. Based on the complete record and for the reasons explained by Petitioner, we are persuaded that Petitioner has demonstrated sufficiently that Kiss teaches a facilitating engine "operable to parse a service request in order to interpret a compound goal," as recited in claim 26.

Patent Owner does not respond specifically to Petitioner's challenge to claim 26 beyond Patent Owner's arguments advanced with respect to claim 1 discussed above. On the full record now before us, we are persuaded that Petitioner has shown sufficiently that the combination of Kiss and FIPA97 teaches or suggests all the limitations of claim 26.

10. Dependent Claim 36

Claim 36 depends directly from independent claim 26 and further recites substantially the same limitations as dependent claim 2. Petitioner refers back to its analysis for claim 2, and Patent Owner advances the same arguments as it does for claim 2. Pet. 73; PO Resp. 103. For the same reasons set forth above respect to claim 2, Petitioner has shown sufficiently that Kiss teaches or suggests the limitations of claim 36. Accordingly, based on the complete record, and for the reasons explained by Petitioner, we are persuaded that Petitioner has shown sufficiently that the combination of Kiss and FIPA97 teaches or suggests all the limitations of claim 36.

11. Dependent Claim 37

Claim 37 depends directly from claim 36 and contains many limitations that are the same as or similar to those in dependent claim 3. For those limitations, Petitioner refers back to its analysis for claim 3. Pet. 73–74.

Claim 37 also requires "a specific facilitating engine operable to parse a service request in order to interpret an arbitrarily complex goal set forth therein." Ex. 1001, 33:36–38. As Petitioner asserts, the '560 patent defines "arbitrarily complex goal expression" or "arbitrarily complex goal" as a "goal expressed in a language or syntax that allows the expression of multiple sub-goals and can potentially include more than one type of logical connector (e.g., AND, OR, NOT), and/or more than one level of logical nesting (e.g., use of parentheses), or the substantive equivalent, although not every goal is itself necessarily complex." Pet. 74 (citing Ex. 1001, 14:62–15:10); *see id.* at 10. Petitioner argues that this definition does not require multiple sub-goals to be expressed within the request, but instead requires only that the goal be expressed in a language "that allows the expression of

multiple sub-goals." *Id.* at 74. Petitioner contends that in the combined system of Kiss and FIPA97, the request "What is the effect of increasing sales by 20%?" is an "arbitrarily complex goal" because it is a goal expressed in FIPA ACL, which allows the expression of multiple sub-goals and can potentially include more than one type of logical connector and more than one level of logical nesting (e.g., use of parentheses), or the substantive equivalent. *Id.* at 74–75.

Claim 37 further requires the specific facilitating engine to be "operable to construct a goal satisfaction plan using reasoning to determine sub-goal requests based on non-syntactic decomposition of the base goal and using said reasoning to co-ordinate and schedule efforts by the service-providing electronic agents for fulfilling the sub-goal requests in a cooperative completion of the base goal." Ex. 1001, 33:39–45. Petitioner asserts that the combination of Kiss and FIPA97 teaches this limitation for the same reasons discussed with respect to claim 1, which recites virtually identical claim language. Pet. 75; *see supra* § II.G.2.f.vi.

Patent Owner does not present arguments beyond those discussed above with respect to claim 2. Based on the complete record, and for the reasons explained by Petitioner, we are persuaded that Petitioner has shown sufficiently that the combination of Kiss and FIPA97 teaches or suggests all the limitations of claim 37.

12. Dependent Claim 38

Claim 38 depends directly from claim 37 and further recites substantially the same limitations as dependent claim 4. Petitioner refers back to its analysis for claim 4, and Patent Owner does not present arguments beyond those discussed above with respect to claim 2. Based on the complete record, and for the reasons explained by Petitioner, we are

persuaded that Petitioner has shown sufficiently that the combination of Kiss and FIP A97 teaches or suggests all the limitations of claim 38.

13. Dependent Claims 39–44

Claims 39–44 depend directly or indirectly from claim 38 and further recite substantially the same limitations as dependent claims 14–19. Ex. 1001, 33:49–34:6. Petitioner refers back to its analysis for claims 14–19 (Pet. 75–76), and Patent Owner does not present arguments beyond those discussed above with respect to claims 14 and 15. Based on the complete record, and for the reasons explained by Petitioner, we are persuaded that Petitioner has shown sufficiently that in the combined system of Kiss and FIP A97, FIP A97 teaches or suggests the limitations of claims 39–44.

14. Objective Indicia of Nonobviousness

In determining whether the challenged claims would have been obvious as Petitioner alleges, we must also weigh secondary considerations of nonobviousness, such as commercial success, long-felt but unmet need, failure of others, and unexpected results. *KSR,* 550 U.S. at 406. A nexus is required between the merits of the claimed invention and any objective evidence of nonobviousness if that evidence is to be given substantial weight in reaching a conclusion on obviousness. *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1539 (Fed. Cir. 1983). Evidence of secondary considerations is only significant if there is a nexus with respect to the claimed invention. *Ormco Corp. v. Align Tech., Inc.*, 463 F.3d 1299, 1311–12 (Fed. Cir. 2006).

Nexus is a legally and factually sufficient connection between the objective evidence and the claimed invention, such that the objective evidence should be considered in the determination of nonobviousness. *See Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1392

(Fed. Cir. 1988). For instance, commercial success is relevant if it flows from the merits of the claimed invention. *Sjolund v. Musland*, 847 F.2d 1573, 1582 (Fed. Cir. 1988). The burden of showing nexus is on the patent owner. *In re Huang*, 100 F.3d 135, 139–40 (Fed. Cir. 1996). Objective evidence of nonobviousness also must be commensurate in scope with the claims that the evidence is offered to support. *In re Kulling*, 897 F.2d 1147, 1149 (Fed. Cir. 1990).

Patent Owner contends that objective indicia of nonobviousness confirm the nonobviousness of the '560 patent. PO Resp. 140–163. Patent Owner argues that industry praise for a software application known as "Siri," "which was first made available for download to iPhone users on Apple, Inc.'s App Store on February 4, 2010," bears a nexus to the claims of the '560 patent. *Id.* at 142, 163. Patent Owner argues that the "personal context awareness and service delegation 'main technical components' of the Siri application are made possible by the claims of the '560 Patent." *Id.* at 154.

Patent Owner asserts that the '560 patent "was based on SRI International's development of version 2 of the Open Agent Architecture ('OAA')." *Id.* at 153 (citing Ex. 2032, App'x A; Ex. 1001, 23:35–36). For support, Patent Owner relies on Exhibit 2054, an SRI web page, which states, "SRI developed OAA® software, which is designed with intelligent 'agents' that track human interactions and work processes to streamline electronic and computer interchange." *Id.* at 153–54 (quoting Ex. 2054). Patent Owner further asserts that "[a]fter version 2 of OAA was developed, SRI International spun out Siri, Inc. as an SRI venture, where the Siri application was created based on an OAA groundwork." *Id.* at 154 (citing Ex. 2054 ("OAA laid the groundwork for the DARPA-funded CALO

project, from which Siri, the first virtual personal assistant, was born. Siri was spun out into an SRI venture that Apple acquired from SRI.")). Apple Inc. apparently acquired Siri, Inc. in April 2010, approximately two months after the Siri application's initial release.[21] *See id.* at 9, 142, 154.

Patent Owner argues that its "evidence of industry praise . . . satisfies the nexus requirement, as it shows praise for the Siri application's integration of personal context awareness into a service-delegating virtual personal assistant." *Id.* at 154; *see id.* at 143–54. Patent Owner also argues that "industry journalists recognized that the Siri application filled an unmet need for a true virtual personal assistant." *Id.* at 159; *see id.* at 159–63.

To establish a nexus between claim 1 of the '560 patent and the Siri application, Patent Owner provides the chart below. *Id.* at 155–57. Patent Owner relies, in significant part, on the opinion of its declarant, Dr. Medvidovic, to establish a nexus between the Siri application and the claims of the '560 patent. *See* Ex. 2032 ¶¶ 282–290.

[21] We note for the record that the effective filing date for the '560 patent is Jan. 5, 1999, approximately ten years prior to the Siri application's initial release.

