



STARK, U.S. District Judge:

Pending before the Court is the issue of claim construction for nine disputed terms in U.S. Patent No. 5,755,725 (“the ’725 patent”), all appearing in claim 1.

I. BACKGROUND

Plaintiff Sarif Biomedical LLC (“Sarif” or “Plaintiff”) filed this patent infringement suit against Defendants Brainlab, Inc., Brainlab AG, and Brainlab Medizinische Computersysteme GMBH (“Defendants”) on May 14, 2013, alleging infringement of the ’725 patent. (D.I. 1) Sarif amended its complaint on July 19, 2013. (D.I. 12)

The ’725 patent, entitled “Computer-Assisted Microsurgery Methods and Equipment,” issued on May 26, 1998. (D.I. 1-1) The ’725 patent relates to surgical installations that allow physicians to guide the position of a surgical tool during an operation using digital images and reference frames which, when correlated by computer technology, avoid the need to immobilize the patient during operations. (*See* D.I. 75 at 1) A goal of the invention is to “assure a correlation between the digital images obtained by means of a medical imaging system with the patient so as to provide the surgeon with the data intended to guide his operative strategy in real time.” (’725 patent, col. 2 ll. 42-46)

The parties completed claim construction briefing on February 24, 2015. (D.I. 73, 75, 76, 79, 81, 85) The Court conducted a claim construction hearing on March 6, 2015. (D.I. 121) (“Tr.”) At the hearing, both sides chose to present live testimony from an expert, and to cross-examine each other’s expert. (*See* Tr. at 6-39, 88-100) Defendants submitted supplemental authority to the Court on June 22, 2015. (D.I. 124)

II. LEGAL STANDARDS

The ultimate question of the proper construction of a patent is a question of law. See *Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 135 S. Ct. 831, 837 (2015) (citing *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 388-91 (1996)). “It is a bedrock principle of patent law that the claims of a patent define the invention to which the patentee is entitled the right to exclude.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (internal quotation marks omitted). “[T]here is no magic formula or catechism for conducting claim construction.” *Id.* at 1324. Instead, the court is free to attach the appropriate weight to appropriate sources “in light of the statutes and policies that inform patent law.” *Id.*

“[T]he words of a claim are generally given their ordinary and customary meaning . . . [which is] the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application.” *Id.* at 1312-13 (internal citations and quotation marks omitted). “[T]he ordinary meaning of a claim term is its meaning to the ordinary artisan after reading the entire patent.” *Id.* at 1321 (internal quotation marks omitted). The patent specification “is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.” *Vitronics Corp. v. Conceptoronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996).

While “the claims themselves provide substantial guidance as to the meaning of particular claim terms,” the context of the surrounding words of the claim also must be considered. *Phillips*, 415 F.3d at 1314. Furthermore, “[o]ther claims of the patent in question, both asserted and unasserted, can also be valuable sources of enlightenment . . . [b]ecause claim terms are normally used consistently throughout the patent . . .” *Id.* (internal citation omitted).

It is likewise true that “[d]ifferences among claims can also be a useful guide For example, the presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim.” *Id.* at 1314-15 (internal citation omitted). This “presumption is especially strong when the limitation in dispute is the only meaningful difference between an independent and dependent claim, and one party is urging that the limitation in the dependent claim should be read into the independent claim.” *SunRace Roots Enter. Co., Ltd. v. SRAM Corp.*, 336 F.3d 1298, 1303 (Fed. Cir. 2003).

It is also possible that “the specification may reveal a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess. In such cases, the inventor’s lexicography governs.” *Phillips*, 415 F.3d at 1316. It bears emphasis that “[e]ven when the specification describes only a single embodiment, the claims of the patent will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using words or expressions of manifest exclusion or restriction.” *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 906 (Fed. Cir. 2004) (internal quotation marks omitted), *aff’d*, 481 F.3d 1371 (Fed. Cir. 2007).

