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CLERK US DISTRICT COURT  
WESTERN DISTRICT OF TEXAS

IN THE UNITED STATES DISTRICT COURT  
FOR THE WESTERN DISTRICT OF TEXAS  
AUSTIN DIVISION

BY \_\_\_\_\_ *BJ* \_\_\_\_\_  
DEPUTY

MAXUS STRATEGIC SYSTEMS, §  
INC., §  
PLAINTIFF, §  
§  
V. §  
§  
AQUMIN LLC AND NIRVANA §  
SYSTEMS, INC., §  
DEFENDANTS. §

CAUSE NO. 1:11-CV-073-LY

**MEMORANDUM OPINION AND ORDER REGARDING  
CLAIMS CONSTRUCTION**

Before the court are the parties' Amended Joint Claim Construction Statement filed May 29, 2012 (Clerk's Doc. No. 68); Maxus Strategic Systems, Inc.'s (Maxus) Markman Brief filed April 6, 2012 (Clerk's Doc. No. 58); Aqumin LLC's (Aqumin) Opening Claim Construction Brief filed April 6, 2012 (Clerk's Doc. No. 59); Nirvana Systems, Inc.'s (Nirvana) Opening Claim Construction Brief filed April 6, 2012 (Clerk's Doc. No. 60); Maxus's Reply Claim Construction Brief filed May 4, 2012 (Clerk's Doc. No. 62); Aqumin's Reply Claim Construction Brief filed May 4, 2012 (Clerk's Doc. No. 63); Nirvana's Reply Claim Construction Brief filed May 4, 2012 (Clerk's Doc. No. 64); and the parties' claim-construction presentations.

The court held a claim-construction hearing on May 18, 2012. *See Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 976 (Fed. Cir. 1995) (*en banc*), *aff'd*, 517 U.S. 370 (1996). After considering the patent and its prosecution history, the parties' claim-construction briefs, the applicable law regarding claim construction, and argument of counsel, the court now renders its order with regard to claim construction.

## **I. Introduction**

The court renders this memorandum opinion and order to construe the claims in U.S. Patents No. 5,774,878 (the “‘878 Patent”) and 6,073,115 (the “‘115 Patent”) (collectively, the “patents-in-suit”). Maxus asserts claims against Aqumin and Nirvana for infringement of the patents-in-suit. The ‘115 Patent is a continuation-in-part of the ‘878 Patent, and both patents share a common specification and drawings. The patents generally relate to an apparatus and method for displaying information in a virtual-reality environment to facilitate the viewing of otherwise unmanageable amounts of data.

## **II. Legal Principles of Claim Construction**

Determining infringement is a two-step process. *See Markman*, 52 F.3d at 976 (“[There are] two elements of a simple patent case, construing the patent and determining whether infringement occurred . . .”). First, the meaning and scope of the relevant claims must be ascertained. *Id.* Second, the properly construed claims must be compared to the accused device. *Id.* Step one, claim construction, is the current issue before the court.

The court construes patent claims without the aid of a jury. *See Markman* 52 F.3d at 979. The “words of a claim ‘are generally given their ordinary and customary meaning.’” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (*en banc*) (quoting *Vitronics Corp. v. Conceptoronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). The ordinary and customary meaning of a claim term 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. *Id.* at 1313. The person of ordinary skill in the art is deemed to have read the claim term in the context of the entire patent. *Id.* Therefore, to ascertain the

meaning of claims, courts must look to the claims, the specification, and the patent's prosecution history. *Id.* at 1314–17; *Markman*, 52 F.3d at 979.

Claim language guides the court's construction of claim terms. *Phillips*, 415 F.3d at 1314. “[T]he context in which a term is used in the asserted claim can be highly instructive.” *Id.* Other claims, asserted and unasserted, can provide additional instruction because “terms are normally used consistently throughout the patent.” *Id.* Differences among claims, such as additional limitations in dependent claims, can provide further guidance. *Id.*

Claims must also be read “in view of the specification, of which they are a part.” *Markman*, 52 F.3d at 979. The 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.” *Teleflex, Inc. v. Ficoso N. Am. Corp.*, 299 F.3d 1313, 1325 (Fed.Cir.2002) (internal citations omitted). In the specification, a patentee may define a term to have a meaning that differs from the meaning that the term would otherwise possess. *Phillips*, 415 F.3d at 1316. In such cases, the patentee's lexicography governs. *Id.* The specification may also reveal a patentee's intent to disclaim or disavow claim scope. *Id.* Such intentions are dispositive for claim construction. *Id.* Although the specification may indicate that certain embodiments are preferred, particular embodiments appearing in the specification will not be read into the claims when the claim language is broader than the embodiment. *Electro Med. Sys., S.A. v. Cooper Life Scis., Inc.*, 34 F.3d 1048, 1054 (Fed. Cir. 1994).

The prosecution history is another tool to supply the proper context for claim construction because it demonstrates how the inventor understood the invention. *Phillips*, 415 F.3d at 1317. A patentee may serve as his own lexicographer and define a disputed term in prosecuting a patent. *Home Diagnostics, Inc. v. LifeScan, Inc.*, 381 F.3d 1352, 1356 (Fed.Cir.2004). Similarly,

distinguishing the claimed invention over the prior art during prosecution indicates what the claims do not cover. *Spectrum Int'l v. Sterilite Corp.*, 164 F.3d 1372, 1378–79 (Fed.Cir.1988). The doctrine of prosecution disclaimer precludes patentees from recapturing specific meanings that were previously disclaimed during prosecution. *Omega Eng'g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1323 (Fed.Cir.2003). Disclaimers of claim scope must be clear and unambiguous. *Middleton, Inc. v. 3M Co.*, 311 F.3d 1384, 1388 (Fed.Cir.2002).

Although “less significant than the intrinsic record in determining the legally operative meaning of claim language,” the court may rely on extrinsic evidence to “shed useful light on the relevant art.” *Phillips*, 415 F.3d at 1317 (quotation omitted). Technical dictionaries and treatises may help the court understand the underlying technology and the manner in which one skilled in the art might use claim terms, but such sources may also provide overly broad definitions or may not be indicative of how terms are used in the patent. *Id.* at 1318. Similarly, expert testimony may aid the court in determining the particular meaning of a term in the pertinent field, but “conclusory, unsupported assertions by experts as to the definition of a claim term are not useful.” *Id.* Generally, extrinsic evidence is “less reliable than the patent and its prosecution history in determining how to read claim terms.” *Id.* Extrinsic evidence may be useful when considered in the context of the intrinsic evidence, *id.* at 1319, but it cannot “alter a claim construction dictated by a proper analysis of the intrinsic evidence.” *On-Line Techs., Inc. v. Bodenseewerk Perkin-Elmer GmbH*, 386 F.3d 1133, 1139 (Fed. Cir. 2004).

The patents-in-suit contain means-plus-function limitations that require construction. The use of the means-plus-function concept is generally triggered by the use of the term “means,” or equivalent functional language in the claims, in the absence of corresponding structural language.

*See Phillips*, 415 F.3d at 1311; *Cardiac Pacemakers, Inc. v. St. Jude Med., Inc.*, 296 F.3d 1106, 1113 (Fed. Cir. 2002). Such a claim limitation allows an applicant to express a claim limitation “as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof,” and provides that “such claim[s] shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.” 35 U.S.C. § 112, ¶ 6; *see also Odetics, Inc. v. Storage Tech. Corp.*, 185 F.3d 1259, 1266 (Fed. Cir. 1999).

Construction of a means-plus-function limitation consists of two steps: (1) identifying the claimed function, and (2) determining what, if any, structure in the specification corresponds with that function. *Cardiac Pacemakers, Inc.*, 296 F.3d at 1113. The court must construe the function to include only those limitations in the claim language. *Id.* It is improper to narrow the scope of the function beyond claim language or to broaden the scope by disregarding limitations in the claims themselves. *Id.* (indicating further that “ordinary principles of claim construction govern interpretation of the claim language used to describe the function”).

In determining which structure corresponds to the construed function, claims are limited to the structures, materials, or acts disclosed in the specification, and their equivalents, that perform the said function(s). *See WMS Gaming, Inc. v. Int’l Game Tech.*, 184 F.3d 1339, 1348 (Fed. Cir. 1999). To qualify as corresponding, the structure must not only perform the claimed function, but the specification or prosecution history must link or associate the structure with performance of the particular function as would be understood from the perspective of a person of ordinary skill in the relevant art. *See Cardiac Pacemakers, Inc.*, 296 F.3d 1113. The failure to disclose an adequate structure renders the claim invalid as indefinite. *See Kemco Sales, Inc. v. Control Papers Co.*, 208 F.3d 1352, 1360-61 (Fed. Cir. 2000). Thus, in order to meet the definiteness requirement,

corresponding structure must be disclosed so that “one skilled in the art will know and understand what structure corresponds to the means limitation.” *Atmel Corp. v. Info. Storage Devices, Inc.*, 198 F.3d 1374, 1382 (Fed. Cir. 1999).

