IN THE UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF MICHIGAN
SOUTHERN DIVISION

BEACON NAVIGATION GMBH, Plaintiff, v. BAYERISCHE MOTOREN WERKE AG, BMW OF NORTH AMERICA, LLC, AND BMW MANUFACTURING CO., LLC, Defendants.	Case No. 2:13-cv-11410-MAG-EAS Hon. Mark A. Goldsmith Mag. Elizabeth A. Stafford

OPINION AND ORDER DENYING BMW'S MOTION FOR JUDGMENT ON THE PLEADINGS (ECF No. 69)

In this patent infringement case, plaintiff Beacon Navigation GmbH ("Beacon") alleges that defendants Bayerische Motoren Werke AG, BMW of North America, LLC, and BMW Manufacturing Co., LLC (collectively, "BMW") infringe a Beacon patent on vehicle navigation technology, U.S. Patent No. 5,862,511 (the "'511 Patent").

Presently before the Court is BMW's motion for judgment on the pleadings that the asserted claims of the '511 Patent are invalid as patent ineligible. The parties have submitted written briefs explaining their positions on whether the asserted claims recite patent eligible subject matter. ECF No. 69 ("BMW's Motion"); ECF No. 71 ("Beacon's Opposition"); ECF No. 76 ("BMW's Reply"). Pursuant to Local

Rule 7.1(f)(2), the Court will decide BMW's motion for judgment on the pleadings without a hearing. E.D. Mich. LR 7.1(f)(2).

For the reasons more fully stated in this opinion and order, because the Court finds at step one of the patent eligibility analysis that the asserted claims are not directed to an abstract idea, the Court will **DENY** BMW's motion for judgment on the pleadings that the asserted claims of the '511 Patent are invalid as patent ineligible.

I. PROCEDURAL HISTORY

This case once belonged to a larger group of related patent infringement cases involving additional defendants and additional Beacon patents. The Court has previously set forth a detailed procedural history of these cases. ECF No. 88, PageID.4120-4122. Only this case against BMW, which now only involves the '511 Patent, remains pending. In summary, this case was filed by Beacon on October 11, 2011 in the United States District Court for the District of Delaware and transferred to this District on March 20, 2013. Beginning on August 12, 2013, the Court stayed this case pending a succession of proceedings in the United States Patent and Trademark Office (the "USPTO"). While ultimately cancelling the asserted claims of other Beacon patents, the USPTO issued four reexamination certificates confirming the novelty and non-obviousness of the asserted claims of the '511

Patent. *Ex Parte* Reexamination Certificate Nos. 5,862,511 C1, 5,862,511 C2, 5,862,511 C3, and 5,862,511 C4.

On August 19, 2022, following the conclusion of the last USPTO proceeding, the Court lifted the stay. On November 18, 2022, Beacon filed a first amended complaint ("FAC"), alleging that BMW infringes the '511 Patent. ECF No. 60. On December 2, 2022, BMW answered and counterclaimed for declaratory judgment, denying that it infringes the '511 Patent and alleging that the '511 Patent is invalid. ECF No. 62. On December 16, 2022, Beacon answered, denying that the '511 Patent is invalid. ECF No. 63.

In the FAC, Beacon alleges that BMW infringed Claims 1 and 3 of the '511 Patent in connection with sales of vehicles with GPS navigation systems (the "accused vehicles" and the "accused navigation systems") prior to the '511 Patent's December 28, 2015 expiration date. Beacon alleges that BMW directly infringed Claim 1 by making, importing, and selling the accused vehicles. ECF No. 60, PageID.3223-3224 (FAC ¶¶ 16-17). Beacon alleges that, with knowledge of the '511 Patent, BMW induced consumers to infringe Claim 3 by providing the accused vehicles along with instructions to use the accused navigation systems. ECF No. 60, PageID.3226 (FAC ¶¶ 22-24).