In addition to the specification, a court “should also consider the patent’s prosecution history, if it is in evidence.” *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 980 (Fed. Cir. 1995), *aff’d*, 517 U.S. 370 (1996). The prosecution history, which is “intrinsic evidence,” “consists of the complete record of the proceedings before the PTO [Patent and Trademark Office] and includes the prior art cited during the examination of the patent.” *Phillips*, 415 F.3d at 1317. “[T]he prosecution history can often inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the

invention in the course of prosecution, making the claim scope narrower than it would otherwise be.” *Id.*

In some cases, “the district court will need to look beyond the patent’s intrinsic evidence and to consult extrinsic evidence in order to understand, for example, the background science or the meaning of a term in the relevant art during the relevant time period.” *Teva*, 135 S. Ct. at 841. Extrinsic evidence “consists of all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises.” *Markman*, 52 F.3d at 980. For instance, technical dictionaries can assist the court in determining the meaning of a term to those of skill in the relevant art because such dictionaries “endeavor to collect the accepted meanings of terms used in various fields of science and technology.” *Phillips*, 415 F.3d at 1318. In addition, expert testimony can be useful “to ensure that the court’s understanding of the technical aspects of the patent is consistent with that of a person of skill in the art, or to establish that a particular term in the patent or the prior art has a particular meaning in the pertinent field.” *Id.* Nonetheless, courts must not lose sight of the fact that “expert reports and testimony [are] generated at the time of and for the purpose of litigation and thus can suffer from bias that is not present in intrinsic evidence.” *Id.* Overall, while extrinsic evidence “may be useful” to the court, it is “less reliable” than intrinsic evidence, and its consideration “is unlikely to result in a reliable interpretation of patent claim scope unless considered in the context of the intrinsic evidence.” *Id.* at 1318-19. Where the intrinsic record unambiguously describes the scope of the patented invention, reliance on any extrinsic evidence is improper. *See Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1308 (Fed. Cir. 1999) (citing *Vitronics*, 90 F.3d at 1583).

Finally, “[t]he construction that stays true to the claim language and most naturally aligns with the patent’s description of the invention will be, in the end, the correct construction.”

Renishaw PLC v. Marposs Societa’ per Azioni, 158 F.3d 1243, 1250 (Fed. Cir. 1998). It follows that “a claim interpretation that would exclude the inventor’s device is rarely the correct interpretation.” *Osram GmbH v. Int’l Trade Comm’n*, 505 F.3d 1351, 1358 (Fed. Cir. 2007) (quoting *Modine Mfg. Co. v. U.S. Int’l Trade Comm’n*, 75 F.3d 1545, 1550 (Fed. Cir. 1996)).

III. DISPUTED TERMS¹

A. “microsurgery”

Sarif’s Proposal	<p>This term, which appears only in the preamble, is not a limitation.</p> <p>If construction is necessary, “Surgery performed using magnification” or “Surgery performed at a fine scale”</p> <p>If Defendants’ construction is adopted, “microscope” should be defined broadly to include optical, digital, or other types of microscopes, and not only optical microscopes.</p> <p>An alternative construction: “Surgery performed using an optical, digital, or any other type of microscope.”</p>
Defendants’ Proposal	<p>This term is a limitation.</p> <p>“Surgery performed using a microscope”</p>
Court’s Construction	<p>This term is a limitation.</p> <p>“Surgery performed at a fine scale”</p>

The parties dispute whether the term “microsurgery,” which appears in the preamble of claim 1, is a limitation and needs construction. Defendants assert that the term must be limiting,

¹The parties agreed to the construction of seven terms, which the Court will adopt. (See D.I. 69 at 11)

since the subsequent use of the term “the tool” – in claim limitation 1(d) – would otherwise lack an antecedent. (*See Tr. at 77*)

Generally a preamble does not limit the claims. *See Allen Eng’g Corp. v. Bartell Indus., Inc.*, 299 F.3d 1336, 1346 (Fed. Cir. 2002). However, language in a preamble is limiting “if it recites essential structure or steps, or if it is necessary to give life, meaning, and vitality to the claim.” *Catalina Mktg. Int’l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002) (internal quotation marks omitted). Consistent with *Catalina*, a preamble term is limiting if it: (1) provides antecedent basis for a claim term, (2) is essential to help understand the claim terms, (3) provides any additional steps or structure that is underscored as important by the specification, or (4) was relied on during prosecution. *See id.*