**III. Discussion**

The parties originally submitted 40 claim terms for construction in their Joint Claim Construction Statement filed March 8, 2012. At the start of the claims-construction hearing, the parties agreed to reduce the number of claims for construction to 26 terms. The court will accordingly construe the 26 claim terms contained in the Amended Joint Claim Construction Statement filed May 29, 2012.

*A. Agreed Terms*

During the claims-construction hearing, the parties agreed to the construction of one claim term. The following table summarizes the parties’ agreement. The court hereby adopts the agreed construction of the claim term as listed below.

<u>Claim Term/Phrase</u>	<u>Adopted Agreed Construction<sup>1</sup></u>
virtual reality generator (‘115 Claims 1, 22, 28, 38, 43, 44, 45; ‘878 Claims 1, 21, 23, 35, 40, 41, 42)	<b>the program or other mechanism that creates and modifies the virtual-reality world</b>

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<sup>1</sup> Throughout, the **bolded** terms indicate the court’s adopted construction.

*B. Disputed Terms*

The parties dispute the construction of 25 claim terms. The following table summarizes the parties' proposed constructions of the disputed terms. The court will address and construe each term in turn.<sup>2</sup>

<u>Claim Term/Phrase</u>	<u>Maxus's Proposed Construction</u>	<u>Nirvana and Aqumin's Proposed Constructions<sup>3</sup></u>
1. axis of a three dimensional interface (‘878 Claims 1, 21, 23, 35, 40, 41, 42)	A reference line among a three reference line terrain in a virtual space	Reference line for determining position on a three dimensional coordinate system
2. categorical dimension (‘115 Claims 1, 22, 28, 38, 43, 44, 45)	Categorical dimension—a classification	Non-numerical attribute that corresponds to a position  [Aqumin does not object to Maxus's proposed definition]
3. data mining information (‘115 Claims 43, 44)	Data mining information is the information produced by the process of data mining. Data mining is the automatic or semi-automatic analysis of large quantities of data to extract previously unknown patterns of new information.	[Indefinite for lack of antecedent basis]  [If definite, no construction required]
4. display device (‘115 Claims 1, 22, 28, 38, 43, 44, 45; ‘878 Claims 1, 21, 23, 35, 40, 41, 42)	Display device is an output device for presentation of information in visual or tactile form	Traditional virtual reality display such as a headset with a stereographic display but not including televisions or other displays capable of displaying television pictures

<sup>2</sup> Because the patents-in-suit share a common specification, the court will reference the ‘878 Patent when referring to the specification of the patents.

<sup>3</sup> As indicated in the Amended Joint Claim Construction Statement, Aqumin adopts Nirvana's proposed definitions, unless otherwise indicated.

<p>5. interact with; interaction with</p> <p>(‘115 Claims 1, 43, 44; ‘878 Claims 1, 40, 41)</p>	<p>[No construction required]</p> <p>Alternatively, accepting input from and/or providing output to</p>	<p>Manipulate with virtual reality devices such as a data glove or virtual reality headset and not through a standard graphical user interface with a keyboard and mouse</p>
<p>6. non-integer terrain parameter</p> <p>(‘878 Claims 1, 21, 23, 35, 40, 41, 42)</p>	<p>Classification not capable of being described by an integer</p>	<p>Non-numerical attribute that corresponds to a position</p> <p>[Aqumin does not object to Maxus’s proposed definition, in that Maxus has represented that integer means number and noninteger means nonnumerical]</p>
<p>7. numerical dimension</p> <p>(‘115 Claims 1, 22, 28, 38, 43, 44, 45)</p>	<p>Classification that can be described numerically</p>	<p>Numerical attribute for determining position or height</p>
<p>8. preprocessed</p> <p>(‘115 Claims 38, 44, 45; ‘878 Claims 1, 21, 23, 35, 40, 41, 42)</p>	<p>Information that has been previously organized, structured, or converted to other usable information</p>	<p>Calculated output of a separately compiled computer program that delivers complete financial analysis</p>
<p>9. selected portion of the preprocessed information</p> <p>(‘115 Claim 38)</p>	<p>Information selected from a set of preprocessed information</p>	<p>[Indefinite for lack of antecedent basis]</p> <p>[If definite, no construction required]</p>
<p>10. sensation of travelling through and within; sensation of travelling through</p> <p>(‘115 Claims 1, 22, 28, 38, 43, 44, 45; ‘878 Claims 1, 21, 23, 35, 40, 41, 42)</p>	<p>Perception of traveling within; perception of traveling through</p>	<p><u>Nirvana</u>: Illusion of being inside a world that can be viewed from any perspective</p> <p><u>Aqumin</u>: Sensation of complete physical immersion and ability to see and move in any direction</p>



<p>11. simulate movement through</p> <p>(‘115 Claims 1, 22, 28, 38, 43, 44, 45; ‘878 Claims 1, 21, 23, 35, 40, 41, 4)</p>	<p>Appearance of movement through</p>	<p><u>Nirvana</u>: Illusion of moving in real time in any chosen direction in space</p> <p><u>Aqumin</u>: Create the sensation of complete physical immersion and movement in any direction</p>
<p>12. the pre-processed abstract information; the pre-processed information; the information</p> <p>(‘115 Claim 45)</p>	<p>Pre-processed information is information that has been previously acted upon, often thereby creating new information about the information acted upon</p>	<p>[Indefinite for lack of antecedent basis]</p> <p>[If definite, no construction required]</p>
<p>13. virtual reality world</p> <p>(‘115 Claims 1, 22, 28, 38, 43, 44, 45; ‘878 Claims 1, 21, 23, 35, 40, 41, 42)</p>	<p>The three dimensional model or cyberspace generated by the computer</p>	<p>Computer-based presentation of the illusion of immersion, navigation and interaction, (viewed using head mounted goggles, data gloves, torque balls or a body suit)</p>
<p>14. means for causing the virtual reality world to be displayed on the display device</p> <p>(‘878 Claim 21)</p>	<p>Virtual reality generator program utilizing computer processor and graphics hardware to display virtual world</p> <p><u>Function</u>: to display virtual reality world</p> <p><u>Structure</u>: Virtual Reality Generator Fig. 1. “high speed computer processor and specialized graphics hardware”</p>	<p><u>Function</u>: to display the virtual reality world on the display device</p> <p><u>Structure</u>: “mix switch” or “mix button” but this structure is insufficient and thus indefinite</p>

<p>15. means for causing the virtual reality world to be displayed on the display device from a plurality of perspectives</p> <p>(‘878 Claim 23)</p>	<p>Virtual reality generator program utilizing computer processor, graphics hardware and input module to display virtual world from more than one perspective</p> <p><u>Function:</u> to display virtual reality world from more than one perspective</p> <p><u>Structure:</u> Virtual Reality Generator Fig. 1. “high speed computer processor and specialized graphics hardware.” Input device or module</p>	<p><u>Function:</u> to display the virtual reality world on the display device from a plurality of perspectives</p> <p><u>Structure:</u> “mix switch” or “mix button” but this structure is insufficient and thus indefinite</p>
<p>16. means for displaying in real-time on the display device the virtual reality world</p> <p>(‘878 Claim 35)</p>	<p>Virtual reality generator program utilizing computer processor and graphics hardware to display virtual world in real time</p> <p><u>Function:</u> to display virtual reality world in real time</p> <p><u>Structure:</u> Virtual Reality Generator Fig. 1. “high speed computer processor and specialized graphics hardware”</p>	<p><u>Function:</u> display in real-time on the display device the virtual reality world</p> <p><u>Structure:</u> virtual reality display device such as head mounted display with a high resolution color monitor in front of each eye</p>
<p>17. means for displaying on a display device a virtual reality world</p> <p>(‘878 Claim 40)</p>	<p>Virtual reality generator program utilizing computer processor and graphics hardware to display virtual world</p> <p><u>Function:</u> to display virtual reality world</p> <p><u>Structure:</u> Virtual Reality Generator Fig. 1. “high speed computer processor and specialized graphics hardware”</p>	<p><u>Function:</u> display on the display device a virtual reality world</p> <p><u>Structure:</u> virtual reality display device such as head mounted display with a high resolution color monitor in front of each eye</p>