Siri's Description of Technology Feature	Claim 1 of the '560 Patent
Personal Context Awareness A virtual assistant gives different answers depending on individual preferences and personal context (place, time, history), and if you give it permission, learns more about you so that it can shorten your time-to-task. Information you teach Siri in one domain (e.g. movies) is applied automatically to opportunities rising from other domains. Any personal information you provide Siri is stored in a highly secure, PCI-compliant co-location center, and used only with your explicit permission to accelerate your task completion.	"wherein the plurality of service-providing electronic agents and the distributed facilitator agent communicate using an interagent Communication Language (ICL), wherein the ICL includes: a layer of conversational protocol defined by event types and parameter lists associated with one or more of the events, wherein the parameter lists further refine the one or more events."
Service Delegation An assistant can reason about what specific set of resources or services would best be combined to help you	"1. A software-based, flexible computer architecture for communication and cooperation among distributed electronic agents, the architecture

accomplish a particular task. Siri's patented service delegation algorithms combine numerous attributes about each service provider, including quality scores, fine-grained ratings for specific capabilities, speed measures, and geographic constraints, to plan and execute an optimized strategy for handling your request. Live data is pulled fresh from source sites and world-changing actions are handled in a transaction-safe manner. For example, in a restaurant selection task, Siri integrates information from many sources (local business directories, geospatial databases, restaurant guides, restaurant review sources, menu sites, online reservation services and the user's own favorites) to show results that meet the user's natural language request.	contemplating a distributed computing system comprising: a plurality of service-providing electronic agents; a distributed facilitator agent functionally distributed across at least two computer processes, the facilitator agent capable of bi-directional communications with the plurality of service-providing electronic agents, the facilitator agent including: an agent registry that declares capabilities for each of the plurality of service-providing electronic agents currently active within the distributed computing environment; and a facilitating engine operable to interpret a service request as a base goal, the facilitating engine further operable for generating a goal satisfaction plan associated with the base goal, wherein the goal satisfaction plan involves: using reasoning to determine sub-goal requests based on non-syntactic decomposition of the base goal and

	using said reasoning to co-ordinate and schedule efforts by the service-providing electronic agents for fulfilling the sub-goal requests in a cooperative completion of the base goal; and"

PO Resp. 155–157.

Patent Owner argues that "the Siri application's integration of personal context awareness is made possible because of the claimed inter-agent language limitations." PO Resp. 157 (citing Ex. 2032 ¶ 288). Patent Owner explains that "[b]y having a layer of conversational protocol that has parameter lists, the ['560 patent] describes how agents can then use the parameters in the parameter lists to provide feedback or advice to agents who directly, or indirectly through the facilitating agent, receive the service request." *Id.* (citing Ex. 1001, 16:15–25). For example, Patent Owner explains that a "requesting agent can utilize such a parameter to provide context on a user's preference to the facilitator agent and/or the tasking agents." *Id.* (citing Ex. 2032 ¶ 290). Patent Owner argues that "[t]his same functionality of being able to account for individual preferences, for example, was described by Siri, Inc. as representing personal context awareness." *Id.* at 158 (citing Ex. 2040, 2).

Patent Owner also argues that:

> the Siri application's service delegation corresponds to the claimed dynamic interpretation limitations. Siri, Inc. described the service delegation feature of the Siri application as including "an assistant [that] can reason about what specific set of resources or services would best be combined to help you

> accomplish a particular task." This is precisely what is claimed in the dynamic interpretation limitations, *e.g.*, "generating a goal satisfaction plan associated with the base goal . . . using reasoning . . . to coordinate and schedule efforts by the service-providing electronic agents for fulfilling the sub-goal requests in a cooperative completion of the base goal."

Id. (citing Ex. 2032 ¶ 287).

Petitioner argues that Patent Owner's "secondary considerations position rests primarily on an unsubstantiated, conclusory opinion that certain aspects of the ['560 patent] are embodied in the Apple product 'Siri.'" Pet. Reply 76. Petitioner argues that as "Dr. Medvidovic conceded, the evidence he relied on is 'circumstantial,' or a 'suggestion.'" *Id.* (citing Ex. 1129, 147:12–15). Petitioner argues that Dr. Medvidovic "never reviewed the Siri source code, and indeed never even asked to review that source code." *Id.* (citing Ex. 1129, 146:20–147:6, 147:22–148:9). Petitioner argues,

> [t]he failure to review the code is fatal, because [Dr. Medvidovic] further testified that an "agent"—an element in every claim—is a "piece of functionality that is capable of performing certain tasks that is embodied in at least for a software engineer a clearly identifiable body of code," and that to distinguish an "agent" from any other software he "would have to look inside the code."

Id. (quoting Ex. 1129, 9:14–11:8).

Petitioner faults Patent Owner for "not seek[ing] that code through a motion for additional discovery or other means, [or] seek[ing] any other objective evidence (such as specifications) to support its assertions." *Id.* at 77. Petitioner also faults Patent Owner for not seeking the testimony of Mr. Adam Cheyer, one of the named co-inventor's on the '560 patent and a co-founder of Siri, Inc. *Id.*; *see* PO Resp. 142. During the oral hearing in

this proceeding, counsel for Patent Owner was asked about this potential source of evidence:

> JUDGE TROCK: Counsel, this is Judge Trock again.
>
> Do you have any evidence from Mr. Cheyer that this Siri version that you're discussing right now incorporated the claim limitations of the '115 patent?
>
> MS. ABDULLAH: Your Honor, we do not have any direct evidence from Mr. Cheyer. And the reason is because he was never deposed in this proceeding and he is also not a consultant or anybody that's working with IPA at the moment. I know --
>
> JUDGE TROCK: Wasn't he deposed -- sorry. Wasn't he deposed in the Google proceeding?
>
> MS. ABDULLAH: He was, your Honor. And that was pursuant to a subpoena that we had to get permission to serve from the Board because he refused to simply cooperate with us voluntarily.
>
> JUDGE TROCK: Was there a reason why you didn't approach the Board in this case for a subpoena?
>
> MS. ABDULLAH: Your Honor, because we don't believe that his testimony is as probative as the expert testimony that we presented drawing the direct connection as well as the actual industry praise and long-felt need evidence that we --
>
> JUDGE TROCK: But wouldn't he be a witness

with personal knowledge of whether or not that original Siri version incorporated the claim limitations of the '115 patent?

MS. ABDULLAH: Your Honor, respectfully, I believe that that was not -- that would not be a question of personal knowledge but rather of expert testimony. And also, your Honor, I would note that I don't believe that we would have the requisite showing under the Garmin factors that he would be able to testify to those aspects.

JUDGE TROCK: But he is the inventor, right? You've told us that.

MS. ABDULLAH: Yes, your Honor, he is the inventor.

JUDGE TROCK: All right. So he might be a person -- a witness with personal knowledge; isn't that right?

MS. ABDULLAH: Absolutely. And were this a district court case, you know, I'm sure we would have pursued his deposition. I'm sure Microsoft would have as well. But given the high burden for us to obtain additional discovery, your Honor, we determined that the probative value of his testimony was not such that it would meet the Garmin factors here.

JUDGE TROCK: But you did pursue that in the Google case though?

MS. ABDULLAH: Your Honor, the Google case was a different issue. The question there had to do

16 with authorship of a prior art reference that
17 Mr. Cheyer was an author of. And it had to do with
18 whether that could be considered the work of another
19 versus the inventor. So inventorship was front and
20 center in the Google proceedings where it is not
21 here. Here this is a 103 analysis for which, you
22 know, obviously I can't pretend to say what the
23 Board would have done. But I think the evidence
24 that we have, that we have been able to present
25 demonstrates that link better than Mr. Cheyer's
26 testimony would be able to.

Tr. 114:12–116:26.

Petitioner also points to evidence that potentially undermines a nexus between the challenged claims of the '560 patent and the Siri application. For example, Petitioner argues that "Adam Cheyer testified that 'Siri' did not implement the agent registry functionality described in the ['115 and '560 patents]." Pet. Reply 77–78 (citing Ex. 2034, 46:12–47:5).