The preamble to claim 1 of the ’725 patent recites: “A computer-assisted microsurgery installation, comprising . . .” (’725 patent, col. 10 ll. 62-63) This is the only instance of the term “microsurgery” appearing in the claims of the ’725 patent. (*See Tr. at 74*) The parties agree that if this use of the term “microsurgery” is not limiting, then it need not be construed. (*See Tr. at 77, 78*)

The Court concludes that the preamble of claim 1 is limiting, since it provides the antecedent basis for the term “the tool,” which appears later in limitations (d)(1), (d)(2), (d)(3), and (e) of the same claim 1. These later references to “the tool” refer to a microsurgical tool (as is discussed further below).

Neither the claims nor the specification provide guidance as to the meaning of “microsurgery” as used in the claims of the ’725 patent. The parties have provided competing declarations of experts. On behalf of Plaintiff, Dr. Filler opined, “A person of skill in the art

would understand the term ‘microsurgery’ to refer to surgery at a fine scale.” (D.I. 82 ¶ 67)

Defendants’ expert, Dr. Pelc, had a more limited opinion, stating that “microsurgery” refers only to “surgery using a microscope.” (D.I. 74 ¶ 13) The Court concludes that Dr. Pelc’s view is too narrow in the context of the ’725 patent, which nowhere mentions a “microscope.” (See Tr. at 76 (“There is no ‘microscope’ recited in the ’725 patent”); *see also id.* at 77-78 (“The definitions that we have given the Court clearly show . . . that microsurgery is surgery using a microscope, and that is just a way of interpreting it. I agree that it’s not defined in the specification as that”)) Further, Dr. Filler provided examples of microsurgery which do not utilize microscopes. (See, e.g., D.I. 82 ¶ 72 (describing microsurgery using loupes)) Accordingly, the Court adopts Plaintiff’s broader construction, “surgery performed at a fine scale.”

B. “tool”

Sarif’s Proposal	Plain and ordinary meaning. Alternatively, “a surgical instrument”
Defendants’ Proposal	“a microsurgical instrument”
Court’s Construction	“a microsurgical instrument”

The parties dispute whether “tool” requires construction and, if so, whether it is limited to “microsurgical” instruments (as opposed to all surgical instruments). It follows from the Court’s conclusions above regarding “microsurgery” being a claim limitation, and providing the antecedent basis for “the tool,” that “the tool” must be construed and has the meaning “a microsurgical instrument.” (See Tr. at 79)

C. “an articulated tool support”

Sarif’s Proposal	“A structure supporting the tool that allows flexibility of movement of the tool along plural axes.” ²
Defendants’ Proposal	“A structure supporting the tool with at least one arm hinged between its ends that allows movement of the tool in any direction.”
Court’s Construction	“A structure supporting the tool and including sections that are hinged or otherwise connected to allow flexibility of movement of the tool along plural axes”

The parties dispute whether the term “articulated” as used in the context of the ’725 patent requires a hinge.³ (See Tr. at 79) Defendants argue that Plaintiff’s proposal for “articulated” leaves the limitation nearly meaningless, as without requiring a hinged arm, the term “articulated” is read out of the claim term. (D.I. 73 at 17)

“Articulated tool support” is not expressly defined in the specification. (See Tr. at 80) However, an example of an articulated support does appear in the specification. (See ’725 patent, Fig. 1a (showing “an articulated support (1)”); see also *id.* at col. 3 l. 60 - col. 4 l. 22) Defendants assert that “[t]he term ‘articulated tool support’ is well-illustrated by the specification and drawings which show a structure described by defendants’ construction.” (D.I. 76 at 12)

The embodiment which Defendants rely on is one example of a structure which contains an articulated tool support. (See ’725 patent, col. 4 ll. 8-9) Neither the claims nor the specification exclude other embodiments, including supports which may not include what has been traditionally understood to be a joint or hinge. Plaintiff offers extrinsic support for a

²Plaintiff offered an alternative proposal during the claim construction hearing: “Sections configured to allow flexibility of movement in plural axes.” (Tr. at 83)