On July 28, 2023, the Court denied BMW's motion to dismiss Beacon's induced infringement claims. ECF No. 88. Additionally, the Court issued an opinion

and order construing the disputed claim terms within the asserted claims of the '511 Patent, pursuant to *Markman v. Westview Instruments, Inc.*, 517 U.S. 370 (1996). ECF No. 87.

On April 21, 2023, BMW filed its present motion for judgment on the pleadings, asking the Court to dismiss the FAC under Federal Rule of Civil Procedure 12(c) on the ground that the asserted claims of the '511 Patent are invalid as patent ineligible.

II. '511 Patent

The '511 Patent, entitled "Vehicle Navigation System and Method," was filed in the USPTO on December 28, 1995 and issued on January 19, 1999. The '511 Patent expired on December 28, 2015, twenty years after its filing date. *See* 35 U.S.C. § 154(a)(2).

The '511 Patent is directed to vehicle navigation technology. In the written description, the '511 Patent begins with a helpful background section on prior navigation systems. In general, to support a vehicle's navigation functionality, such as route guidance and turn-by-turn navigation, navigation systems work by continuously determining the vehicle's current position. To determine the current position, navigation systems use information from a Global Positioning System (GPS), motion sensors, and a map database. '511 Patent 1:16-2:25. In connection with these components, as the vehicle moves and the once-current position becomes

a previous position, navigation systems can use different techniques to re-determine the current position. For example, a GPS position based on information from space-based satellites can be used for the current position. *Id.* 1:16-18. Alternatively, using "propagation" (also known as "dead reckoning") techniques, information from the motion sensors can be used to propagate the current position from the previous position. *Id.* 1:63-2:3. Moreover, using "map matching" techniques, information from the motion sensors can be matched to a position in the map database, and the resulting map-matched position can be used for the current position. *Id.* 2:13-25.

The '511 Patent describes a navigation system that uses GPS velocity information to implement purportedly improved propagation techniques. *Id.* 2:32-3:13. Before turning to the disclosed propagation techniques, it is important to note that the '511 Patent assumes knowledge of math principles, two of which are relevant to the asserted claims. First, position and velocity are "vectors." This means that, in addition to their distance and speed (i.e., magnitude) components, position and velocity have a heading (i.e., direction) component. Accordingly, map-matched positions have map headings, and GPS velocities have GPS headings, that point, for example, in the East and North directions. *Id.* 2:32-36, 7:67-8:3. Second, relevant to the disclosed propagation techniques, velocity can be "integrated" to obtain "displacements" (i.e., changes in position) in the directions of the heading. Accordingly, GPS velocities can be integrated to obtain displacements, which can

then be applied to the previous position to obtain the current position. *Id.* 15:45-49, 15:58-63, 16:12-16.

In connection with the disclosed propagation techniques, Claims 1 and 3 of the '511 Patent are directed to an embodiment for updating GPS velocity information with a map heading. *Id.* 15:29-44, 15:53-16:22. As shown in Figure 7c, reproduced below, the embodiment involves steps for updating a GPS velocity vector (**200**) with a map heading (**202**) for use in the propagation of a previous position (**191**) to a current position (**206**). *Id.* 15:53-65.