<p>18. means for displaying the virtual reality world from a plurality of perspectives (‘878 Claim 35)</p>	<p>Virtual reality generator program utilizing computer processor, graphics hardware and input module to display virtual world from more than one perspective</p> <p><u>Function:</u> to display virtual reality world from more than one perspective</p> <p><u>Structure:</u> Virtual Reality Generator Fig. 1. “high speed computer processor and specialized graphics hardware.” Input device or module</p>	<p><u>Function:</u> display the virtual reality world from a plurality of perspectives</p> <p><u>Structure:</u> virtual reality display device such as head mounted display with a high resolution color monitor in front of each eye</p>
<p>19. means for generating and continuously modifying the virtual reality world (‘878 Claim 21)</p>	<p>Virtual reality generator program utilizing computer processor and graphics hardware to display virtual world and continuously modify the virtual reality world</p> <p><u>Function:</u> to continuously generate the virtual reality world</p> <p><u>Structure:</u> Virtual Reality Generator Fig. 1. “high speed computer processor and specialized graphics hardware”</p>	<p><u>Function:</u> generating and continuously modifying the virtual reality world</p> <p><u>Structure:</u> World Tool Kit software library</p>
<p>20. means for generating the virtual reality world (‘878 Claim 23)</p>	<p>Virtual reality generator program utilizing computer processor and graphics hardware to display virtual world</p> <p><u>Function:</u> to generate the virtual reality world</p> <p><u>Structure:</u> Virtual Reality Generator Fig. 1. “high speed computer processor and specialized graphics hardware”</p>	<p><u>Function:</u> generating the virtual reality world</p> <p><u>Structure:</u> World Tool Kit software library</p>

<p>21. means for generating, in real-time as the selected portion of the preprocessed financial information is received from the real-time data source of financial information, the virtual reality world representing the pre-processed financial information</p> <p>(*878 Claim 35)</p>	<p>Virtual reality generator program utilizing computer processor, graphics hardware, and real time data feed to display virtual world in real time</p> <p><u>Function:</u> to generate the virtual reality world</p> <p><u>Structure:</u> Virtual Reality Generator Fig. 1. "high speed computer processor and specialized graphics hardware." Input device and real time data source</p>	<p><u>Function:</u> generating, in real-time as the selected portion of the preprocessed financial information is received from the real-time data source of financial information</p> <p><u>Structure:</u> World Tool Kit software library</p>
<p>22. means for receiving as input in real-time the pre-processed financial information from a data source of pre-processed financial information</p> <p>(*878 Claim 35)</p>	<p>Input module to receive the real time pre-processed information from data source</p> <p><u>Function:</u> to receive the data from the external data source</p> <p><u>Structure:</u> Data input module</p>	<p><u>Function:</u> receiving as input in real-time the pre-processed financial information from a data source of pre-processed financial information</p> <p><u>Structure:</u> CAPRI financial analytic system data feed into input module</p>
<p>23. means for simulating in real-time, on the display device, movement through the virtual reality world</p> <p>(*878 Claim 35)</p>	<p>Virtual reality generator program utilizing computer processor, graphics hardware and input device to display virtual world and simulate movement through the virtual reality world</p> <p><u>Function:</u> to generate the virtual reality world</p> <p><u>Structure:</u> Virtual Reality Generator Fig. 1. "high speed computer processor and specialized graphics hardware." Input device or module</p>	<p><u>Function:</u> simulating in real-time, on the display device, movement through the virtual reality world</p> <p><u>Structure:</u> head-tracking and gesture tracking sensors, such as a spaceball, a dataglove, or a magnetic head position tracker</p>

<p>24. means for simulating, on the display device, movement through the virtual reality world</p> <p>(‘878 Claims 21, 23)</p>	<p>Virtual reality generator program utilizing computer processor, graphics hardware and input device to display virtual world and simulate movement through the virtual reality world</p> <p><u>Function:</u> to generate the virtual reality world</p> <p><u>Structure:</u> Virtual Reality Generator Fig. 1. “high speed computer processor and specialized graphics hardware.” Input device or module</p>	<p><u>Function:</u> simulating in real-time, on the display device, movement through the virtual reality world</p> <p><u>Structure:</u> head-tracking and gesture tracking sensors, such as a spaceball, a dataglove, or a magnetic head position tracker</p>
<p>25. means for updating the virtual reality world</p> <p>(‘878 Claim 40)</p>	<p>Virtual reality generator program utilizing computer processor, graphics hardware and input device to display virtual world and update virtual reality world</p> <p><u>Function:</u> to generate the virtual reality world</p> <p><u>Structure:</u> Virtual Reality Generator Fig. 1. “high speed computer processor and specialized graphics hardware.” Input device or module</p>	<p><u>Function:</u> updating the virtual reality world</p> <p><u>Structure:</u> Intel 486 computer processor but this structure is insufficient and thus indefinite</p>

**Standard Terms:**

1. “axis of a three dimensional interface”

The parties’ proposed definitions are similar, with the key distinction being whether the axis serves as a reference for determining *position* in a virtual space. Maxus argues that an axis is a reference line that defines direction—not necessarily position—on a three-dimensional reference terrain. The axis, Maxus contends, is different than a line on a graph because information in a virtual-reality terrain is related, compared, and analyzed differently than a three-dimensional graph. Maxus argues that in cases where the axis represents a nonnumerical variable, the axis does not necessarily

represent a position or measurement between entries on the same axis.

Nirvana counters that the axis serves as a reference for determining position within a virtual space. Nirvana asserts that even if nonnumerical data is represented on an axis, the very way a coordinate and axis system works is by finding a location based on some value along the axis. Nirvana argues that the specification indicates that the virtual-reality world is defined, in part, by the three-dimensional coordinate system that sets out the borders of the geographical features of the virtual terrain. Nirvana also cites various sections of the prosecution history which, like the specification, describe nonnumerical parameters for the axis of a three-dimensional interface.

The court will not impose a positional limitation on the term. Should the axis represent quantitative variables, like dates and prices, then the axis could serve as a reference line for determining position in the virtual space, similar to a three-dimensional graph. The specification however describes that the axis can represent nonnumerical variables with no particular order or relation. Moreover, the specification distinguishes the claimed virtual-reality world from a three-dimensional graph. The court finds no intrinsic support for Nirvana's proposed positional limitation. However, the court also finds Maxus's definition using "reference line terrain," a term not found in the patent, unnecessarily complicated.

The court therefore construes "axis of a three dimensional interface" to mean "**reference line among a three-dimensional virtual space.**"

## 2. "categorical dimension"

The parties' proposed definitions are again similar, with the key difference being Nirvana's positional limitation. Maxus proposes the term mean "a classification," while Nirvana argues that

the term should mean “a non-numerical attribute that corresponds to a position.” Aquamin does not object to Maxus’s definition.

As previously stated, the court finds no support in the intrinsic record for Nirvana’s positional limitation. Maxus’s construction uses the word “classification” which is not in the specification, nor is it clearer than “categorical.” More importantly, both proposed definitions fail to capture the relation between categorical and dimension.

Accordingly, the court concludes that the correct construction for “categorical dimension” is **“category of information corresponding to a dimension.”**

### 3. “data mining information”

Maxus argues that “data mining information” is information produced by the process of data mining, and that data mining is a common, frequently used term in the field of computer science. As support, Maxus cites several dictionaries that define “data mining.” Nirvana counters that the term “data mining information” is indefinite for lack of an antecedent basis, but that if the court determines otherwise, the term does not require construction.

Failure to provide an explicit antecedent basis does not automatically render a term indefinite. *See Energizer Holdings, Inc. v. Int’l Trade Com’n*, 435 F.3d 1366, 1370 (Fed. Cir. 2006). Claims are considered indefinite when the claims “read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention.” *Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S.Ct. 2120, 2124 (2014).

The court concludes that the term “data mining information” is not indefinite because the specification adequately informs those skilled in the art about the scope of the invention. Although

“data mining” is only found in the claims of the ‘115 Patent, the intrinsic record nevertheless guides the court’s construction. The patents-in-suit are directed towards easily viewing otherwise unmanageable amounts of complex information in a customizable virtual-reality terrain. Maxus’s extrinsic citations demonstrate that data mining is a term of art in the field of computer science related to identifying relationships or patterns within data. These extrinsic references are helpful in determining what a person of ordinary skill in the art would understand “data mining” to mean. *See Phillips*, 415 F.3d at 1319. Most importantly, these definitions are consistent with the specification of the ‘115 Patent, as understanding patterns and relationships between data is directly related to the stated goal of the invention.

The court concludes that “data mining information” means **“information identifying relationships or patterns within the information terrain.”**

#### 4. “display device”

The specification describes examples of hardware displays for viewing the claimed virtual-reality world, including a head-mounted display and a high-resolution monitor. Maxus’s broad definition of the term is consistent with the specification and the term’s plain and ordinary meaning. Nirvana accepts that “display device” has broad scope as used in the specification, but argues that the patentee disavowed claim scope during the prosecution of an earlier-filed patent, U.S. Patent No. 5,675,746, to which the patents-in-suit claim priority. Nirvana contends that because of the patentee’s disavowal, the term should be narrowed to “traditional virtual reality display such as a headset with a stereographic display but not including televisions or other displays capable of displaying television pictures.”