³Defendants offered a concession at the hearing that, “if ‘hinged’ is a problem, ‘jointed’ could be used.” (Tr. 83)

broader construction. (See D.I. 82 ¶ 74) (Dr. Filler declaring that person of ordinary skill in the art would understand that “something that is ‘articulated’ may or may not be ‘hinged’ so long as it is ‘otherwise connected so as to allow flexibility of movement.’”) Dr. Filler identifies articulated arm supports currently used in the field which do not include hinges. (*Id.* at ¶ 77) The parties have also cited to dictionary definitions of “articulated.” (See D.I. 75-3 Ex. C (defining “articulated” as “built in sections that are hinged or otherwise connected so as to allow flexibility of movement”); *see also* Tr. at 80 (“built in sections that are hinged or otherwise connected so as to allow flexibility of movement”), 81 (“consisting of segments united by joints”))

Having considered this collection of intrinsic and extrinsic evidence, the Court will refrain from importing limitations from the examples of the specification into the claims. The Court largely adopts Plaintiff’s proposed construction but amends it to ensure that “articulated” has meaning and that its meaning is consistent with the extrinsic evidence.⁴

D. “a reference frame R_p of a patient / patient reference frame R_p ”

Sarif’s Proposal	“A reference frame that moves with points in or on the patient”
Defendants’ Proposal	“A reference frame that moves with the position of markers placed on, worn by, carried by, or implanted into a patient.”
Court’s Construction	“A reference frame that moves with points in or on the patient”

The parties dispute whether naturally-occurring “points” on the patient can serve as the reference frame of the patient, or whether the claim term is limited to specific “markers.” The

⁴This alternate construction also incorporates Plaintiff’s proposal during the hearing to include the concept of “sections.” Since the “sections” must somehow be connected, the Court’s construction uses the language which Dr. Filler relied upon and the which Plaintiff cited in its brief: “hinged or otherwise connected.”

specification discloses various methods for localizing the patient: “by installing a normalized rigid trihedron, or by installing unaligned implants, or by designating characteristic[] points of the surface of the patient . . . for example, the nose, the corners of the eyes or the chin.” (’725 patent, col. 5 l. 67 - col. 6 l. 11) Defendants contend that even this last method requires “marking 4 conspicuous point[s] on the patient (for example, the nose, the eyes, etc.)” (*Id.* at col. 7 ll. 29-30)

Although the specification discloses “marking,” there is no mention of “markers” and Defendants’ construction does not define what a marker is. Furthermore, the marking contemplated by the specification is to define the “points in or on the patient,” indicating that the point on the patient that can serve as the reference (rather than the marker always having to serve as the reference). Therefore, the Court will adopt Plaintiff’s proposed construction, which is not limited to specific markers.

E. “A function of the position of a reference frame R_p of a patient in the fixed reference frame R_c ”

Sarif’s Proposal	“varying based on where the reference frame R_p of a patient is located relative to the fixed reference frame R_c ”
Defendants’ Proposal	“has a known mathematical relationship with [the position of a reference frame R_p of a patient in the fixed reference frame R_c]”
Court’s Construction	“varying based on where the reference frame R_p of a patient is located relative to the fixed reference frame R_c ”

The parties dispute whether the claim term “a function of” requires “a known mathematical relationship” as proposed by Defendants. Claim limitation 1(c) recites “at least two sensors, integral with the fixed reference frame R_c , supplying a signal that is a function of the

position of a reference frame R_p of a patient in the fixed reference frame R_c .” (*Id.* at col. 11 ll. 1-4)

The specification does not teach a “known mathematical relationship” and Defendants cite no intrinsic evidence for their reliance on this narrow definition of the term “function.” The Court has been directed to no persuasive basis for restricting the claim term in the manner proposed by Defendants. Hence, the Court will adopt the plain and ordinary meaning, which is the construction proposed by Plaintiff.