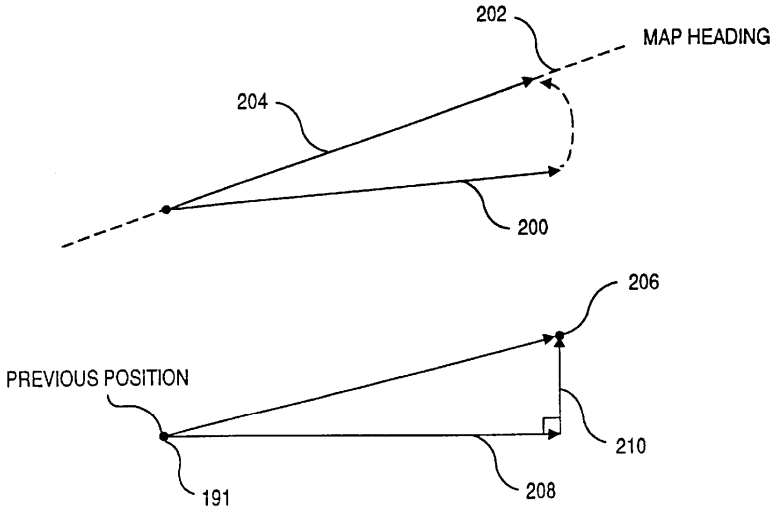

Fig-7c

The GPS velocity vector (**200**) has GPS speed and GPS heading components. *Id.* 2:32-36. The map heading (**202**) is based on the heading of the mapped path on which the vehicle is traveling. *Id.* 15:29-34. When the difference between the GPS heading and the map heading (**202**) is within a threshold, the GPS velocity vector

(**200**) is rotated to align with the map heading (**202**). *Id.* 15:58-63. The rotated GPS velocity vector (**204**) is then integrated to obtain displacements (**208** and **210**). *Id.* The displacements (**208** and **210**) are then applied to the previous position (**191**) to obtain the current position (**206**). *Id.* 15:63-65.

Claim 1 recites the patented navigation system, and Claim 3 recites the patented navigation method:

> **1**. An improved vehicle navigation system comprising:
>
> a map database with map information, said vehicle navigation system derives a map heading from said map information; and
>
> a GPS receiver which provides GPS velocity information including a heading, said vehicle navigation system uses said velocity information to propagate a previous position to a current position and interrogates said map database to obtain said map heading information; said vehicle navigation system updates said velocity information with said map heading for propagating said previous position to said current position if the difference between the heading of said velocity information and said map heading are within a threshold, wherein said system rotates said velocity to align with said map heading and integrates the rotated velocity to obtain displacements; said system obtains said current position by applying said displacements to said previous position.
>
> **3**. A method of estimating the velocity of a vehicle known to be on a mapped path comprising:
>
> determining the velocity of the vehicle, the velocity including a heading;
>
> interrogating a map database to obtain a map heading of said mapped path; and

> updating said velocity with said map heading if the difference between the heading of said velocity and said map heading are within a threshold;
>
> using said velocity to propagate a previous position to a current position, wherein said step of using includes rotating velocity to align with said map heading and integrating rotated velocity to obtain a displacement and obtaining said current position by applying said displacement to said previous position.

Id. 17:11-29 (Claim 1), 17:48-63 (Claim 3).

As noted above, Claims 1 and 3 are directed to the embodiment shown in Figure 7c. Claim 1 recites a GPS receiver and a map database, and is otherwise directed to a navigation system that generally performs the steps recited in Claim 3. In addition to a previous position and a current position, the claim language involves an initial velocity, an updated velocity, and a rotated velocity, as well as a velocity heading of the initial velocity, and a map heading from the map database. In Claim 1, the initial velocity is GPS velocity information from the GPS receiver, and in Claim 3, the initial velocity is the velocity of the vehicle.

At the claim construction stage of this case, before turning to the disputed claim terms, the Court adopted several agreed constructions. By agreement of the parties, "velocity" means "velocity vector, which includes speed and heading components." Similarly, "GPS velocity information" means "information based on the speed and heading of the GPS receiver." With respect to the rotate–then–integrate sequence, "rotates said velocity to align with said map heading" means

"rotates the velocity vector to align with the map heading while maintaining the magnitude of the velocity vector," and "integrates the rotated velocity to obtain displacements" means "calculates the integral of the rotated velocity to obtain displacements." ECF No. 87, PageID.4090-4091.

As to the proper constructions of the disputed claim terms, the Court resolved the disputed issues of definiteness in Beacon's favor and adopted Beacon's proposed constructions. Among other things, the Court found that "current position" is not indefinite, and that "previous position" and "current position" should be given their plain and ordinary meanings. Similarly, the Court found that "propagating said previous position to said current position" is not indefinite, and should be given its plain and ordinary meaning. ECF No. 87, PageID.4092-4101 (current position term), PageID.4101-4103 (propagation terms), PageID.4114-4116 (previous position term).