Petitioner also argues that Patent Owner's "evidence credits the CALO project with being the progenitor of the ideas that led to Siri—not any version of OAA." *Id.* at 78 (citing Ex. 2042, 1 ("Siri traces its origins to a military-funded artificial-intelligence project called CALO"); Ex. 2044, 1; Ex. 2047, 2; Ex. 2054, 1; Ex. 2001, 2). "Nor is there any evidence in the record," Petitioner argues, "that OAA was ultimately utilized in SRI's CALO project other than that the original OAA (*i.e.,* the version first created in 1994 prior to the '560 Patent work) laid 'groundwork' for what would ultimately become CALO." *Id.* (citing Ex. 2054). Petitioner argues that "substantial evidence shows that a later agent system named 'SPARK' (SRI Procedural Agent Realization Kit) was used as the basis of CALO," but that

Patent Owner "ignores this intervening SPARK system and makes no attempt to show it practices the claims, nor does it meaningfully address the CALO project." *Id.* (citing Ex. 1136 § 7).

Petitioner argues that Patent Owner "failed to provide evidence 'that the industry praised a claimed invention or a product that embodies the patent claims.'" *Id.* at 78–79 (quoting *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1053 (Fed. Cir. 2016)) (emphasis omitted). In particular, Petitioner argues, Patent Owner "failed to 'establish that the evidence relied upon traces its basis to a novel element in the claim and not to something in the prior art.'" *Id.* at 79 (quoting *BioMarin Pharm. Inc. v. Genzyme Therapeutic Prods. LP*, IPR2013-00537, Paper 79 at 22 (PTAB Feb. 23, 2015)) (emphasis omitted).

"Furthermore," Petitioner argues, Patent Owner "has provided no showing that the Siri App 'embodies the claimed features and is co-extensive with them,' and accordingly can gain no presumption from any Siri success." *Id.* (quoting *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1072 (Fed. Cir. 2018)) (emphasis omitted). "Even assuming portions of Siri embodied the claims," Petitioner argues, "the record is undisputed that Siri provides significant functionality well beyond anything covered by the claims—voice recognition, for example." *Id.* at 79–80.

Petitioner further argues "the table provided by [Patent Owner] merely lists unrelated claim language and 'examples' of 'personal context awareness' with no further analysis." *Id.* at 80. "For example," Petitioner argues, Patent Owner "provides no explanation about how the alleged 'Personal Context Awareness' feature in Siri practices 'a layer of conversational protocol.'" *Id.* (emphasis omitted). Moreover, Petitioner argues, "despite claiming that 'the Siri application's integration of personal

context awareness is made possible because of the claimed inter-agent language limitations,' [Patent Owner] provides no evidence." *Id.* at 81. Rather, Petitioner continues, Patent Owner "cites only to a single paragraph of Dr. Medvidovic's declaration, which is itself bare *ipse dixit* and further undermined by his failure to examine the source code or any other descriptive technical materials for Siri." *Id.* (citing Ex. 2032 ¶ 288).

Petitioner argues that Patent Owner's evidence that Siri embodies the ICL limitations of claim 1 "is no better." *Id.* at 81–82 (citing PO Resp. 158). Petitioner argues Patent Owner:

> does not discuss the actual limitations of claim 1 nor explain how giving different answers depending on individual preferences embodies the claims. For example, [Patent Owner] does not even attempt to articulate how Siri has a conversational layer, or event types, or how those event types are refined by parameters. Nor does [Patent Owner] address how Siri embodies the claimed agent registry limitation, particularly when the testimony of the inventor Mr. Cheyer indicates that it does not.

Id. at 82 (citing Ex. 2034, 46:12–47:5).

Petitioner also argues that Dr. Medvidovic's testimony should be given no weight. *Id.* Petitioner argues that:

> Dr. Medvidovic admitted that he would be unable to determine whether a piece of software was an "agent" without examining the source code for that software, and further admitted that he had not reviewed the Siri source code nor ever asked to review such source code. Yet, Dr. Medvidovic opines at length that Siri must embody the claims of the ['560 patent] because, for example, "personal context awareness and service delegations are made possible by the functionality claimed in the independent claims of the ['560 patent]"—an opinion without any evidentiary support. Indeed, by Dr. Medvidovic's own admission, he lacks the necessary personal knowledge to opine on the architecture of Siri.

Id. at 82–83 (quoting Ex. 2032 ¶ 286) (citing Ex. 1129, 11:9–16).

We agree with Petitioner that Patent Owner does not provide persuasive evidence that the Siri application is reasonably commensurate with the scope of the challenged claims. Patent Owner's cited evidence attempting to tie the Siri application to the limitations of claim 1 relies substantially on the opinion testimony of Dr. Medvidovic (Ex. 2032) and a web.archive.org Internet page (Ex. 2040) Patent Owner identifies as "Siri, Inc., Technology – 'About Siri – Your Virtual Personal Assistant.'" *See* PO Resp. 155–57 (citing Ex. 2032 ¶¶ 282–286, 288; Ex. 2040, 1–2), 174.

We note at the outset that Dr. Medvidovic's opinion does not rely on an examination of the Siri application's source code. During his deposition, Dr. Medvidovic testified as follows:

> [Q] Let me ask you, have you ever reviewed the Siri source code?
>
> [A] I have not.
>
> [Q] So you don't know the details of how Siri is implemented?
>
> [A] Not beyond what I'm stating in the declaration as my sources of information that I'm drawing on.

Ex. 1129, 146:10–17. This is significant because Dr. Medvidovic testified at his deposition that an "agent"—an element in every claim—is a "piece of functionality that is capable of performing certain tasks that is embodied in at least for a software engineer a clearly identifiable body of code," and that "if there is no accompanying specification language, then we would have to look inside the code [to determine] what kinds of facilities the agent provides." *See id.* at 9:13–11:8. Instead, Dr. Medvidovic testified, the evidence he relied upon to form his opinion is "circumstantial," or a "suggestion." *Id.* at 147:7–148:9.

In Section XII.B of his declaration, "Nexus of Industry Praise to the Independent Claims of the '560 Patent," Dr. Medvidovic cites to Exhibit 2040 as support for his understanding of how the Siri application works. *See e.g.*, Ex. 2032 ¶¶ 281–282, 284, 292, 295.

Exhibit 2040 describes "Siri" as:

> the first mainstream consumer application of a Virtual Personal Assistant. Siri is an intelligent software agent designed to have a back-and-forth conversational interaction with you as it helps you get tasks done. The three main technical components behind Siri's differentiation correspond to the essential qualities of an assistant: a conversational interface, personal context awareness and service delegation.

Ex. 2040, 1.

In his declaration, Dr. Medvidovic discusses the "personal context awareness" and "service delegation" aspects of Siri in some detail. *See, e.g.*, Ex. 2032 ¶¶ 284–286. Dr. Medvidovic, however, only mentions Siri's "conversational interface" in passing, even though Exhibit 2040 describes Siri as an intelligent software agent "designed to have a back-and-forth conversational interaction with you as it helps you get tasks done," and lists Siri's "conversational interface" as the first of Siri's "three main technical components." *See* Ex. 2032 ¶ 281; Ex. 2040, 1.

In his declaration, Dr. Medvidovic attempts to link the Siri application and the limitations of the independent claims of the '560 patent. Dr. Medvidovic does this by first separating the limitations of the independent claims of the '560 patent into two categories, an "Inter-agent Communication Layer" (ICL) and "Service Request Planning and Execution." *See* Ex. 2032 ¶ 287. Dr. Medvidovic then states that "[i]t is my opinion that the Siri application's integration of personal context awareness is made possible because of the claimed ICL limitations above." *Id.* ¶ 288.

Dr. Medvidovic explains that "within the conversational protocol layer of the ICL, there are further claimed 'parameter lists' that may 'further refine the one or more events.'" *Id.* ¶ 289. Dr. Medvidovic concludes that "[t]he claimed parameter lists are what allows the Siri application to provide 'different answers' depending on the context, as they are able to refine the meaning of a service request." *Id.* ¶ 292. Dr. Medvidovic, however, provides no citation or further support for this conclusion, nor does he point to any evidence to show that the Siri application utilizes the claimed parameter lists. *See id.*

In his declaration, Dr. Medvidovic also states that "[i]t is further my opinion that the Siri application's integration of service delegation is made possible because of the claimed service request planning and execution claim limitations." *Id.* ¶ 293. Dr. Medvidovic attempts to support this opinion by comparing the language of claim of the '560 patent to language used in Exhibit 2040 to describe the service delegation feature of the Siri application. *Id.* ¶ 295. The claim language he quotes, however, does not appear in claim 1 (or any claim) of the '560 patent. *See id.* (erroneously asserting that claim 1 recites "a suitable delegation of sub-goal requests to best complete the requested service request by using reasoning"). Thus, Dr. Medvidovic's testimony on this point is unpersuasive with respect to the '560 patent.