F. “control position and displacements of the tool as a function of control signals originating from a control unit, wherein the fixed reference frame R_c is independent of the patient reference frame R_p and of the image reference frame R_i ”

Sarif’s Proposal	This element is not a means-plus-function clause. Plain and ordinary meaning.
Defendants’ Proposal	This element is a means-plus-function clause <u>Function:</u> “control position and displacements of the tool as a function of control signals originating from a control unit, wherein the fixed reference frame R_c is independent of the patient reference frame R_p and of the image reference frame R_i ” <u>Structure:</u> Not supported in the specification Alternatively, if the term is not indefinite: “control movements of the tool using the real-time signal from the at least two sensors” ⁵

⁵Defendants offer an alternative construction in the event the Court finds that the term is not indefinite. (*See* Tr. at 68-69) Plaintiff agrees that this alternative construction is the plain and ordinary meaning and does not object to its adoption. (Tr. at 72)

Court's Construction	<p>This element is a means-plus-function clause</p> <p><u>Function:</u> “control position and displacements of the tool as a function of control signals originating from a control unit, wherein the fixed reference frame R_c is independent of the patient reference frame R_p and of the image reference frame R_i”</p> <p><u>Structure:</u> Not supported in the specification</p>
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First, the parties dispute whether this element is a means-plus-function term. If the Court finds that it is, Defendants assert that no structure has been disclosed as required under § 112, ¶ 6. In the alternative, if the Court finds that this is not a means-plus-function claim, then the parties agree as to the construction which should be adopted.

The Federal Circuit has articulated the analysis for determining whether a claim invokes § 112, ¶ 6, as follows:

The overall means-plus-function analysis is a two-step process. . . . In the first step, we must determine if the claim limitation is drafted in means-plus-function format. As part of this step, we must construe the claim limitation to decide if it connotes “sufficiently definite structure” to a person of ordinary skill in the art, which requires us to consider the specification (among other evidence). In the second step, if the limitation is in means-plus-function format, we must specifically review the specification for “corresponding structure.” Thus, while these two “structure” inquiries are inherently related, they are distinct.

Apple Inc. v. Motorola, Inc., 757 F.3d 1286, 1296 (Fed. Cir. 2014).

The disputed claim term here appears in claim 1, which recites, “(d) a computer adapted to: . . . (3) control position and displacements of the tool” (’725 patent, col. 11 ll. 5-13) (hereinafter, “the (d)(3) term”) For the (d)(3) term – as well as the (d)(1) term discussed in the next section – Defendants argue that although the claim does not use the term “means,” the claim

language is equivalent to typical means-plus-function claim language and, therefore, the claim limitation comes within the scope of § 112, ¶ 6.

“Without the term ‘means,’ a claim element is presumed to fall outside means-plus-function strictures.” *Micro Chem., Inc. v. Great Plains Chem. Co., Inc.*, 194 F.3d 1250, 1257 (Fed. Cir. 1999); *see also Personalized Media Commc’ns, LLC v. Int’l Trade Comm’n*, 161 F.3d 696, 703-04 (Fed. Cir. 1998) (“[F]ailure to use the word ‘means’ creates a presumption that § 112, ¶ 6 does not apply.”). Subsequent to the claim construction hearing in this case, the Federal Circuit stated:

The standard is whether the words of the claim are understood by persons of ordinary skill in the art to have a sufficiently definite meaning as the name for structure. When a claim term lacks the word “means,” the presumption can be overcome and § 112, para. 6 will apply if the challenger demonstrates that the claim term fails to “recite sufficiently definite structure” or else recites “function without reciting sufficient structure for performing that function.”

Williamson v. Citrix Online, LLC, 792 F. 3d 1339, 1349 (Fed. Cir. 2015) (en banc) (internal citations omitted).⁶ In addition, the Federal Circuit abandoned “characterizing as ‘strong’ the presumption that a limitation lacking the word ‘means’ is not subject to § 112, para. 6.” *Id.*

In this case, the presumption against means-plus-function claiming in the absence of the word “means” has been overcome. The (d)(3) term, and the entirety of the intrinsic (and extrinsic) evidence, fail to recite sufficiently definite structure to accomplish the function of “control position and displacements of the tool as a function of control signals originating from a control unit.” Claim 1’s “computer adapted to” perform this function is an insufficient disclosure