III. LEGAL STANDARDS

In accordance with Federal Circuit jurisprudence, district courts adjudicating patent cases apply the law of the Federal Circuit to questions pertaining to patent law and the law of the regional circuit to procedural questions. *McZeal v. Sprint Nextel Corp.*, 501 F.3d 1354, 1356 (Fed. Cir. 2007). Whether to grant a motion for judgment on the pleadings under Federal Rule of Civil Procedure 12(c) is a

procedural question governed by the law of the regional circuit. *Imation Corp. v. Koninklijke Philips Elecs. N.V.*, 586 F.3d 980, 984 (Fed. Cir. 2009).

A. Pleading

Federal Rule of Civil Procedure 8(a)(2) requires a complaint to include "a short and plain statement of the claim showing that the pleader is entitled to relief." Fed. R. Civ. P. 8(a)(2). A complaint that fails to make such a showing may be dismissed pursuant to Federal Rule of Civil Procedure 12(b)(6) for "failure to state a claim upon which relief can be granted." Fed. R. Civ. P. 12(b)(6). Federal Rule of Civil Procedure 12(c) provides that "[a]fter the pleadings are closed—but early enough not to delay trial—a party may move for judgment on the pleadings." Fed. R. Civ. P. 12(c).

Where, as here, the defendant is the moving party, district courts decide a motion for judgment on the pleadings under Rule 12(c) using the same standard that applies to a motion to dismiss under Rule 12(b)(6). *United Food & Commercial Workers v. Kroger Co.*, 51 F.4th 197, 202 (6th Cir. 2022). Accordingly, a district court must accept all of the factual allegations contained in the complaint as true and construe the complaint and its exhibits in the light most favorable to the plaintiff. *Id.* Beyond the complaint, a district court may consider public records, items in the record of the case, and exhibits attached to the defendant's motion for judgment on the pleadings so long as they are "referred to" in the complaint and "central to" the

claims. *Brent v. Wayne Cty. Dep't of Human Servs.*, 901 F.3d 656, 695 (6th Cir. 2018).

A complaint need only contain "enough facts to state a claim for relief that is plausible on its face." *Bell Atl. Corp. v. Twombly*, 550 U.S. 544, 570 (2007). "A claim has facial plausibility when the plaintiff pleads factual content that allows the court to draw the reasonable inference that the defendant is liable for the misconduct alleged." *Ashcroft v. Iqbal*, 556 U.S. 662, 678 (2009) (citing *Twombly*, 550 U.S. at 556). "Where a complaint pleads facts that are merely consistent with a defendant's liability, it 'stops short of the line between possibility and plausibility of entitlement to relief.'" *Id.* (quoting *Twombly*, 550 U.S. at 557). "Determining whether a complaint states a plausible claim for relief will … be a context-specific task that requires the reviewing court to draw on its judicial experience and common sense." *Id.* at 679.

B. Patent Eligibility

The Patent Act establishes invalidity as a defense to infringement. 35 U.S.C. § 282(b). Under an invalidity defense, an accused infringer can "attempt to prove that the patent never should have issued in the first place." *Microsoft Corp. v. i4i Ltd. P'ship*, 564 U.S. 91, 96 (2011). A patent enjoys a statutory presumption of validity, and the party asserting invalidity must prove invalidity by clear and convincing evidence. 35 U.S.C. § 282(a); *Microsoft*, 564 U.S. at 95.