“Absent a clear disavowal in the specification or the prosecution history, the patentee is entitled to the full scope of its claim language.” *Home Diags., Inc.*, 381 F.3d at 1358. None of the patentee’s statements referenced by Nirvana amount to a clear disavowal of claim scope as related to the term “display device.” First, the patentee distinguished the invention from the PV-Wave reference, arguing that the PV-Wave software lacked a virtual-reality generator module. Although the PV-Wave software created three-dimensional graphs, the patentee argued, it did not teach “a virtual reality world that enables a user to simulate movement through financial information.” Nirvana focuses on the patentee’s statement that the PV-Wave references “do not describe viewing or manipulating the graphs it creates using virtual reality hardware, such as a virtual reality headset or a dataglove.” Reading the statement in context, the court finds that the patentee was distinguishing “navigate” as used with graphical user interface features, like windows and macros, from “navigate” in the virtual-reality sense. The court does not find the patentee’s statements in response to the PV-Wave reference limit the term “display device” to a virtual-reality headset.

Second, Nirvana argues that the patentee narrowed “display device” when distinguishing his invention from a television set. In response to the examiner, the patentee argued that “Claim 59 simply is not directed to hardware devices that are capable of displaying television pictures.” The patentee’s statement must be considered in context. The patentee distinguished “updating a screen display” from “updating a virtual world,” noting that “a virtual reality world can be generated and updated . . . without being displayed.” The patentee’s argument was directed to a television’s lack of a virtual-reality generator, an element distinct in the claim language and specification from the display device. The court finds that the patentee’s distinction does not disavow the use of a television as a display device for the claimed virtual-reality generator.

Third, Nirvana cites the patentee's arguments in response to an article describing the n-Vision system by Feiner, *et al.* To distinguish the claimed invention from n-Vision, the patentee claimed that n-Vision lacks immersion and navigation in a virtual-reality world. While the n-Vision system displays objects using 3D-graphics hardware, the patentee argued, the n-Vision user is located outside looking into the virtual-reality world. Therefore, n-Vision lacks the immersion and navigation of the claimed invention. To further this distinction, the patentee highlighted that Feiner "contemplates display only in simulated three dimensions (from one perspective), and does not contemplate use of 'traditional' virtual reality display devices, such as a headset comprising a stereographic display, to allow a user to view and be immersed in the display." If the patentee's statement amounts to disavowal, it is a narrower disavowal of merely a system lacking immersion and navigation, not of traditional display devices.

The court concludes that "display device" has broad scope as used in the claims and specification. Because the court does not find the patentee's statements a clear disavowal of claim scope, the term "display device" is defined as "**device for displaying information in a visual form.**"

##### 5. "interact with"; "interaction with"

Maxus contends that these terms do not require construction, but in the alternative, they should be construed to mean "accepting input from and/or providing output to." Nirvana instead asserts that the patentee disavowed the use of a keyboard or mouse to input commands or select menu choices when distinguishing the claimed invention from the PV-Wave reference during prosecution. Nirvana argues that the patentee is therefore limited to a narrowed construction of "manipulate with virtual reality devices such as a data glove or virtual reality headset and not through a standard

graphical user interface with a keyboard and a mouse.”

The court concludes that the patentee’s statements do not amount to disavowal here. The patentee distinguished the claimed invention from the PV-Wave reference during prosecution by arguing that the PV-Wave lacked a virtual-reality generator module. After a careful reading of the patentee’s argument in its full context, the court concludes that the patentee’s statements do not amount to a clear disavowal with respect to the terms “interact with” and “interaction with.” Instead, the court interprets the patentee’s statements as an effort to distinguish PV-Wave’s command and menu navigation from navigation in the virtual-reality sense. Accordingly, the court concludes that the patentee’s statements do not limit interaction with the virtual-reality world, but instead address whether PV-Wave contains a virtual-reality world in the first place.

The specification supports a broad definition of these terms. The patent describes interaction as “the ability of the user to interact with and control the virtual reality world.” The specification further reads “[u]sers interact with the interface panel 20 using standard GUI commands” to “input parameters to define a virtual reality world and to instruct the present invention to create a virtual reality world.” Additionally, the virtual-reality generator is said to “interpret[] the user instructions 10 and coordinate[] interaction with the configuration file 6.” Interaction is used broadly throughout the patent to refer generally to the passage of information.

Consistent with its usage throughout the patent, and consistent with its plain and ordinary meaning, the court concludes that “interact with” and “interaction with” mean “**accepting input from or providing output to.**”

#### 6. “non-integer terrain parameter”

Nirvana again seeks to import a positional limitation into the claims, arguing “non-integer terrain parameter” means “non-numerical attribute that corresponds to a position.” The court finds Nirvana’s argument for a positional limitation unpersuasive. Furthermore, Nirvana’s construction conflicts with its own opening claim-construction brief, in which Nirvana did not include “position” in its proposed definition.

Maxus’s proposed construction is a “classification not capable of being described by an integer.” In support of this definition in its Markman Brief, Maxus uses slightly narrower language, describing the term as a classification “that is not described with numbers.” Aqumin does not object to Maxus’s proposed construction except to clarify that the phrase “non-integer” should mean “non-numerical,” consistent with Maxus’s argument in its brief.

The intrinsic record provides no support for limiting “non-integer” to “non-numeric.” The term “numerical” appears once in the specification, and “integer” appears only in the claims of the ‘878 Patent. Absent any restrictions in the specification, the court adopts the plain and ordinary meaning of the term.

Accordingly, the court construes the term “non-integer terrain parameter” as a **“terrain parameter not capable of being described by an integer.”**

#### 7. “numerical dimension”

Maxus proposes the term mean “classification that can be described numerically.” Nirvana instead proposes “numerical attribute for determining position or height.” Nirvana cites the same portions of the specification and prosecution history used to support its proposed constructions of

“axis of a three dimensional interface” and “categorical dimension.”

Neither the claim language, nor the intrinsic record impose a height or position limitation. Although numerical attributes, like price, may correspond to a particular position or height as in a Cartesian coordinate system, the court does not import such a limitation into the non-Cartesian system described in the present invention.

The court therefore construes “numerical dimension” as “**numerical information corresponding to a dimension.**”

#### 8. “preprocessed”

Maxus’s proposed construction is “information that has been previously organized, structured, or converted to other usable information.” Nirvana proposes that “preprocessed” means “calculated output of a separately compiled computer program that delivers complete financial analysis.”<sup>4</sup>

Nirvana claims that its definition is supported by both the description of a representative embodiment in the specification and statements made during prosecution. First, Nirvana cites the CAPRI financial analytic system described in the specification, which processes real-time financial information and builds a database of processed financial information. Nirvana then argues that statements made during prosecution make such an analytic preprocessing system a requirement for all real-time embodiments of the claimed invention.

Nirvana’s definition is overly restrictive because it seeks to read limitations from a

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<sup>4</sup> The parties use the words “preprocessed” and “pre-processed” and their derivatives interchangeably throughout the patents-in-suit and the parties’ claim-construction briefing. The court therefore draws no distinction between information that is preprocessed or that which is pre-processed.

representative embodiment into the claims. *See Phillips*, 415 F.3d at 1323 (discussing danger of reading limitation from specification into claim). During prosecution, the patentee described the CAPRI analytic system as “a separately compiled program that delivers financial analytics.” However, the specification makes clear that the CAPRI system is only a representative embodiment, and that in “alternative embodiments,” input can be received from a “knowledge base, neural network, artificial intelligence system, or *any system that structures or categorizes data.*” (emphasis added). The specification also indicates that the “analytic system can be a database and need not be permanently connected to a real-time source of financial information.” The patentee’s distinction of the invention over the prior art based on the preprocessing of information does not require this court to read limitations of the CAPRI system into the claims.

On the other hand, the court finds Maxus’s definition overly broad. During prosecution, the Examiner rejected the claims because “virtually all financial information of interest is preprocessed to some extent.” Defining “preprocessed” as “information that has been previously organized, structured, or converted to other usable information” ignores the teachings of the patent and prosecution history, while rendering the term virtually boundless.

The patent’s contents and its prosecution history guide the court’s interpretation of “preprocessing.” The patent opens with the statement that “financial information can be pre-processed by a financial analytic system prior to input to the virtual reality generator.” “Preprocessed” is used in reference to the display of real-time data (claim 43 of the ‘115 Patent), and prestored data (claims 44 and 45 the ‘115 Patent). The specification and dependent claims of the ‘115 Patent further indicate that the preprocessing analytic system can be a “fuzzy logic-based system,” a “neural network” system, or “any system that structures or categorizes data.” During prosecution,

the patentee explained that a real-time virtual-reality system is made possible by the preprocessing of financial data because such processing allows the virtual-reality engine to focus on nonfinancial processing.