Petitioner also points out, and we agree, that there is evidence of record that credits the CALO project with being the progenitor of the ideas that led to Siri. *See, e.g.*, Ex. 2042, 1 ("Siri traces its origins to a military-funded artificial-intelligence project called CALO"); *see also* Ex. 2044, 1; Ex. 2047, 2; Ex. 2054, 1; Ex. 2001, 2. Opus Research explains that "Siri is set apart because it applies the depth of knowledge its founders and software

specialists have built at SRI and elsewhere in creating a 'cognitive assistant that learns and organizes' (CALO)." Ex. 2044, 1. Petitioner points out that there is also evidence of record that indicates a later agent system named "SPARK" was used as the basis of CALO. *See* Pet. Reply 78 (citing Ex. 1136 § 7). The SPARK-based Personal Assistant is described as follows:

> SPARK provides general-purpose agent technology for a range of domains that require reactive task execution. To date, the driving application for SPARK has been the development of an intelligent personal assistant for a high-level knowledge worker. This assistant, called CALO, will be able to perform routine tasks on behalf of its user (e.g., arrange meetings, complete online forms, file email), as well as undertake open-ended processes (e.g., purchasing a computer online), and anticipate future needs of its user.

Ex. 1136 § 7. This evidence, however, does not appear to have been considered or addressed by Dr. Medvidovic. *See* Ex. 2032 ¶¶ 271–295.

We are mindful that objective evidence of nonobviousness need only be "reasonably commensurate with the scope of the claims." *Rambus Inc. v. Rea*, 731 F.3d 1248, 1257 (Fed. Cir. 2013). We also bear in mind that "[w]hen the thing that is commercially successful is not coextensive with the patented invention—for example, if the patented invention is only a component of a commercially successful machine or process"—the patentee must show prima facie a legally sufficient relationship between that which is patented and that which is sold." *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019) (quoting *Demaco*, 851 F.2d at 1392).

Here, Patent Owner relies on industry praise for the Siri application and evidence of an unmet need to establish a nexus between the Siri application and the claimed invention. However, we are concerned that

Patent Owner and its declarant, Dr. Medvidovic, pay little attention to one of the "three main technical components behind Siri's differentiation," the "conversational interface," when evaluating the proffered industry praise. *See* Ex. 2040, 1.

Petitioner argues, and we agree, that "[e]ven assuming portions of Siri embodied the claims, the record is undisputed that Siri provides significant functionality well beyond anything covered by the claims—voice recognition, for example." Pet. Reply 79–80. The impression made by Siri's conversational interface on reviewers is notable. For example, MIT Technology Review explains that with Siri, "[u]sers can type or speak commands in casual sentences, and the software deciphers their intent from the context." Ex. 2042, 1. A reviewer in Opus Research reports: "I've had [Siri] for a couple of days and here are my initial reactions. My overall experience has been quite positive. The quality of voice recognition (powered by the same 'engine' that supports Dragon Dictation and Dragon Search on the iPhone) is quite good." Ex. 2044, 1. Fast Company.Com reports, "Siri, which launches today as a free iPhone app, is a virtual personal assistant that amazingly resembles . . . an actual personal assistant. It understands plain English commands, which can be spoken or typed (e.g. 'Get me tickets to that Matt Damon movie')." Ex. 2045, 2.

Further, The Chronicle of Higher Education explains that Siri "takes a multi-step search process and turns it into one, simple, voice-driven request." Ex. 2046, 2. A USA Today reviewer reported that "[t]here were occasional mistakes in speech recognition, but the overall accuracy [of Siri] was impressive, at least when I spoke slowly and clearly in a quiet environment." Ex. 2047, 2. Spatial Computing Strategy & Research reports that, with Siri, "You ask it to do stuff like 'find me a pizza place near me' or

'tell me the weather in Chicago this weekend,' [w]ith your voice or by typing commands." Ex. 2048, 2. Search Engine Land explains that Siri is "intended to enable you to do more with your voice and your phone in fewer clicks or moves." Ex. 1050, 1. It further explains that "one can speak to Siri in a more natural way. Rather than speaking like a robot and saying 'Open Table' to minimize error, you can say something more elaborate and 'conversational' such as, 'I'd like a reservation tonight around 7:30 at Le Cheval.'" *Id.* at 2.

Each of these reported examples indicate that the reviews Patent Owner relies upon to demonstrate industry praise for the Siri application considered Siri's conversational interface to be a significant part of its functionality. Unfortunately, Patent Owner and Dr. Medvidovic give Siri's conversational functionality little consideration when evaluating the reasons for the "industry praise" used to try and establish a nexus between the Siri application and the claimed invention. *See, e.g.*, Ex. 2032 ¶ 276. Even if the Siri application incorporated some of the functionality of the claimed invention, the evidence of record relied on by Patent Owner shows that the Siri application, and its attendant "industry praise," is not coextensive with the patented invention. Patent Owner does not argue that the Siri application's "conversational interface" is claimed by the '560 patent.

For these reasons, we are not persuaded that Patent Owner's evidence of industry praise for the Siri application, and evidence of an unresolved need, establishes a sufficient nexus between the Siri application and the challenged claims of the '560 patent. If anything, the evidence of record establishes only a weak or vague connection between the Siri application and the claimed invention. Accordingly, we determine that Patent Owner's

secondary considerations evidence does not weigh in favor of nonbviousness.

15. Conclusion

Having considered the *Graham* factors, including the scope and content of the prior art, the differences between the prior art and the challenged claims, and the evidence of secondary considerations, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–4, 14–19, 26, and 36–44 of the '560 patent are unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of Kiss and FIPA97.

H. Asserted Obviousness over Kiss, FIPA97, and Cohen

Petitioner adds the teachings of Cohen (Ex. 1014) to the basic combination of Kiss and FIPA97 in an asserted ground of obviousness as to dependent claims 2–4, 14–17, and 39–42. Pet. 76–92. Generally, Petitioner cites Cohen as teaching additional claimed features of facilitator agents. *Id.*

We have reviewed the parties' arguments in the Petition, Patent Owner Response, Reply, and Sur-reply, as well as the relevant evidence discussed in those papers and other record papers, including the declarations of Dr. Lieberman and Dr. Medvidovic. For the reasons that follow, we determine Petitioner has shown by a preponderance of the evidence that claims 2–4, 14–17, and 39–42 are unpatentable as obvious over the combined teachings of Kiss, FIPA97, and Cohen.

1. Cohen (Ex. 1014)

Cohen describes SRI International's Open Agent Architecture (OAA), which is mentioned in the '560 patent as a starting point for the subject matter described in the patent. *See* Ex. 1014, 1; Ex. 1001, 4:40–51. Cohen describes an "open agent architecture and accompanying user interface for networked desktop and handheld machines." Ex. 1014, 1 (Abstract).

Cohen's Open Agent Architecture "is a blackboard-based framework allowing individual software 'client' agents to communicate by means of goals posted on a blackboard controlled by a 'Server' process." *Id.* at 2. "The Server is responsible both for storing data that is global to the agents, for identifying agents that can achieve various goals, and for scheduling and maintaining the flow of communication during distributed computation." *Id.*

Cohen's distributed blackboard architecture is depicted in Figure 1 below.