A claim of a patent is invalid if it is not directed to patent eligible subject matter pursuant to Section 101. Section 101 provides that a patent may be obtained for "any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof." 35 U.S.C. § 101. But the Supreme Court has held that the statutory definition of patent eligible subject matter includes an implicit exception for laws of nature, natural phenomena, and abstract ideas. *Alice Corp. v. CLS Bank Int'l*, 573 U.S. 208, 216 (2014). The judicial exception is driven by a concern of preemption. *Id.* Laws of nature, natural phenomena, and abstract ideas are not patent eligible because they are "building blocks of human ingenuity." *Id.* at 217. In determining patent eligibility, courts must distinguish between patents that "claim the building blocks" and those whose claims "integrate the building blocks into something more." *Id.*

Supreme Court cases "have endorsed a bright-line prohibition against patenting laws of nature, mathematical formulas, and the like." *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 89 (2012). At the same time, the Supreme Court has instructed courts to "tread carefully" lest the judicial exception "swallow all of patent law." *Alice*, 573 U.S. at 217. It is not enough that the claims "involve" a patent ineligible concept because "[a]t some level, all inventions embody, use, reflect, rest upon, or apply laws of nature, natural phenomena, or abstract ideas." *Id.* (quotation and alteration omitted).

The Supreme Court has articulated a two-step framework for determining patent eligibility. *Alice*, 573 U.S. at 217-18 (citing *Mayo*, 566 U.S. at 72-73, 77-79). At step one, courts must determine whether the claims are "directed to" a patent ineligible concept, such as an abstract idea. *Id.* at 218. If the claims are directed to a patent ineligible concept, at step two, courts must consider the claim elements "both individually and as an ordered combination" to determine whether the claims contain "additional elements" that constitute an "inventive concept" sufficient to "transform" the concept into a patent eligible "application." *Id.* at 217-18 (quotation and citation omitted). These "additional elements" must involve more than performance of "well-understood, routine, conventional activities previously known to the industry." *Id.* at 225 (quotation and citation omitted).

Patent eligibility is a question of law based on underlying factual findings. *Berkheimer v. HP Inc.*, 881 F.3d 1360, 1368 (Fed. Cir. 2018). At step two, the determination of whether the claims contain an inventive concept is a question of law that may be informed by factual determinations of whether a claim element or a combination of claim elements was well-understood, routine, and conventional. *BSG Tech LLC v. BuySeasons, Inc.*, 899 F.3d 1281, 1290 (Fed. Cir. 2018) (citing *Berkheimer*, 881 F.3d at 1368). Any fact concerning whether a claim element or combination of claim elements was well-understood, routine, and conventional must be proven by clear and convincing evidence. *Berkheimer*, 881 F.3d at 1368 (citing

Microsoft, 564 U.S. at 95). Patent eligibility may be resolved at the pleadings stage where the undisputed facts, considered under the standards required by Rule 12(b)(6) or Rule 12(c), require a holding of patent ineligibly under the substantive legal standards. *SAP Am., Inc. v. InvestPic, LLC*, 898 F.3d 1161, 1166 (Fed. Cir. 2018).

IV. PATENT ELIGIBILITY ANALYSIS

Although the asserted claims include similar limitations, the parties discuss Claims 1 and 3 separately, and have not designated a representative claim. In the below patent eligibility analysis, the Court will refer to the claim language of Claim 1 except when necessary to distinguish between the asserted claims.

A. Arguments

In its motion for judgment on the pleadings, BMW argues that the asserted claims are invalid because they recite patent ineligible subject matter. BMW's basic contention is that the navigation system of the '511 Patent applies standard math to information from conventional navigation system components. At step one, BMW argues that the asserted claims are directed to the abstract idea of "organizing information through mathematical correlations." ECF No. 69, PageID.3772 (BMW's Mot. Br. 15). Citing the absence of new navigation system components, BMW argues that the asserted claims do not focus on a technological improvement at step one and do not contain an inventive concept at step two.

In its opposition, Beacon argues that BMW oversimplifies the claimed invention. Beacon's basic contention is that the navigation system of the '511 Patent uses GPS velocity information and map matching as set forth in the asserted claims to implement solutions to problems with prior navigation systems. At step one, Beacon argues that the asserted claims focus on "an improved GPS system that allows the navigation system to update a vehicle's position more efficiently than prior systems." ECF No. 71, PageID.3841 (Beacon's Opp'n Br. 10). Citing the benefits of the claimed invention, Beacon argues that the asserted claims are not directed to an abstract idea at step one and contain an inventive concept at step two.