The court must adopt a construction consistent with the term's usage in the intrinsic record. There is no restriction in the record requiring that preprocessing be done by the CAPRI analytic system. In fact, the specification enumerates several alternative analytic systems. The intrinsic record does, however, require that the preprocessing occur before the data is input into the virtual-reality generator and that this preprocessing structure or categorize the information.

For these reasons, the court concludes that “preprocessed” means “**structured or categorized prior to input into the virtual-reality generator.**”

#### 9. “selected portion of the preprocessed information”

Nirvana asserts that the term “selected portion of the preprocessed information” is indefinite for lack of an antecedent basis. Because neither “preprocessed” nor “preprocessed information” appear in the claim, Nirvana argues, no antecedent can be inferred and the claim is indefinite and invalid. Maxus counters that the meaning of the term is straightforward, and the term should be construed as “information selected from a set of preprocessed information.”

Although the term does lack an antecedent basis, the term is not indefinite. *See Energizer Holdings, Inc.*, 435 F.3d at 1370. As stated in the claim language, the virtual-reality generator module is coupled to the input module. The specification indicates that the input module “feeds [] information to the virtual reality generator,” and the input module receives information “pre-processed by a financial analytic system.” Based on the claim language, the virtual-reality

generator generates “the information terrain representing the abstract information.” In addition to generating the information terrain, the virtual-reality generator also displays “the selected portion of the preprocessed information” to a display device. Because the user can travel the terrain and view the virtual-reality world from a plurality of perspectives, the court interprets the current term as referring to the abstract information represented in the user’s current view of the virtual-reality world. This information is preprocessed and selected based on the user’s viewing perspective.

Accordingly, the court construes “selected portion of preprocessed information” as **“preprocessed information from the input module representing the user’s current viewing perspective of the information terrain.”**

10. “sensation of travelling through and within”: “sensation of travelling through”

Maxus argues that these disputed terms should mean “perception of traveling within” and “perception of traveling through,” respectively. Maxus further contends that the freedom of movement and views are determined by the configuration of the virtual-reality generator, and nowhere does the term imply that the world can be viewed from any perspective.

Nirvana and Aquamin propose more restrictive definitions that they claim are supported by the claims, the specification, and the prosecution history. Nirvana asserts that the terms mean “illusion of being inside a world that can be viewed from any perspective.” Nirvana argues that the claim language requires that the user be able to explore and move through the information terrain, allowing movement to any place and views of the information from any perspective. Nirvana cites the specification, which describes the user as being able to “fly” through the virtual world of information. Additionally, Nirvana points to the patentee’s statements during prosecution distinguishing the



present invention from the prior art based on the ability to “move through and interact with information.” Aqumin argues for a similar construction: “sensation of complete physical immersion and ability to see and move in any direction.” For support, Aqumin cites many of the same sections of the specification and prosecution history.

The “present invention” is described in the patent specification as allowing the user to “fly” through a virtual world representing financial information. *See SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1343 (Fed. Cir. 2001) (holding that description of “present invention” in specification is limiting on claim). The specification further elaborates that the user can look at stock-market information from a bird’s-eye view and then fly down to the ground level for a different perspective on the information, for example, viewing which stocks are situated above or below ground level.

The patentee distinguished the claimed invention from the prior art during prosecution based on the user’s immersion in and ability to navigate through a virtual world. Specifically, the patentee described virtual reality to the examiner as having “three features, namely, immersion, navigation and interaction.” Immersion was defined by the patentee as “the illusion created by the system so that the user believes he or she is inside the virtual reality world.” Navigation was described as the “ability to ‘travel through’ the virtual reality world, viewing the virtual reality world from *any perspective*.” (emphasis added).

The court finds Nirvana’s construction consistent with the intrinsic record. In particular, the patentee expressly stated during prosecution that navigation of the virtual-reality world allowed for “viewing the virtual reality world from any perspective.” The court interprets this statement as a clear disavowal of claim scope. *See Home Diags., Inc.*, 381 F.3d at 1358.

The court concludes that the terms “sensation of travelling through and within” and “sensation of travelling through” mean “**illusion of being inside a world that can be navigated and viewed from any perspective.**”

11. “simulate movement through”

Maxus asserts that this term means “appearance of movement through.” Nirvana argues that the term should mean “illusion of moving in real time in any chosen direction in space,” while Aquamin proposes “create the sensation of complete physical immersion and movement in any direction.”

“Movement” and “travel” are used interchangeably in the specification to describe the navigation of a virtual-reality world. Virtual reality is described as “allow[ing] users to see, *move* through and interact with information displayed as a three dimensional world.” ‘878 Patent 1:14-16 (emphasis added). Later, virtual reality is also described as allowing the user to “view, manipulate, structure and *travel* through a three dimensional virtual reality world.” ‘878 Patent 3:30-32 (emphasis added). A virtual-reality generator is said to “simulate *movement* through the virtual reality world.” ‘878 Patent 1:34-35 (emphasis added). Finally, the specification states that a virtual reality generator allows the user to “*travel* through a three dimensional virtual reality world.” ‘878 Patent 3:31-32 (emphasis added).

Although employing different words, the court finds the term “simulate movement through” to carry the same meaning as “sensation of travelling through.” The terms “travel” and “movement” are used interchangeably throughout the patent, and the use of “simulate” instead of “sensation” does not warrant a divergent construction. Moreover, the parties argued the terms simultaneously in the claim-construction hearing and used similar arguments for the two terms in their briefing.

Accordingly, the court defines “simulate movement through” as the “**illusion of being inside a world that can be navigated and viewed from any perspective.**”

12. “The pre-processed abstract information”; “the pre-processed information”; “the information”

Construction of these terms is similar to the previously discussed construction of “selected portion of the preprocessed information.”<sup>5</sup> Nirvana asserts that the terms “the pre-processed abstract information,” “the pre-processed information,” and “the information” are all indefinite for lack of an antecedent basis. Maxus counters that the meaning of the terms are “information that has been previously acted upon, often thereby creating new information about the information acted upon.”

Although the terms lack antecedent bases, they are not indefinite. *See Energizer Holdings, Inc.*, 435 F.3d at 1370. The patent gives sufficient detail that a person skilled in the art would understand the scope of the claim when read in light of the specification. The terms, although different, are interpreted as referring to the same preprocessed abstract information. The court has defined “preprocessed” as “structuring or categorizing information prior to input into the virtual-reality generator.” The court’s construction of “preprocessed” guides the construction of these terms. But because claim 45 of the ‘115 Patent is a method claim, reference to the “virtual reality generator” included in the construction of “preprocessed” is removed.

The court construes “the pre-processed abstract information,” “the pre-processed information,” and “the information” as “**information structured or categorized prior to its receipt.**”

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<sup>5</sup> See discussion *supra* pp. 23–24.

### 13. “virtual reality world”

Aqumin seeks to impose a limitation on the method of display. Aqumin’s proposed construction is “computer-based presentation of the illusion of immersion, navigation and interaction, viewed using head mounted goggles, data gloves, torque balls or a body suit.” The claims and specification, Aqumin argues, require that virtual reality have immersion, navigation, and interaction. Aqumin cites the patentee’s prosecution arguments in response to the PV-Wave reference as further evidence that interaction and navigation are required. Nirvana adopts Aqumin’s proposed construction. Maxus objects to Aqumin’s attempt to limit the method of display. Instead, Maxus proposes “virtual reality world” means “the three dimensional model or cyberspace generated by the computer.”

Aqumin’s arguments for requiring “head mounted goggles, data gloves, torque balls or a body suit” are not compelling. The arguments and supporting citations overlap those used by Nirvana for the construction of the term “display device.” For the reasons previously discussed,<sup>6</sup> the court does not find that the patentee’s statements amount to clear disavowal of claim scope with respect to how the virtual-reality world is displayed.

Virtual reality is defined in the specification as “a three dimensional computer-generated interface that allows users to see, move through and interact with information displayed as a three dimensional world.” The next sentence of the specification states that “[t]he three dimensional world is called a virtual reality world.” During prosecution, the patentee distinguished the current invention from the prior art based on the user’s immersion in and ability to navigate through a virtual world.

Considering the specification and prosecution history together, the court construes “virtual

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<sup>6</sup> See discussion *supra* pp. 16–18.

reality world” as “**three-dimensional computer-generated world that users can view, navigate through, and interact with.**”

### **Means-Plus-Function Terms:**

The parties agree that the remaining terms are means-plus-function claims. *See* 35 U.S.C. § 112, ¶ 6. The court concurs, and will construe the remaining terms accordingly.