⁶*Williamson* is the subject to Defendants’ post-hearing submission of supplemental authority. (D.I. 124) Plaintiff did not respond to Defendants’ filing.

of structure as there is no disclosure as to how the computer would perform the function. “[I]f a claim recites a generic term that, properly construed in light of the specification, lacks sufficiently definite structure to a person of ordinary skill in the art, the presumption is overcome and the patentee has invoked means-plus-function claiming.” *Apple*, 757 F.3d at 1300. Moreover, as recently stated by the Federal Circuit in *Williamson*, “the fact that one of skill in the art could program a computer to perform the recited functions cannot create structure where none otherwise is disclosed.” *Williamson*, 792 F.3d at 1351.

The Court is persuaded by Defendants that there is insufficient structure disclosing how the computer in claim 1(d) “control[s the] position and displacements of the tool.” (’725 patent, col. 11 l. 13) Plaintiff contends:

The ’725 patent explains that the previously acquired digital imaging data, after being processed by calibration, segmentation, and indexing, can be used to plan the movements of the tool during the operative phase and that the algorithms disclosed in the ’725 patent for establishing correspondence among the tool reference frame R_o , fixed reference frame R_c , patient reference frame R_p , and image reference frame R_i enable “automatic control of the tool in real time in relation to a target defined in the image data base.”

(D.I. 79 at 7) (internal citations omitted) Plaintiff further relies on equations disclosed in the specification as the purported requisite structure for controlling the position of the tool in step (d)(3). (See ’725 patent, col. 10 ll. 53-56) However, Plaintiff – and its expert Dr. Filler – concedes that “the structure of the device that performs the recited function are the numerous well-developed systems, including general purpose IBM PC or Apple computers running *specialized software*.” (D.I. 79 at 8 (emphasis added); see also D.I. 82 ¶ 53 (“As of the filing date of the ’725 patent, a person of skill in the art would understand that the ‘computer’ and

‘control unit’ performing this function would be a small general-purpose computer in the operating room – universally either an Apple or an IBM PC type computer depending on surgeon preference, running specialized software, and there would be no need for the ’725 patent to identify the precise type of computer or control unit that could be used given this well-known understanding.”)) This is inadequate disclosure of structure to support a means-plus-function term. The patent provides no guidance as to how the computer would operate, other than the general assertion that it would run “specialized software.”

- G. “determine correspondence of a reference frame R_o of the tool with the patient reference frame R_p and the image reference frame R_i as a function of the signal from the at least two sensors”**

<p>Sarif’s Proposal</p>	<p>This limitation is not a means-plus-function clause.</p> <p>Plain and ordinary meaning</p>
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<p>Defendants' Proposal</p>	<p>This element is a means-plus-function clause</p> <p><u>Function:</u> “determine correspondence of a reference frame R_o of the tool with the patient reference frame R_p and the image reference frame R_i as a function of the signal from the at least two sensors.”</p> <p><u>Structure:</u> Not supported in the specification</p> <p>Alternatively, if the term is not indefinite:</p> <p>“the signal that provides the measurements of the position and orientation of the tool reference frame and the patient reference frame”⁷</p>
<p>Court's Construction</p>	<p>This element is a means-plus-function clause</p> <p><u>Function:</u> “determine correspondence of a reference frame R_o of the tool with the patient reference frame R_p and the image reference frame R_i as a function of the signal from the at least two sensors.”</p> <p><u>Structure:</u> The corresponding structure related to this term is disclosed in the specification of the '725 patent at col. 7, l. 66 through col. 10, l. 56.⁸</p>

⁷Defendants offer an alternative construction should the Court find that the term is not indefinite. (See Tr. at 69) Plaintiff agrees that this proposal is the plain and ordinary meaning and does not object to its adoption. (Tr. at 72) Although Defendants repeatedly stated (in their briefing and at the hearing) this alternative construction should be adopted if the term is not indefinite, the Court understands Defendants' alternative proposal to be pertinent only if the Court determines the claim term is not a means-plus-function term. (See Tr. at 69, 72) However, having found that Defendants have overcome the presumption against this term being a means-plus-function term, the Court will not adopt Defendants' alternative proposal, as that alternative is not a means-plus-function construction.