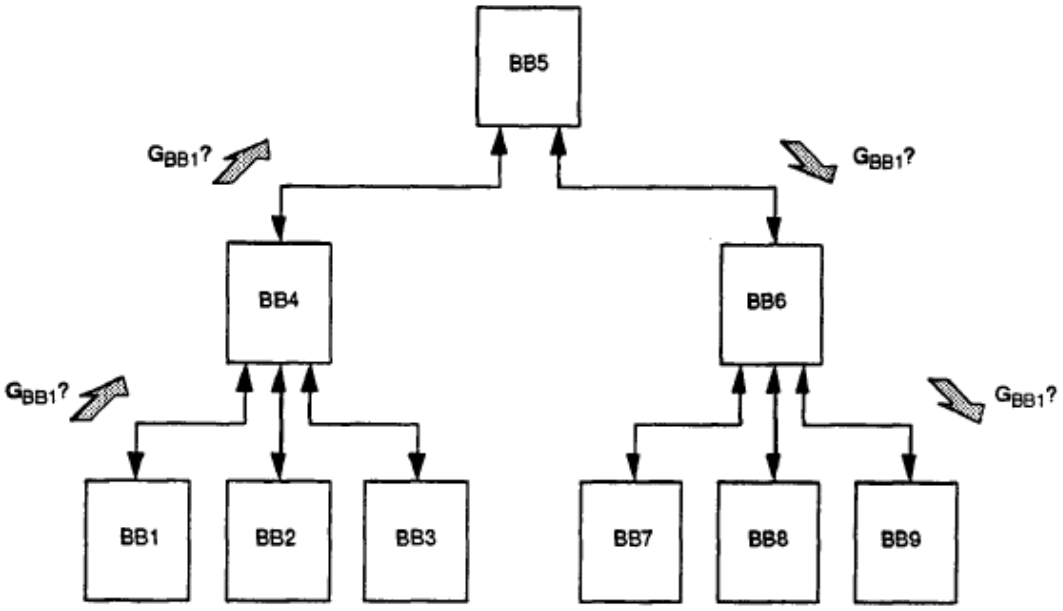


Figure 1: Hierarchy of Blackboard Servers

Id. at 3. Cohen's Figure 1, above, shows "an architecture in which a server may itself be a client in a hierarchy of servers." *Id.* at 2. If none of the server's "client agents can solve a particular goal, this goal may be passed further along in the hierarchy." *Id.*

Petitioner cites evidence showing that, among other things, Cohen was published in 1994 in conjunction with the Association for the

Advancement of Artificial Intelligence Spring Symposia that took place in March 1994, was available to conference attendees in March 1994, was received by libraries in 1997 and 1998, and was heavily cited in patents and academic papers between 1994 and 1998. Pet. 25 (citing, e.g., Ex. 1041, i; Ex. 1045; Ex. 1050 ¶¶ 170–173, 175–179). Patent Owner does not dispute Petitioner's contention that Cohen is available as prior art. *See* PO Resp. 57–58. In view of the evidence submitted by Petitioner, we find that Petitioner has demonstrated that Cohen qualifies as prior art to the '560 patent at least under 35 U.S.C. § 102(a).

2. Proposed Combination of Kiss, FIPA97, and Cohen

Petitioner argues that Cohen discloses facilitator agent functionality relating to its blackboard server that, when combined with the teachings of Kiss and FIPA97, satisfies the limitations of claims 2–4, 14–17, and 39–42. Pet. 76–78. In Petitioner's proposed combination, Cohen's blackboard functionality would be added to the meta-agent/agent registry in the combined Kiss/FIPA97 system. *Id.* at 78.

Petitioner argues that Cohen is analogous art to Kiss, FIPA97, and the '560 patent because it describes the same OAA architecture as the '560 patent. *Id.* at 77 (citing Ex. 1014, 1; Ex. 1050 ¶¶ 207–208, 331–332). The combination, Petitioner argues,

> would have been the arrangement of old elements (i.e., Blackboard server functionality of Cohen, the functionality of FIPA97, and the system of Kiss) with each performing the same function it had been known to perform (e.g., methods of complex trigger implementation (Cohen); implementing communication between distributed agents (FIPA97); distributed agents conducting cooperative task competition and problem solving (Kiss)) and yielding no more than what one would expect from such an arrangement (a system of

> distributed agents, able to communicate and set triggers to conduct cooperative task completion and problem solving).

Id. (citing Ex. 1050 ¶ 333). Petitioner also argues a

> Skilled Artisan would have been motivated to combine Cohen with Kiss/FIPA97 in this manner because Cohen encourages the incorporation of components from other systems and seeks to 'support distributed execution of a user's requests,' as does FIPA97 and Kiss, which would have . . . led a Skilled Artisan to consider these agents-based technologies in combination. Moreover, the Cohen Blackboard server operates as a 'facilitator agent,' as does the meta-agent/agent registry of Kiss/FIPA97, providing additional motivation to combine such similar functionality of these systems in order to achieve the benefits of each.

Id. at 77–78 (citing Ex. 1014, 1, 2; Ex. 1005, 3:1–4, 12:21–14:30, Figs. 8–20; Ex. 1006, 6–7; Ex. 1007, vii; Ex. 1050 ¶¶ 328, 334, 589). Petitioner further argues that Cohen discloses several agent characteristics that would have motivated a person of ordinary skill in the art to adopt Cohen's teachings, including delegation capabilities, data-directed execution, communication, reasoning, and planning. *Id.* at 78 (citing Ex. 1014, 1).

With respect to the reason a person of ordinary skill in the art would have combined the teachings of Cohen with those of Kiss and FIPA97, Patent Owner argues that Dr. Lieberman's annotated figures showing that Cohen's blackboard functionality would be added to Kiss's meta-agent demonstrate hindsight bias. *See* PO Resp. 98–99. We disagree with Patent Owner on this point for essentially the same reasons discussed above with respect to the combination of Kiss and FIPA97. *See* § II.G.1. Petitioner provides persuasive evidence that a person of ordinary skill in the art would have had reason to incorporate aspects of Cohen's blackboard server into Kiss's meta-agent as part of a "facilitator agent" and apply Cohen's agent

characteristics to agents in the combined system. *See, e.g.*, Pet. 77–78; Ex. 1050 ¶¶ 328–334.

For these reasons, we find that Petitioner has articulated sufficient reasoning with rational underpinning for why a person of ordinary skill in the art at the time of the invention would have combined the teachings of Kiss, FIPA97, and Cohen in the manner proffered by Petitioner.

3. Dependent Claim 2

Claim 2 depends directly from claim 1 and further recites "wherein the distributed facilitator agent includes a plurality of single process facilitator agents each executing within a separate computer process, each of the single process facilitator agents being bi-directionally coupled with at least one other single process facilitator agent." Ex. 1001, 30:24–30. As explained in § II.G.3, we adopt Petitioner's proposed construction of a "single process facilitator agent" as a "facilitator agent executing within a single computer process."

In Petitioner's proposed combination of Cohen with Kiss and FIPA97, the functionality of Cohen's blackboard servers is combined with that of Kiss's meta-agents, so that Cohen's blackboards and Kiss's meta-agents form part of the claimed "distributed facilitator agent." *See* Pet. 78. Petitioner asserts that in Cohen, each blackboard system contains "one blackboard 'server' process, and many client agents," and "the individual client agents communicate with each other by 'means of goals posted on a blackboard controlled by a "Server" process.'" *Id.* at 78–79 (citing Ex. 1014, 2; Ex. 1050 ¶¶ 328–329). Petitioner contends that each blackboard becomes a "single process facilitator agent" in a network of facilitator agents (i.e., a "distributed facilitator agent") because "each blackboard is relegated to a distinct sub-process of the larger distributed

network, and is responsible for matching requests, from users and agents, with descriptions of the capabilities of other agents." *Id.* (citing Ex. 1050 ¶ 330).

Petitioner contends that Cohen's distributed blackboard hierarchy is "distributed over a network" and that each blackboard executes on a different host machine. Pet. 80 (citing Ex. 1014, 2). Petitioner asserts, therefore, that Cohen's blackboard servers communicate and cooperatively solve problems while each is "executing within a separate computer process." *Id.* (citing Ex. 1050 ¶ 340).

Petitioner also contends that each blackboard server in Cohen is able to communicate and interoperate with at least one other server in the hierarchy and propagates a query through the network until an agent capable of solving the goal is found. *Id.* at 81 (citing Ex. 1014, 2). Petitioner contends that this communication is bi-directional because following a query, a solution is routed to the originating blackboard. *Id.* (citing Ex. 1014, 2). Thus, Petitioner contends, Cohen's blackboard servers are single process facilitator agents that are "bi-directionally coupled." *Id.* (citing Ex. 1050 ¶ 347).

Patent Owner argues that Cohen's blackboard system is not a facilitator system. PO Resp. 104. As discussed above, however, Petitioner has shown sufficiently that a person of ordinary skill in the art would have combined Cohen's blackboard functionality with that of Kiss's meta-agents to form part of the claimed distributed facilitator agent. *See* Pet. Reply 42. Patent Owner also argues that Cohen does not disclose separate computer processes. PO Resp. 104 (citing Ex. 2032 ¶ 171). Petitioner persuasively shows, however, that a person of ordinary skill in the art would have understood each blackboard server to represent an independent computer

process. *See* Pet. 79; Pet. Reply 43; Ex. 1050 ¶ 328; *see also* Ex. 1050 ¶ 498 ("Because of their independence and distributed nature a Skilled Artisan would consider each Blackboard server to be a separate computer process.").