#### 14. “means for causing the virtual reality world to be displayed on the display device”

“The first step in construing a means-plus-function limitation is to identify the function explicitly recited in the claim.” *Asyst Techs., Inc. v. Empak, Inc.*, 268 F.3d 1364, 1369 (Fed. Cir. 2001). Maxus argues that the function is “to display virtual reality world,” while Nirvana asserts it is “to display the virtual reality world on the display device.” Both constructions fail to capture the function as explicitly recited in the claim. *See Micro Chem., Inc. v. Great Plains Chem. Co., Inc.*, 194 F.3d 1250, 1258 (Fed. Cir. 1999) (“The statute does not permit limitation of a means-plus-function claim by adopting a function different from that explicitly recited in the claim.”). Accordingly, the court adopts the function as directly stated in the claim language: “causing the virtual-reality world to be displayed on the display device.”

Next, the court must determine the corresponding structure disclosed in the specification. Maxus argues that the corresponding structures is “virtual reality generator Fig. 1” and “high speed computer processor and specialized graphics hardware.” Nirvana instead points to the “mix switch” or “mix button” described in the specification as the disclosed structure. The specification must clearly associate the structure with performance of the function, and the structure must perform the

claimed function. *Id.* Nowhere are the disclosed “mix switch” or “mix button” said to display the virtual-reality world. Accordingly, neither the mix switch nor the mix button can be the corresponding structure. Instead, the specification indicates that the “virtual reality generator outputs to a display device a virtual-reality world.” The court finds the virtual-reality generator to be the corresponding structure.

Nirvana contends that the term is indefinite and invalid. *See* 35 U.S.C. § 112, ¶ 2. Although Nirvana’s indefiniteness argument turns on what it claims is insufficient detail for the mix-switch structure, the court analyzes the virtual-reality generator structure for indefiniteness. Claims are invalid as indefinite if the patentee fails to disclose adequate structure for the function of a means-plus-function claim. *See Kemco Sales*, 208 F.3d at 1360-61. With computer-implemented inventions, the specification must disclose more than a general-purpose computer to perform the stated function. *Aristocrat Techs. Australia Pty Ltd. v. Int’l Game Tech.*, 521 F.3d 1328, 1333 (Fed. Cir. 2008). Such a limitation prevents pure functional claiming. *Id.*

The court concludes that the specification meets the disclosure requirements of Section 112, paragraph 2 with regard to the virtual-reality generator structure. The functionality of the virtual-reality generator, including its creation and display of the virtual-reality world, are described throughout the specification. For example, the user is said to have flexibility in selecting the information and display parameters that affect the world generated by the virtual-reality generator. The generator is further described as using the WorldToolKit library<sup>7</sup> to “redraw[] the virtual reality world 30 times per second.” Finally, a “high speed computer processor and specialized graphics

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<sup>7</sup> The WorldToolKit library is described in the specification as “a library of C [programming language] routines that lets a developer rapidly and easily build real-time three dimensional computer simulations and virtual world applications that run on desktop computers.” ‘878 Patent 2:6-9.

hardware” like “a 486 microprocessor manufactured by the Intel Corporation and an Intel DVI 2 board is used to render the virtual reality images” on a display device, like a “20 inch NEC color monitor.” The specification therefore provides details on how data is selected for display, how the display is configured, how software libraries are used to create the images for display, and ultimately, how the images representing the virtual-reality world are displayed to the user.

In return for the convenience of using functional language in the claim, the claim is limited to the corresponding structure disclosed in the specification and equivalents thereof. *See* 35 U.S.C. § 112, ¶ 6. Specifically, the structure is limited by the general algorithm disclosed in the specification. *See WMS Gaming*, 184 F.3d at 1349 (corresponding structure for claim covering computer-implemented function is algorithm disclosed in specification).

The court construes the corresponding structure for “means for causing the virtual reality world to be displayed on the display device” as “**high-speed computer processor and specialized graphics hardware using display graphics library routines to redraw the virtual-reality world 30 times per second on a display device,**” and the function as “**causing the virtual-reality world to be displayed on the display device.**”

15. “means for causing the virtual reality world to be displayed on the display device from a plurality of perspectives”

Maxus proposes that the function for the disputed term is “to display virtual reality world from more than one perspective,” and Nirvana argues it is “to display the virtual reality world on the display device from a plurality of perspectives.” The court instead adopts the function from the claim language as “causing the virtual-reality world to be displayed on the display device from a plurality of perspectives.” *See Micro Chem., Inc.*, 194 F.3d at 1258.

Nirvana asserts that the corresponding structure is the “mix switch” or “mix button” discussed in the patent specification, while Maxus argues it is the virtual-reality generator, high-speed computer processor, and specialized graphics hardware. Although the function here is distinct from “causing the virtual-reality world to be displayed on the display device,” the court finds that the same virtual-reality generator structure, and its corresponding elements, similarly apply. The virtual-reality generator structure is limited by the algorithm disclosed in the specification.

Accordingly, the court concludes that the function of “means for causing the virtual reality world to be displayed on the display device from a plurality of perspectives” is “**causing the virtual-reality world to be displayed on the display device from a plurality of perspectives,**” and the corresponding structure is “**high-speed computer processor and specialized graphics hardware using display graphics library routines to redraw the virtual-reality world 30 times per second on a display device.**”

16. “means for displaying in real-time on the display device the virtual reality world”

Maxus argues that the function is “to display virtual reality world in real time,” while Nirvana proposes “display in real-time on the display device the virtual reality world.” To be consistent with the claim language, the court construes the function as “displaying in real-time on the display device the virtual-reality world.”

Maxus again argues that the corresponding structure is the virtual-reality generator, high-speed computer processor, and specialized graphics hardware. Nirvana instead asserts that the “virtual reality display device such as head mounted display with a high resolution color monitor in front of each eye” is the corresponding structure.



The court concludes that the display devices suggested by Nirvana cannot be the corresponding structure for “displaying in real-time on the display device the virtual reality world.” Such an interpretation is circular, as the display device would have to serve as a means for displaying on itself. The court instead interprets the virtual-reality generator as the structure that displays the virtual-reality world on the display device. The specification describes that the “virtual reality generator outputs to a display device a virtual reality world.” The court finds the same virtual-reality generator structure described in the previous term also applicable to the current function.

Accordingly, the court construes the function for “means for displaying in real-time on the display device the virtual reality world” as “**displaying in real-time on the display device the virtual-reality world,**” and the corresponding structure as “**high-speed computer processor and specialized graphics hardware using display graphics library routines to redraw the virtual-reality world 30 times per second on a display device.**”

17. “means for displaying on a display device a virtual reality world”

Maxus proposes the same function it proposed for Term 14: “to display virtual reality world.” Nirvana argues that the function is “display on the display device a virtual reality world.” Again, the court derives the function directly from the claim language as “displaying on a display device a virtual-reality world.”

Maxus and Nirvana argue the same structures each respectively argued for the previous term. The court again declines to define the display devices proposed by Nirvana as the corresponding structure. The court instead finds the virtual-reality generator to be the appropriate structure.

Therefore, the court construes the function of “means for displaying on a display device a

virtual reality world” as “**displaying on a display device a virtual-reality world,**” and the corresponding structure as “**high-speed computer processor and specialized graphics hardware using display graphics library routines to redraw the virtual-reality world 30 times per second on a display device.**”

18. “means for displaying the virtual reality world from a plurality of perspectives”

Maxus contends that the function is “to display virtual reality world from more than one perspective,” while Nirvana argues it is “display the virtual reality world from a plurality of perspectives.” To remain consistent with the claim language, the court construes the function as “displaying the virtual-reality world from a plurality of perspectives.”

Maxus argues the corresponding structure is the virtual-reality generator, high-speed computer processor, and specialized graphics hardware. As with the previous two terms, Nirvana contends the structure is “virtual reality display device such as head mounted display with a high resolution color monitor in front of each eye.”

For the same reasons enumerated previously,<sup>8</sup> the court construes the function of “means for displaying the virtual reality world from a plurality of perspectives” as “**displaying the virtual-reality world from a plurality of perspectives,**” and the corresponding structure as “**high-speed computer processor and specialized graphics hardware using display graphics library routines to redraw the virtual-reality world 30 times per second on a display device.**”

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<sup>8</sup> See discussion *supra* pp. 32–33.

19. “means for generating and continuously modifying the virtual reality world”

Maxus argues that the function for this term is “to continuously generate the virtual reality world,” while Nirvana instead proposes “generating and continuously modifying the virtual reality world.” The court adopts Nirvana’s function because it directly follows the claim language.