⁸Neither party proposed what structure the Court should identify if it finds the (d)(1) term is means-plus-function, but sufficiently definite, as it does here. Therefore, the Court relies on Plaintiff's answering brief to identify the associated structure. (See D.I. 79 at 8)

This dispute is analogous to the one just discussed, although the outcome differs. Claim 1 element (d) recites: “(d) a computer adapted to: . . . (1) determine correspondence of a reference frame R_o of the tool with the patient reference frame R_p and the image reference frame R_i as a function of the signal from the at least two sensors.” (’725 patent, col. 11 ll. 5-9) (hereinafter, “the (d)(1) term”) Defendants again contend that although the term “means” is not used, they have rebutted the presumption against construing the (d)(1) term as a means-plus-function term. Plaintiff disagrees.

The Court concludes that while Defendants have overcome the presumption against this term being a means-plus-function term, Defendants have failed to show that there is insufficient structure disclosing how the computer claimed in the (d)(1) term “determines correspondence” of the tool reference frame, the patient reference frame, and the image reference frame “as a function of the signal from the at least two sensors.” (*Id.* at col. 11 ll. 6-9) As Plaintiff explains, algorithms disclosed in the specification correspond to the functional language of the (d)(1) term, including in Step 1 of the specification as found in columns 6 and 7. (*See* Tr. at 71) Step 1 teaches the “[i]mplementation of concordance between the image reference frame and the patient reference frame.” (’725 patent, col. 6 ll. 42-43) Once the patient and the image references correspond, the patent teaches steps for corresponding the tool and fixed reference frames (Step 2), and the image and camera reference frames (Step 3). (*Id.* at col. 7 l. 66 - col. 10 l. 27) Finally, Step 4 teaches “[i]mplementation of concordance between the image reference frame and the tool reference frame.” (*Id.* at col. 10 ll. 28-29)

Unlike the (d)(3) term, the (d)(1) term does identify sufficient structure to perform the identified function. The specification adequately discloses how the computer “determine[s]

correspondence” of the various reference frames. The mathematical equations and steps set forth in the specification provide a person of ordinary skill in the art sufficiently definite structure.

The structure provided in the specification is also clearly linked to the function of the (d)(1) term, which is to correspond three reference frames – the patient, the image, and the tool – as a function of the signal received from sensors. As Plaintiff explains:

A person of skill in the art reading the '725 patent would understand that the patient frame of reference (R_p) is simply the real version of the virtual data set (R_i) [the image reference frame]. . . . When the patient is positioned in the room it is possible to locate various points in the patient/image reference frame (R_p and R_i) and place them within the room reference frame. This allows these three systems to be fused Once this is done, when the tool frame of reference R_o is moved relative to the R_c room frame, it will simultaneously be possible to know how the tool is moving relative to the patient and image frames.

(D.I. 79 at 8-9)

H. “visualization of position of the tool in the image reference frame R_i ”

Sarif’s proposal	“displaying the current position of the tool relative to objects in the preoperative images of the patient that define the image reference frame R_i ”
Defendants’ proposal	“displaying the current position of the tool overlaid on the preoperative images of the patient that define the image reference frame R_i ”
Court’s Construction	“displaying the current position of the tool relative to objects in the preoperative images of the patient that define the image reference frame R_i ”

The parties are in agreement that “an image reference frame R_i ” is “a reference frame that defines the position and orientation of objects in the preoperative images.” (D.I. 69 at 11) The parties do not agree, however, whether the preoperative image is overlaid, as Defendants

contend, or may instead simply be displayed “relative to objects in the preoperative images,” as Plaintiff asserts.

Defendants argue, “The disputed claim language requires that the position of the tool must be shown *in* the image reference frame . . . The tool’s current position can only be displayed in the preoperative images if it is overlaid on those images.” (D.I. 73 at 19)

Neither the claims nor the specification use the term “overlaid.” The requirement that “the position of the tool [be displayed] *in* the image reference frame R_i ” (*see* ’725 patent, col. 11 ll. 10-12), can be satisfied through an overlay of the images, but this is not the only way it may be satisfied. Accordingly, the Court will adopt Plaintiff’s proposed construction.