B. Abstract Ideas Category

BMW's motion for judgment on the pleadings centers on the abstract ideas exception to patent eligibility. As noted above, BMW argues that the asserted claims are directed to the abstract idea of organizing information through mathematical correlations. However, BMW does not begin with this formulation or limit itself to this argument. Rather, on the way to this formulation, BMW argues that the asserted claims are directed to abstract ideas in the form of a mathematical algorithm, a mental process, and collecting, analyzing, and displaying information. Before turning to the patent eligibility analysis, the Court will provide an overview of the relevant caselaw on these types of abstract ideas.

The abstract ideas exception to patent eligibility "embodies the longstanding rule that an idea of itself is not patentable." *Alice*, 573 U.S. at 218 (quotations and alteration omitted). The Supreme Court has not delimited the "precise contours" of the abstract ideas category. *Id.* at 221. However, the Supreme Court and the Federal Circuit have provided guidance on identifying subject matter that falls within the judicial exception.

"We know that mathematical algorithms, including those executed on a generic computer, are abstract ideas." *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245, 1256 (Fed. Cir. 2014) (citing *Gottschalk v. Benson*, 409 U.S. 63, 64 (1972)). The Supreme Court has described a mathematical algorithm as a "procedure for solving a given type of mathematical problem." *Benson*, 409 U.S. at 65. *See also* Manual of Patent Examining Procedure § 2106.04(a)(2)(I) ("The mathematical concepts grouping is defined as mathematical relationships, mathematical formulas or equations, and mathematical calculations."). Mathematical algorithms are not patent eligible because, like laws of nature, they are "the basic tools of scientific and technological work." *Benson*, 409 U.S. at 67. Accordingly, "if a claim is directed essentially to a method of calculating, using a mathematical formula, even if the solution is for a specific purpose, the claimed method is nonstatutory." *Parker v. Flook*, 437 U.S. 584, 595 (1978) (quotation omitted).

The prohibition against patenting abstract ideas cannot be circumvented by limiting a mathematical algorithm to a particular technological environment or a particular field of use. In *Benson*, the applicant sought claims on a method of programming a general-purpose computer to implement a formula for converting binary-coded decimal numerals into pure binary numerals. *Benson*, 409 U.S. at 65. The Supreme Court held that the method was not patent eligible because the formula had "no substantial practical application except in connection with a digital computer" and a patent on the method "would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself." *Id.* at 71-72.

In *Flook*, the applicant sought claims on a method of using a formula for calculating and updating alarm limit values in hydrocarbon chemical catalytic conversion processes. *Flook*, 437 U.S. at 585-86. The application did not explain how to select the variables used in the formula, or contain any disclosure about the chemical processes, monitoring the variables, or the means of adjusting an alarm limit or setting off an alarm. *Id.* at 586. The Supreme Court held that the method was not patent eligible because all the application provided was "a new and presumably better method for calculating alarm limit values." *Id.* at 594-95. The Supreme Court rejected the argument that the specific end use of adjusting an alarm limit made the method patent eligible because "[a] competent draftsman could attach some form of

post-solution activity to almost any mathematical formula." *Id.* at 590 (explaining that "the Pythagorean theorem would not have been patentable, or partially patentable, because a patent application contained a final step indicating that the formula, when solved, could be usefully applied to existing surveying techniques"). Similarly, the Supreme Court rejected the argument that limiting the formula to certain industries made the method patent eligible because "[i]t would make the determination of patentable subject matter depend simply on the draftsman's art." *Id.* at 593.

Although mathematical algorithms are not patent eligible, "an *application* of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection." *Diamond v. Diehr*, 450 U.S. 175, 187 (1981) (emphasis in original). In *Diehr*, the applicant sought claims on a process of molding rubber products in which a computer used the mold temperature and the Arrhenius equation to calculate the cure time and open the molding press. *Id.* at 177-78. The process included loading uncured rubber in the mold, closing the mold, constantly measuring the temperature inside the mold and recalculating the appropriate cure time, and automatically opening the molding press at the proper time. *Id.* at 187. The Supreme Court held that the process was patent eligible because the applicant was not attempting "to patent a mathematical formula," but rather sought claims on "an industrial process for the molding of rubber products." *Id.* at 192-93. Noting "all of

the other steps" of the process, the Supreme Court explained that "a claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula, computer program, or digital computer." *Id.* at 187.