For the structure, Nirvana contends that it is the WorldToolKit library disclosed in the specification, while Maxus again argues that the structure is the virtual-reality generator, high-speed computer processor, and specialized graphics hardware. The WorldToolKit library is described in the specification as an example of a software library that allows “a developer [to] rapidly and easily build real-time three dimensional simulations and virtual world applications that run on desktop computers.” According to the claim language, the means for generating and continuously modifying the virtual-reality world is part of the virtual-reality generator. It is the virtual-reality generator that generates and modifies the virtual-reality world, albeit using a graphics library like WorldToolKit. Because generating the virtual-reality world is distinct from displaying it, the court does not require the same display element contained in the previously construed means-plus-function claims.

Accordingly, the court construes the function of “means for generating and continuously modifying the virtual reality world” as **“generating and continuously modifying the virtual-reality world,”** and the corresponding structure as **“high-speed computer processor and specialized graphics hardware using display graphics library routines to redraw the virtual-reality world 30 times per second.”**

20. “means for generating the virtual reality world”

Maxus proposes that the function for this term is “to generate the virtual reality world,” while Nirvana instead contends that it is “generating the virtual reality world.” The court adopts Nirvana’s function because it uses the exact claim language.

The parties propose the same structures as in Term 19. For the same reasons explained above, the court finds the corresponding structure to be the virtual-reality generator.

Accordingly, the court construes the function of “means for generating the virtual reality world” as **“generating the virtual-reality world,”** and the corresponding structure as **“high-speed computer processor and specialized graphics hardware using display graphics library routines to redraw the virtual-reality world 30 times per second.”**

21. “means for generating, in real-time as the selected portion of the pre-processed financial information is received from the real-time data source of financial information, the virtual reality world representing the pre-processed financial information”

Maxus asserts the function of this term is “to generate the virtual reality world,” and Nirvana proposes that the function is “generating, in real-time as the selected portion of the pre-processed financial information is received from the real-time data source of financial information.” The court instead construes the function as “generating, in real-time as the selected portion of the preprocessed financial information is received from the real-time data source of financial information, the virtual-reality world representing the preprocessed financial information,” adding the remainder of the missing language from the claim.

The parties argue for the same structures asserted for Term 20. The construction of the

structure for this term follows directly from that of the previous term because both terms relate to generating the virtual-reality world.

The court construes the function of “means for generating, in real-time as the selected portion of the pre-processed financial information is received from the real-time data source of financial information, the virtual reality world representing the pre-processed financial information” as **“generating, in real-time as the selected portion of the preprocessed financial information is received from the real-time data source of financial information, the virtual-reality world representing the preprocessed financial information,”** and the corresponding structure as **“high-speed computer processor and specialized graphics hardware using display graphics library routines to redraw the virtual-reality world 30 times per second.”**

22. “means for receiving as input in real-time the pre-processed financial information from a data source of pre-processed financial information”

Maxus asserts that the function is “to receive the data from the external data source,” and Nirvana, “receiving as input in real-time the pre-processed financial information from a data source of pre-processed financial information.” The court adopts Nirvana’s proposed function because it uses the exact claim language.

Nirvana argues that the corresponding structure is the “CAPRI financial analytic system data feed into input module.” Maxus proposes instead that the structure is “data input module.”

The court determines that the corresponding structure is the input module, not the analytic system providing the preprocessed information. The specification states that the “input module continuously receives a stream of financial information . . . [that] comprises real-time data.” It further

describes that the input module “takes as input information structured by an analytic system.” The CAPRI analytic system proposed by Nirvana “feed[s] in real-time . . . financial information to the input module.” Stated differently, the CAPRI analytic system is the data source of preprocessed financial information, and the input module is the means for receiving this information from the analytic system.

The input module is limited to the structures disclosed in the specification and equivalents thereof. *See* 35 U.S.C. § 112, ¶ 6. The specification describes several methods by which the input module can receive financial information. In one embodiment, the input module receives, via the dynamic data exchange (“DDE”) protocol, information that has been exported by the analytic system “to the Microsoft Excel spreadsheet program” in real-time. In an alternative embodiment, “the input module can be coupled directly to the financial data feed, such as the Reuter's data feed.” In yet another embodiment, “the virtual reality generator can store, in an associated database, the financial information that is required to create the virtual reality world.” Only the spreadsheet and data feed methods are described as “real-time;” therefore, the structure is limited to these two means.

The court concludes that the structure for the term “means for receiving as input in real-time the pre-processed financial information from a data source of pre-processed financial information” is “**receiving as input in real-time the preprocessed financial information from a data source of preprocessed financial information,**” and the corresponding structure is “**receiving information from a Microsoft Excel spreadsheet program via the dynamic data exchange protocol, or directly from a financial data feed.**”

23. “means for simulating in real-time, on the display device, movement through the virtual reality world”

Maxus proposes that the function of this claim is “to generate the virtual reality world.” The court adopts Nirvana’s proposed function, “simulating in real-time, on the display device, movement through the virtual-reality world,” because it uses the exact claim language.

Nirvana argues that the structure should be “head-tracking and gesture tracking sensors, such as a spaceball, dataglove, or a magnetic head position tracker,” while Maxus posits that the structure is the virtual-reality generator, high-speed computer processor, and specialized graphics hardware. The court finds that the structure for this term is the virtual-reality generator that generates and displays the virtual-reality world. The virtual-reality generator is implemented by a general-purpose computer, and is therefore limited to the algorithm previously summarized in the discussion of Term 14.

In addition to the previously defined algorithm for the virtual-reality generator, the current term also includes the simulation of movement through the virtual-reality world. Simulating movement requires navigation by the user. The specification states that “the user can navigate through the virtual reality world using control devices, such as a trackball or spaceball, an electronic dataglove, a magnetic head position tracker, a keyboard, a joystick or a steering wheel.” Because navigation is required to simulate movement through the virtual-reality world, the court also construes these control devices to be part of the virtual-reality generator structure.

Accordingly, the court concludes the function of term “means for simulating in real-time, on the display device, movement through the virtual reality world” is “**simulating in real-time, on the display device, movement through the virtual-reality world,**” and the corresponding structure is

**“high-speed computer processor and specialized graphics hardware using display graphics library routines to redraw the virtual-reality world 30 times per second on a display device based on the user’s navigation of the virtual-reality world with a control device, such as a trackball or spaceball, an electronic dataglove, a magnetic head position tracker, a keyboard, a joystick, or a steering wheel.”**

24. “means for simulating, on the display device, movement through the virtual reality world”

The parties proposed functions and structures are identical to those proposed for Term 23. Maxus argues that the function for this term is “to generate the virtual reality world,” and Nirvana counters that it is “simulating in real-time, on the display device, movement through the virtual reality world.” The court instead construes the function directly from the claim language: “simulating, on the display device, movement through the virtual-reality world.”

Nirvana posits that the corresponding structure is “head-tracking and gesture tracking sensors, such as a spaceball, dataglove, or a magnetic head position tracker,” while Maxus argues it is the virtual-reality generator, high-speed computer processor, and specialized graphics hardware. The court concludes that the structure for this term is the virtual-reality generator defined previously.

The court construes the function of term “means for simulating, on the display device, movement through the virtual reality world” as **“simulating, on the display device, movement through the virtual-reality world,”** and the corresponding structure as **“high-speed computer processor and specialized graphics hardware using display graphics library routines to redraw the virtual-reality world 30 times per second on a display device based on the user’s navigation of the virtual-reality world with a control device, such as a trackball or spaceball, an electronic**



**dataglove, a magnetic head position tracker, a keyboard, a joystick, or a steering wheel.”**

25. “means for updating the virtual reality world”

Maxus asserts that the function of this term is “to generate the virtual reality world,” while Nirvana argues it is “updating the virtual reality world.” The court adopts Nirvana’s function language because it tracks the claim language exactly.

Nirvana argues that the term is indefinite because the structure is an “Intel 486 computer processor,” while Maxus posits that the structure is the virtual-reality generator, high-speed computer processor, and specialized graphics hardware.

As discussed with regard to Term 21, the court defines the virtual-reality generator as the corresponding structure. The term is not indefinite because the court finds adequate structure contained in the specification. The virtual-reality generator is implemented by a general-purpose computer, and is therefore limited to the algorithm disclosed in the specification. The court also concludes that the display device is not a necessary component for generating the virtual-reality world.