I. “means for determining coordinates of the tool in the fixed reference system R_c based on data from the image data base”

<p>Sarif’s Proposal</p>	<p>This element is a means-plus-function clause.</p> <p><u>Function:</u> “determining coordinates of the tool in the fixed reference system R_c based on data from the image data base.”</p> <p><u>Structure:</u> “at least two acquisition cameras integral with the fixed reference system R_c and positions such that their field of observation contains the mobility space of the tool” disclosed at Col. 3 Lns. 39-43 and the algorithms disclosed at Col. 7 Ln. 66-Col. 9 Ln. 60 under the heading “Step 2: Implementation of concordance between the tool reference frame and the fixed reference frame.”</p>
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Defendants' Proposal	<p>This element is a means-plus-function clause.</p> <p><u>Function:</u> "determining coordinates of the tool in the fixed reference system R_c based on data from the image data base."</p> <p><u>Structure:</u> Not supported in the specification.</p>
Court's Construction	<p>This element is a means-plus-function clause.</p> <p><u>Function:</u> "determining coordinates of the tool in the fixed reference system R_c based on data from the image data base."</p> <p><u>Structure:</u> Not supported in the specification.</p>

The parties agree this is a means-plus-function term, and further agree on the function, but disagree as to whether there is a disclosed structure. Sarif points to the acquisition cameras and the algorithms disclosed in the patent specification as the requisite corresponding structure for the agreed-upon function. (Tr. at 42-43) Defendants contend that there is no adequate disclosure of corresponding structure. They put on their expert, Dr. Pelc, to testify at the hearing with respect to this claim dispute. (See, e.g., Tr. at 89-93) Having considered the intrinsic and extrinsic evidence, the Court agrees with Defendants.

The specification states, "[T]he means for determining the coordinates of the tool in said fixed reference system R_c are constituted by at least two acquisition cameras integral with the fixed reference system R_c and positioned such that their field of observation contains the mobility space of the tool." ('745 patent, col. 3 ll. 39-43) The acquisition cameras are (as both sides agree) clearly linked to at least a portion of the recited function. (See, e.g., Tr. at 43, 47) However, the Court further agrees with Defendants that the cameras do not determine the

coordinates “based on data from the image data base.” (See Tr. at 48 (“The problem we have here is that . . . [t]here is no image database. The cameras obviously don’t take things from the image database.”); see also *id.* at 11 (Sarif’s expert Dr. Filler agreeing that function envisions using data image database to determinate what tool coordinates should be.))

Sarif encourages the Court to find adequate structure from the algorithms disclosed over four columns of the patent, which describe going from one frame of reference to another, encompassing “Step 2: Implementation of concordance between the tool reference frame and the fixed reference frame,” “Step 3: Implementation of concordance between the image reference frame and the camera reference frame,” and “Step 4: Implementation of concordance between the image reference frame and the tool reference frame.” (’745 patent, col. 7 l. 66 - col. 10 l. 60)

Sarif’s expert testified at the hearing that he believes the necessary structure is disclosed as the transformation equation found in Column 10, which “makes it possible to control the tool in real-time, just to determine its position, in relation to a target that’s defined in the image database.”

(Tr. at 12) This same expert, Dr. Filler, further testified that the transformation algorithms allow a person practicing the invention to:

go from one frame of reference into another frame of reference. . . .
[T]he transformation would allow you to shift, reinterpret the coordinates so that you can move continuously from one to the other frame. That is performed by these transformation algorithms which are laid out in the specification. . . . Step 2 Position the tool in the reference frame based on the camera. Step 3, correlate the image reference frame. And then we want to then position the tool based on the image reference frame. So 2, 3, 4.

(Tr. at 13-14)

While it is true that the specification teaches detailed formulas for transitioning from one frame to another, there is no clear structural link for the cameras to use the image database to determine the coordinates of the tool – which is the disclosed function. Therefore, the Court is persuaded by Defendants (and their expert, Dr. Pelc) with respect to this claim term.

VI. CONCLUSION

An appropriate order follows.