Based on the foregoing and upon considering the complete record, we determine that Petitioner has shown sufficiently that Cohen, in combination with Kiss and FIPA97, teaches or suggests a plurality of single process facilitator agents, each executing within a separate computer process and bi-directionally coupled with at least one other single process facilitator agent, as recited in claim 2.

4. Dependent Claim 3

As noted previously, claim 3 depends from claim 2 and further recites:

> a specific single process facilitator including:
>
> > a specific agent registry that declares capabilities for each of the plurality of service-providing electronic agents currently active within the process wherein the specific single process is executing, the specific agent registry further declaring capabilities made available to the specific single process facilitator agent through the at least one other single process facilitator agent bi-directionally coupled with the specific single process facilitator agent; and
> >
> > a specific facilitating engine operable to interpret a service request as a base goal, the specific facilitating engine further operable to determine sub goals required to complete the base goal; the specific facilitating engine further operable to select service providing agents best capable of completing the sub goal and assigning the sub goals thereto.

Ex. 1001, 3:36–51.

Petitioner contends that Cohen in combination with Kiss and FIPA97 teaches or suggestions the "specific agent registry" and "specific facilitating engine" limitations of claim 3. First, Petitioner contends that Cohen teaches

as part of new agent registration, a client library "provides methods for defining an agent's capabilities (used by the blackboard to determine when this agent should participate in the solving of a subgoal)." Pet. 82 (quoting Ex. 1014, 2). Petitioner argues that such methods are functionally the same as an agent registry because they facilitate identification of agents in the process and delegation of subgoals to appropriate agents. *Id.* Further, Petitioner contends it would have been obvious to implement this functionality as an agent registry in the combination of Cohen with Kiss and FIPA97 to make available the agent registrations of those agents active within the process. *Id.* (citing Ex. 1050 ¶ 358).

Petitioner contends that this functionality in Cohen records the agents "currently active within the process wherein the specific single process is executing," as recited in claim 3. Specifically, Petitioner asserts that each blackboard server "maintains a knowledge base of the predicates that its lower level blackboards can evaluate." Pet. 83 (quoting Ex. 1014, 2). During query processing, a goal may be posted to a local blackboard (i.e., "the specific single process") that checks whether any of its child agents has the capabilities to achieve the goal. *Id.* (citing Ex. 1014, 2). If not, then it propagates the goal to a more senior blackboard server. *Id.* (citing Ex. 1014, 2). Petitioner contends a person of ordinary skill in the art would have recognized this functionality as agent registry functionality within a specialized domain, limited to only those agents active within the "specific single process." *Id.* (citing Ex. 1050 ¶ 359).

Petitioner asserts that Cohen discloses that a higher level blackboard server "maintains a knowledge base of the predicates that its lower level blackboards can evaluate" (i.e., "capabilities for each of the plurality of service-providing electronic agents," as recited in claim 3). Pet. 83 (citing

Ex. 1014, 2). Petitioner contends that the disclosed "knowledge base" is an agent registry of all agents accessible to the higher level blackboard and it would have been obvious for a blackboard (i.e., a single process facilitator agent) to access the agent registry via a bi-directional communication channel. *Id.* at 84 (citing Ex. 1050 ¶ 363).

Turning to the "facilitating engine" limitation, Petitioner contends that the blackboard servers of Cohen in combination with Kiss and FIPA97 contain a facilitating engine that can "determine sub goals required to complete the base goal" and "select service providing agents best capable of completing the sub goal and assigning the sub goals thereto." Pet. 84–85 (citing Ex. 1014, 2, 4; Ex. 1050 ¶¶ 368, 371). In particular, Petitioner argues, Cohen explains that "[t]he primary job of the Server is to decompose ICL expressions and route them to agents who have indicated a capability in resolving them." *Id.* at 84 (quoting Ex. 1014, 2). Petitioner further contends that Cohen's agents are "service-providing agents" because they provide services, such as mail, database, and telephone services. *Id.* at 85 (citing Ex. 1014, 4).

Patent Owner does not specifically dispute that the combination of Cohen with Kiss and FIPA97 teaches or suggestions the limitations of claim 3 beyond its arguments advanced with respect to claim 2 discussed above. *See* PO Resp. 104. Based on the complete record, and for the reasons explained by Petitioner, we determine that Petitioner has demonstrated sufficiently that the combination of Cohen with Kiss and FIPA97 teaches or suggests all the limitations of claim 3.

5. Dependent Claim 4

Claim 4 depends directly from claim 3 and further recites "wherein at least two of the plurality of single process facilitator agents reside upon

separate computer systems." Ex. 1001, 30:53–55. Petitioner contends that Cohen teaches this limitation for the same reasons it teaches "a plurality of single process facilitator agents each executing within a separate computer process," as recited in claim 2. Pet. 85.

Patent Owner does not specifically dispute that the combination of Cohen with Kiss and FIPA97 teaches or suggestions the limitations of claim 4 beyond its arguments advanced with respect to claim 2 discussed above. *See* PO Resp. 104. Based on the complete record, and for the reasons explained by Petitioner, we determine that Petitioner has demonstrated sufficiently that the combination of Cohen with Kiss and FIPA97 teaches or suggests all the limitations of claim 4.

6. Dependent Claim 14

Claim 14 depends from claim 1 and further recites "wherein the distributed facilitator agent is formed in a hierarchical topology." Ex. 1001, 31:24–26. Petitioner contends that Cohen teaches a series of blackboard servers (i.e., a "distributor facilitator agent") that can be structured in a hierarchy distributed over a network (i.e., "formed in a hierarchical topology").

Patent Owner argues that Cohen's blackboard system is not a facilitator system. PO Resp. 110. As discussed above, however, Petitioner has shown sufficiently that a person of ordinary skill in the art would have combined Cohen's blackboard functionality with that of Kiss's meta-agents to form part of the claimed distributed facilitator agent. *See* Pet. Reply 54.

Based on the foregoing and upon considering the complete record, we determine that Petitioner has shown sufficiently that Cohen, in combination with Kiss and FIPA97, teaches or suggests a distributed facilitator agent "formed in a hierarchical topology," as recited in claim 14.

7. Dependent Claim 15

As noted previously, claim 15 depends from claim 14 and further recites:

> wherein the hierarchical topology includes a top level facilitator agent and at least one other facilitator agent registered within the top level facilitator agent, the top level facilitator agent operable to directly manage those service-providing agents registered within the top level facilitator agent and indirectly manage those service-providing agents registered within the at least one other agent registered with the top level facilitator agent.

Id. at 31:27–35.

With reference to Cohen's Figure 1, reproduced in § II.H.1, Petitioner contends that any of blackboard servers BB4, BB5, and BB6 is a "top level facilitator agent" because it manages collections of both client agents and other facilitators (e.g., BB5 manages BB4 and BB6, which themselves manage BB1–BB3 and BB7–BB9). Pet. 86 (citing Ex. 1050 ¶ 465). Petitioner contends that lower level agents (e.g., BB1–BB4 and BB6–BB9) are "at least one other facilitator agent registered within the top level facilitator agent." *Id.* (citing Ex. 1050 ¶ 466).

Petitioner argues that Cohen teaches a "top level facilitator" (e.g., BB4 in an example provided in Cohen) that is capable of "directly manag[ing] those service-providing agents registered within the top level facilitator agent." *Id.* at 87. Specifically, Petitioner points out that when a blackboard server receives a goal, it first determines whether a client agent (i.e., one of its local collection of "service-providing agents") can satisfy the goal. *Id.* at 87–88 (citing Ex. 1014, 2). Thus, Petitioner argues, Cohen teaches a "top level facilitator agent operable to directly manage those

service-providing agents registered within the top level facilitator agent." *Id.* at 88 (citing Ex. 1014, 2; Ex. 1050 ¶ 471).

Petitioner also contends that Cohen teaches a "top level facilitator" that "indirectly manage[s] those service-providing agents registered within the at least one other agent registered with the top level facilitator agent." *Id.* (citing Ex. 1014, 2). Petitioner contends that each blackboard in Cohen maintains a knowledge base of the predicates its lower level blackboards can evaluate. *Id.* (citing Ex. 1014, 2). When a blackboard (e.g., BB4) determines that a subsidiary server (e.g., BB1) can handle a request, it will delegate the request to the server, which then delegates it to a client agent. *Id.* (citing Ex. 1014, 2). In this way, Petitioner argues, BB4 "indirectly manages" BB1's client agents, which are "service-providing agents registered with the at least one other agent" (i.e., BB1). *Id.* (citing Ex. 1014, 2; Ex. 1050 ¶ 473).