Accordingly, the court construes the function of term “means for updating the virtual reality world” as **“updating the virtual-reality world,”** and the corresponding structure as **“high-speed computer processor and specialized graphics hardware using display graphics library routines to redraw the virtual-reality world 30 times per second.”**

C. Summary Table of Adopted Agreed and Disputed Terms

<u>Claim Term/Phrase</u>	<u>Court's Construction</u>
virtual reality generator (‘115 Claims 1, 22, 28, 38, 43, 44, 45; ‘878 Claims 1, 21, 23, 35, 40, 41, 42)	<b>the program or other mechanism that creates and modifies the virtual-reality world</b>
1. axis of a three dimensional interface (‘878 Claims 1, 21, 23, 35, 40, 41, 42)	<b>reference line among a three-dimensional virtual space</b>
2. categorical dimension (‘115 Claims 1, 22, 28, 38, 43, 44, 45)	<b>category of information corresponding to a dimension</b>
3. data mining information (‘115 Claims 43, 44)	<b>information identifying relationships or patterns within the information terrain</b>
4. display device (‘115 Claims 1, 22, 28, 38, 43, 44, 45; ‘878 Claims 1, 21, 23, 35, 40, 41, 42)	<b>device for displaying information in a visual form</b>
5. interact with; interaction with (‘115 Claims 1, 43, 44; ‘878 Claims 1, 40, 41)	<b>accepting input from or providing output to</b>
6. non-integer terrain parameter (‘878 Claims 1, 21, 23, 35, 40, 41, 42)	<b>terrain parameter not capable of being described by an integer</b>
7. numerical dimension (‘115 Claims 1, 22, 28, 38, 43, 44, 45)	<b>numerical information corresponding to a dimension</b>
8. preprocessed (‘115 Claims 38, 44, 45; ‘878 Claims 1, 21, 23, 35, 40, 41, 42)	<b>structured or categorized prior to input into the virtual-reality generator</b>

<p>9. selected portion of the preprocessed information (‘115 Claim 38)</p>	<p><b>preprocessed information from the input module representing the user’s current viewing perspective of the information terrain</b></p>
<p>10. sensation of travelling through and within; sensation of travelling through (‘115 Claims 1, 22, 28, 38, 43, 44, 45; ‘878 Claims 1, 21, 23, 35, 40, 41, 42)</p>	<p><b>illusion of being inside a world that can be navigated and viewed from any perspective</b></p>
<p>11. simulate movement through (‘115 Claims 1, 22, 28, 38, 43, 44, 45; ‘878 Claims 1, 21, 23, 35, 40, 41, 4)</p>	<p><b>illusion of being inside a world that can be navigated and viewed from any perspective</b></p>
<p>12. the pre-processed abstract information; the pre-processed information; the information (‘115 Claim 45)</p>	<p><b>information structured or categorized prior to its receipt</b></p>
<p>13. virtual reality world (‘115 Claims 1, 22, 28, 38, 43, 44, 45; ‘878 Claims 1, 21, 23, 35, 40, 41, 42)</p>	<p><b>three-dimensional computer-generated world that users can view, navigate through, and interact with</b></p>
<p>14. means for causing the virtual reality world to be displayed on the display device (‘878 Claim 21)</p>	<p><u>Function:</u> <b>causing the virtual-reality world to be displayed on the display device</b></p> <p><u>Structure:</u> <b>high-speed computer processor and specialized graphics hardware using display graphics library routines to redraw the virtual-reality world 30 times per second on a display device</b></p>
<p>15. means for causing the virtual reality world to be displayed on the display device from a plurality of perspectives (‘878 Claim 23)</p>	<p><u>Function:</u> <b>causing the virtual-reality world to be displayed on the display device from a plurality of perspectives</b></p> <p><u>Structure:</u> <b>high-speed computer processor and specialized graphics hardware using display graphics library routines to redraw the virtual-reality world 30 times per second on a display device</b></p>

<p>16. means for displaying in real-time on the display device the virtual reality world</p> <p>(‘878 Claim 35)</p>	<p><u>Function:</u> <b>displaying in real-time on the display device the virtual-reality world</b></p> <p><u>Structure:</u> <b>high-speed computer processor and specialized graphics hardware using display graphics library routines to redraw the virtual-reality world 30 times per second on a display device</b></p>
<p>17. means for displaying on a display device a virtual reality world</p> <p>(‘878 Claim 40)</p>	<p><u>Function:</u> <b>displaying on a display device a virtual-reality world</b></p> <p><u>Structure:</u> <b>high-speed computer processor and specialized graphics hardware using display graphics library routines to redraw the virtual-reality world 30 times per second on a display device</b></p>
<p>18. means for displaying the virtual reality world from a plurality of perspectives</p> <p>(‘878 Claim 35)</p>	<p><u>Function:</u> <b>displaying the virtual-reality world from a plurality of perspectives</b></p> <p><u>Structure:</u> <b>high-speed computer processor and specialized graphics hardware using display graphics library routines to redraw the virtual-reality world 30 times per second on a display device</b></p>
<p>19. means for generating and continuously modifying the virtual reality world</p> <p>(‘878 Claim 21)</p>	<p><u>Function:</u> <b>generating and continuously modifying the virtual-reality world</b></p> <p><u>Structure:</u> <b>high-speed computer processor and specialized graphics hardware using display graphics library routines to redraw the virtual-reality world 30 times per second</b></p>
<p>20. means for generating the virtual reality world</p> <p>(‘878 Claim 23)</p>	<p><u>Function:</u> <b>generating the virtual-reality world</b></p> <p><u>Structure:</u> <b>high-speed computer processor and specialized graphics hardware using display graphics library routines to redraw the virtual-reality world 30 times per second</b></p>

<p>21. means for generating, in real-time as the selected portion of the pre-processed financial information is received from the real-time data source of financial information, the virtual reality world representing the pre-processed financial information</p> <p>('878 Claim 35)</p>	<p><u>Function:</u> <b>generating, in real-time as the selected portion of the preprocessed financial information is received from the real-time data source of financial information, the virtual-reality world representing the preprocessed financial information</b></p> <p><u>Structure:</u> <b>high-speed computer processor and specialized graphics hardware using display graphics library routines to redraw the virtual-reality world 30 times per second</b></p>
<p>22. means for receiving as input in real-time the pre-processed financial information from a data source of pre-processed financial information</p> <p>('878 Claim 35)</p>	<p><u>Function:</u> <b>receiving as input in real-time the preprocessed financial information from a data source of preprocessed financial information</b></p> <p><u>Structure:</u> <b>receiving information from a Microsoft Excel spreadsheet program via the dynamic data exchange protocol, or directly from a financial data feed</b></p>
<p>23. means for simulating in real-time, on the display device, movement through the virtual reality world</p> <p>('878 Claim 35)</p>	<p><u>Function:</u> <b>simulating in real-time, on the display device, movement through the virtual-reality world</b></p> <p><u>Structure:</u> <b>high-speed computer processor and specialized graphics hardware using display graphics library routines to redraw the virtual-reality world 30 times per second on a display device based on the user's navigation of the virtual-reality world with a control device, such as a trackball or spaceball, an electronic dataglove, a magnetic head position tracker, a keyboard, a joystick, or a steering wheel</b></p>

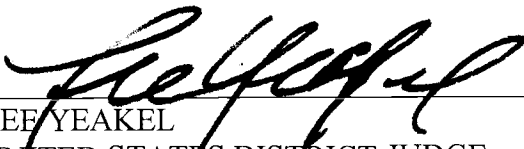
<p>24. means for simulating, on the display device, movement through the virtual reality world</p> <p>('878 Claims 21, 23)</p>	<p><u>Function:</u> <b>simulating, on the display device, movement through the virtual-reality world</b></p> <p><u>Structure:</u> <b>high-speed computer processor and specialized graphics hardware using display graphics library routines to redraw the virtual-reality world 30 times per second on a display device based on the user's navigation of the virtual-reality world with a control device, such as a trackball or spaceball, an electronic dataglove, a magnetic head position tracker, a keyboard, a joystick, or a steering wheel</b></p>
<p>25. means for updating the virtual reality world</p> <p>('878 Claim 40)</p>	<p><u>Function:</u> <b>updating the virtual-reality world</b></p> <p><u>Structure:</u> <b>high-speed computer processor and specialized graphics hardware using display graphics library routines to redraw the virtual-reality world 30 times per second</b></p>

**IV. Conclusion**

For the above reasons, the court construes the disputed claims as noted and so **ORDERS**. No further claim terms require construction.

**IT IS FURTHER ORDERED** that this case is set for a **Scheduling Conference** on **September 8, 2014, at 10:00 a.m.**, in Courtroom 7, Seventh Floor, United States Courthouse, 501 W. 5th Street, Austin, Texas 78701. The parties shall meet and confer in advance of that date in an attempt to settle this case. If the case is not settled, the parties shall confer in an attempt to reach agreement on a schedule to follow for the remainder of this case. The court will render a Scheduling Order as a result of the **September 8, 2014** conference.

SIGNED this 7th day of July, 2014.

  
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LEE YEAKEL  
UNITED STATES DISTRICT JUDGE