Patent Owner argues there is no evidence in Cohen of a "top level facilitator" that is able to manage agents registered through another facilitator agent. PO Resp. 110 (citing Ex. 2032 ¶ 194). Instead, Patent Owner argues, Cohen "describes how the goal is essentially passed from server to server in hopes that it hits upon a server that has agents registered that will be able to complete the goal." *Id.* (citing Ex. 1014, 2).

In its Reply, Petitioner argues that each blackboard maintains a knowledge base of the predicates its lower level blackboards can evaluate, and when the goal is at the top of the hierarchy in Cohen's Figure 1, BB5 has a larger knowledge base of predicates and can respond to a request by propagating it down to its subsidiary servers. Pet. Reply 54 (citing Ex. 1014, 2). Therefore, Petitioner contends, at least BB5 is a top level facilitator agent that manages subsidiary servers and client agents. *Id.*

(citing Ex. 1014, 2); *see* Pet. 86 (identifying BB5 as a top level facilitator). We are persuaded by Petitioner's argument that BB5 in Cohen teaches a "top level facilitator agent" capable of indirectly managing another facilitator's agents as claimed. Patent Owner does not further address Petitioner's contentions regarding Cohen in its Sur-reply. *See generally* PO Sur-reply.

Based on the foregoing and upon considering the complete record, we determine that Petitioner has shown sufficiently that Cohen, in combination with Kiss and FIPA97, teaches or suggests a "top level facilitator agent" meeting the limitations of claim 15.

8. Dependent Claims 16 and 17

Claims 16 and 17 each depend directly from claim 15 and place further limitations on the "top level facilitator agent" or the "at least one other facilitator agent." Ex. 1001, 31:36–42. Petitioner contends that Cohen teaches these limitations in the combined system of Cohen with Kiss and FIPA97. Pet. 88–90.

Claim 16 requires the "top level facilitator agent" and the "at least one other facilitator agent" to be "executing on different computer systems." Ex. 1001, 31:36–39. Petitioner asserts that Cohen's blackboard servers, executing on distinct host machines, are "executing on different computer systems." Pet. 89–90 (citing Ex. 1014, 2; Ex. 1050 ¶ 478).

Claim 17 requires the "other facilitator agent" to be "installed for a specific computer user." Ex. 1001, 31:40–42. Petitioner contends that a person of ordinary skill in the art would have been motivated to combine Cohen's mail management system with Kiss and FIPA97 and install it for a specific computer user because Cohen's mail management system includes a

single blackboard server personalized to a particular user. Pet. 90 (citing Ex. 1014, 4–5; Ex. 1050 ¶ 484).

Patent Owner does not specifically dispute that Cohen teaches or suggests the limitations of claims 16 and 17 beyond its arguments advanced with respect to claims 14 and 15 discussed above. *See* PO Resp. 110. Based on the complete record, and for the reasons explained by Petitioner, we determine that Petitioner has demonstrated sufficiently that Cohen, in combination with Kiss and FIPA97, teaches or suggests the additional limitations of claims 16 and 17.

9. Dependent Claims 39–42

Claims 39–42 depend directly or indirectly from claim 38 and further recite substantially the same limitations as dependent claims 14–17. Ex. 1001, 33:49–65. Petitioner refers back to its analysis for claims 14–17 (Pet. 91–92), and Patent Owner does not present arguments beyond those discussed above with respect to claims 14 and 15. Based on the complete record, and for the reasons explained by Petitioner, we are persuaded that Petitioner has shown sufficiently that Cohen, in combination with Kiss and FIPA97, teaches or suggests the limitations of claims 39–42.

10. Conclusion

Having considered the *Graham* factors, including the scope and content of the prior art, the differences between the prior art and the challenged claims, and the evidence of secondary considerations (*see* § II.G.14), we determine that Petitioner has shown by a preponderance of the evidence that claims 2–4, 14–17, and 39–42 of the '560 patent are unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of Kiss, FIPA97, and Cohen.

I. Patent Owner's Motion to Exclude

Patent Owner filed a Motion to Exclude Exhibits 1127, 1137, 1141, 1145, 2034, and a portion of Exhibit 1129. PO Mot. 1–11. We address each of these exhibits below.

1. Exhibit 1129

Exhibit 1129 is the deposition transcript of Patent Owner's expert Dr. Medvidovic, taken on May 19, 2020. Patent Owner seeks to exclude Petitioner's reliance "on portions of Dr. Medvidovic's deposition testimony that should be excluded because the question on which the testimony is based is vague, ambiguous, confusing, lacks foundation and calls for a legal conclusion. And any testimony elicited from this improper question is irrelevant, prejudicial, and misleading." *Id.* at 8.

In particular, Patent Owner seeks to exclude lines 53:19–54:21 of Exhibit 1129, which read as follows:

> Q: If that's true, then it's your opinion these three things, these three types of processing are required to teach '115's facilitator, correct?
>
> MS. ABDULLAH: Objection.
>
> BY THE WITNESS:
>
> A: I think that the authors of the patent, the inventors were very careful to specify that this is is an embodiment. It's a preferred embodiment. There are other embodiments that they discuss. For this particular embodiment that deals with compound goals, delegation, optimization and interpretation are preferably involved. So this is the preferred embodiment. This is a legal thing, not a technical thing. What a preferred embodiment is, that's something that appears in patents, pretty much every patent I've ever read, software patent, anyway. It is something that has a particular meaning. So if you want to handle compound goals, you need to have three types of processing preferably, delegation, optimization and interpretation. So it is my opinion that anybody who tries or, sorry, anybody who is

> claiming, purporting to be solving the same kinds of problems needs to show an embodiment that matches those three.

Ex. 1129, 53:19–54:21.

Patent Owner argues that Petitioner "attempts to use this improper testimony to support its incorrect conclusion that 'delegation, optimization, and interpretation' are 'functionalities [] related to a preferred embodiment, so they are not relevant to the claims.'" PO Mot. 9–10 (citing Ex. 1001, 19:26–29; Ex. 1129, 54:2–9; Pet. Reply 28). Patent Owner argues that Petitioner's "question was vague, ambiguous, confusing, lacked foundation and called for a legal conclusion." *Id.* at 10. Patent Owner also argues "the testimony is irrelevant, prejudicial, and misleading." *Id.*

Petitioner opposes the motion, arguing that the testimony is admissible and that Petitioner's counsel "failed to object to this question with sufficient specificity at the appropriate time." Pet. Opp. to Mot. 13 (citing PTAB Consolidated Trial Practice Guide, 128 (Nov. 2019) ("An objection must be stated concisely in a non-argumentative and non-suggestive manner . . . ."). Petitioner points out that Patent Owner's counsel "only said 'Objection' but failed to indicate what type of objection—*i.e.*, form, relevance, etc." *Id.* Petitioner argues that for the first time, Patent Owner "now attempts to assert multiple grounds for exclusion which were not previously raised—objections which it has waived." *Id.* "Furthermore," Petitioner argues, Patent Owner "does not explain how the question is "vague, ambiguous, and confusing," and that "summarily saying it is without more is insufficient to challenge admissibility." *Id.* (citing 37 C.F.R. § 42.20 (c); *Samsung Elecs. Am., Inc. v. Uniloc 2017 LLC*, IPR2017-01798, Paper 32 at 103 (PTAB Jan. 31, 2019)).

Petitioner also points out that:

> the party proffering a witness for cross-examination has the opportunity to conduct redirect examination of the witness immediately following the cross-examination to cure any perceived deficiency or to provide a more complete answer. Here, IPA did not avail themselves of this opportunity.

Id. at 14 (citing 37 CFR § 42.53(c)(2); *CBS Interactive Inc. v. Helferich Patent Licensing, LLC*, IPR2013-00033, Paper 101 (Oct. 7, 2013); *Garmin Int'l, Inc. v. Cuozzo Speed Techs. LLC*, IPR2012-00001, Paper 50 (July 18, 2013); Ex. 1129, 164:15–16 (MS. ABDULLAH: IPA does not have any redirect.)).

In its Reply, Patent Owner argues "[t]he vague, ambiguous, confusing, lack of foundation, and legal conclusion nature of questions asked by Microsoft's counsel in Exhibit 1129 is clear both on its face and by Dr. Medvidovic's deposition response," and that "[Patent Owner's] counsel properly and timely objected." PO Mot. Reply 5.

We are not persuaded by Patent Owner's arguments that Dr. Medvidovic's testimony should be excluded from evidence in this proceeding. Although Patent Owner's counsel did state the word "Objection" in response to Petitioner's question to Dr. Medvidovic, Patent Owner's counsel did not state the nature of objection, thus depriving Petitioner's counsel of the opportunity to cure the objection by rephrasing the question.

In its Motion to Exclude, Patent Owner now takes the position that the question is "vague, ambiguous, confusing, lacks foundation and calls for a legal conclusion." PO Mot. 8. Patent Owner, however, does not explain adequately how the question is vague, ambiguous or confusing, other than to state that "Dr. Medvidovic['s] testimony highlights the vague, ambiguous, and confusing nature of Microsoft's question." *Id.* at 8. Nor does Patent

Owner explain adequately how the question lacks foundation or calls for a legal conclusion aside from pointing to Dr. Medvidovic's response that "[t]his is a legal thing, not a technical thing" in reference to the term "preferred embodiment." *Id.* at 9.

Patent Owner also argues that Dr. Medvidovic's response to the question is "irrelevant, prejudicial, and misleading." *Id.* at 8. Dr. Medvidovic's testimony, however, concerns his understanding of a preferred embodiment described in the '115 patent (and the '560 patent) and his opinion of whether the prior art, particularly Kiss, teaches a "facilitator." *See, e.g.*, Ex. 1129, 52:15–54:21. We find it difficult to see how Dr. Medvidovic's testimony is "irrelevant," since it goes to his understanding of the challenged patent, the asserted prior art, and the nature of his opinion in this proceeding.

It is also relevant to note, as Petitioner points out, that Patent Owner's counsel had "the opportunity to conduct redirect examination of the witness immediately following the cross-examination to cure any perceived deficiency or to provide a more complete answer." Pet. Opp. to Mot. 13. Patent Owner's counsel, however, declined to redirect any questions to Dr. Medvidovic. *See* Ex. 1129, 164:15–16.

As for Dr. Medvidovic's testimony being prejudicial or misleading, the Board, sitting as a non-jury tribunal with particular administrative and technical expertise, is not as vulnerable to being misled or prejudiced as a jury might, and is well-positioned to determine and assign appropriate credibility and weight to the evidence presented at trial, without resorting to a formal exclusion of evidence that might later be held to be reversible error. *See, e.g.*, *Liberty Mut. Ins. Co. v Progressive Cas. Ins. Co.*, CBM2012-

00002, Paper 66 at 70 (PTAB Jan. 23, 2014); *Gnosis S.P.A. v. S. Alabama Med. Sci. Found.*„ IPR2013-00118, Paper 64 at 43 (PTAB June 20, 2014).

For these reasons, we deny Patent Owner's Motion to Exclude the identified testimony of Dr. Medvidovic.

2. Exhibit 2034

Patent Owner moves to exclude portions of Exhibit 2034, the transcript of a deposition of Mr. Adam Cheyer taken in a set of different proceedings involving the '560 patent and '115 patent, *Google LLC v. IPA Technologies Inc.*, including IPR2019-00728, IPR2019-00730, and IPR2019-00731. *See* PO Mot. 10–11. Specifically, Patent Owner seeks to exclude portions of Mr. Cheyer's cross-examination testimony (Ex. 2034, 46:12–47:5, 58:15–63:16) as beyond the scope of his direct testimony in those proceedings. PO Mot. 10–11.

Petitioner argues that Patent Owner never objected in this proceeding to Exhibit 2034, an exhibit submitted by Patent Owner itself to support its arguments. Pet. Opp. to Mot. 14. Petitioner argues that Patent Owner did not make any objections to the testimony on the record in this proceeding and therefore its argument is waived. *Id.* at 14–15. Petitioner also argues that Patent Owner has not explained why the portions it seeks to exclude were outside the scope of direct testimony. *Id.* at 15.

We agree with Petitioner that Patent Owner's motion summarily asserts that the portions of testimony it seeks to exclude are outside the scope of Mr. Cheyer's direct testimony without sufficient explanation. *See id.*; PO Mot. 10–11. Although Patent Owner identifies the topics addressed in those portions, the motion provides no details regarding the scope of direct testimony in a deposition that was taken in a different proceeding. PO Mot. 11. Thus, we are unable to determine whether Mr. Cheyer's cross-

examination testimony was beyond the scope of his direct testimony, and Patent Owner has not shown it is entitled to the requested relief. *See* 37 C.F.R. § 42.20(c).

For at least this reason, we deny Patent Owner's Motion to Exclude the identified deposition testimony of Mr. Cheyer.

3. Exhibits 1127, 1137, 1141, and 1145

Patent Owner moves to exclude Exhibit 1127 as irrelevant, prejudicial, misleading, and outside the scope of direct examination. PO Mot. 1–4. Patent Owner moves to exclude Exhibit 1137 on hearsay, lack of authentication, misleading, undue prejudice, and lack of relevance grounds. *Id.* at 4–6. Patent Owner moves to Exclude Exhibits 1141 and 1145 on grounds of hearsay, lack of authentication, and lack of relevance. *Id.* at 6–8. Because we do not rely on the cited evidence in this Final Written Decision, we dismiss Petitioner's Motion to Exclude Exhibits 1127, 1137, 1141, and 1145 as moot.

J. Constitutional Challenges

Patent Owner raises two constitutional challenges. First, Patent Owner argues that subjecting a pre-AIA patent, such as the'560 patent, retroactively to *inter partes* review violates the Takings and Due Process Clauses of the Fifth Amendment. PO Resp. 164. Second, Patent Owner asserts that *inter partes* reviews violate the Appointments Clause of the U.S. Constitution when conducted by administrative patent judges not nominated by the President and confirmed by the Senate. *Id.*

Addressing first Patent Owner's Appointments Clause challenge, we are bound by the Federal Circuit's decision in *Arthrex, Inc. v. Smith & Nephew, Inc.*, 941 F.3d 1320 (Fed. Cir. 2019), *cert. granted sub nom. United States v. Arthrex, Inc.*, 2020 WL 6037206 (Oct. 13, 2020), which addressed

this issue. *See* 941 F.3d at 1337 ("This as-applied severance . . . cures the constitutional violation."); *see also Arthrex, Inc. v. Smith & Nephew, Inc.*, 953 F.3d 760, 764 (Fed. Cir. 2020) (Moore, J., concurring in denial of rehearing) ("Because the APJs were constitutionally appointed as of the implementation of the severance, *inter partes* review decisions going forward were no longer rendered by unconstitutional panels."). Accordingly, we do not consider this issue any further.

With regard to the Takings and Due Process Clause challenge, we note that challenges to retroactive application of IPRs to pre-AIA patents have been addressed by the Federal Circuit in *Celgene Corp. v. Peter*, 931 F.3d 1342, 1357–1363 (Fed. Cir. 2019), *cert. denied* 2020 WL 3405867 (June 22, 2020) (Takings Clause), and *Sound View Innovations, LLC v. Hulu, LLC*, Nos. 2019-1865, 2019-1867, 2020 WL 3583556, *3 (Fed. Cir. July 2, 2020) (non-precedential) (Due Process Clause). Accordingly, we do not consider this issue any further.

III. CONCLUSION

For the foregoing reasons, we determine Petitioner has shown by a preponderance of the evidence that claims 1–4, 14–19, 26, and 36–44 of the '560 patent are unpatentable. The chart below summarizes our conclusions:

Claims	35 U.S.C. §	References	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–4, 14–19, 26, 36–44	103(a)	Kiss, FIPA97	1–4, 14–19, 26, 36–44	
2–4, 14–17, 39–42	103(a)	Kiss, FIPA97, Cohen	2–4, 14–17, 39–42	
Overall Outcome			1–4, 14–19, 26, 36–44	

IV. ORDER

Accordingly, it is

ORDERED that claims 1–4, 14–19, 26, and 36–44 of the '560 patent have been shown to be unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Exclude is denied in part and dismissed in part; and

FURTHER ORDERED that, because this is a final written decision, parties to this proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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