Observing the Supreme Court's discussion of the mental character of solving mathematical problems, the Federal Circuit has held that mental processes are abstract ideas. *CyberSource Corp. v. Retail Decisions, Inc.*, 654 F.3d 1366, 1371 (Fed. Cir. 2011) (citing *Benson*, 409 U.S. at 67; *Flook*, 437 U.S. at 586). The Federal Circuit has described mental processes as methods that "can be performed in the human mind" or "by a human using a pen and paper." *Id.* at 1372-73. Mental processes are not patent eligible because "the application of only human intelligence to the solution of practical problems is no more than a claim to a fundamental principle." *Id.* at 1371 (quotation and alteration omitted).

Moreover, the Federal Circuit has held that the mental processes exception to patent eligibility "undergirds" an information-based category of abstract ideas. *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1355 (Fed. Cir. 2016). "Information as such is an intangible." *Id.* at 1353. Accordingly, "collecting information, including when limited to particular content (which does not change its character as information)," and "analyzing information by steps people go through in their minds, or by mathematical algorithms, without more," is an abstract idea. *Id.* at 1353-54 (collecting cases). And "merely presenting the results of abstract processes of

collecting and analyzing information, without more (such as identifying a particular tool for presentation), is abstract as an ancillary part of such collection and analysis." *Id.* at 1354 (collecting cases). The Federal Circuit has held that "even if a process of collecting and analyzing information is limited to particular content or a particular source, that limitation does not make the collection and analysis other than abstract." *SAP*, 898 F.3d at 1168 (quotations omitted) (citing *Elec. Power*, 830 F.3d at 1353, 1355 (collecting cases)).

C. Analysis

At step one, the Federal Circuit has instructed courts to look to whether the claims "focus on a specific means or method that improves the relevant technology or are instead directed to a result or effect that itself is the abstract idea and merely invoke generic processes and machinery." *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299, 1314 (Fed. Cir. 2016). To do so, courts consider the claims in their entirety to ascertain whether their "character as a whole" is directed to an abstract idea, as well as the written description, as it informs the understanding of the claims. *CardioNet, LLC v. InfoBionic, Inc.*, 955 F.3d 1358, 1367-68 (Fed. Cir. 2020) (quotation omitted). The Federal Circuit has instructed that courts "be careful to avoid oversimplifying the claims by looking at them generally and failing to account for the specific requirements of the claims." *Id.* at 1371 (quotation omitted). Although step one and step two "involve overlapping scrutiny of the content of the

claims," the Supreme Court's two-step framework "makes clear that the first-stage filter is a meaningful one, sometimes ending the § 101 inquiry." *Elec. Power*, 830 F.3d at 1353 (citing *Alice*, 573 U.S. at 218).

For computer-related technology, a relevant inquiry is "whether the claims are directed to an improvement to computer functionality versus being directed to an abstract idea." *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1335 (Fed. Cir. 2016). The Federal Circuit has explained this distinction by contrasting "claims that focus on an improvement in computers and other technologies as tools" and "claims that focus on certain independently abstract ideas that use computers as tools." *CardioNet*, 955 F.3d at 1371 (quotations and alteration omitted). "If a claimed invention only performs an abstract idea on a generic computer, the invention is directed to an abstract idea at step one." *BSG Tech*, 899 F.3d at 1285 (citing *Alice*, 573 U.S. at 218-21).

For the reasons set forth below, the Court finds at step one that, considered as a whole and in light of the written description, Claims 1 and 3 of the '511 Patent are not directed to an abstract idea. Having found at step one that Claims 1 and 3 of the '511 Patent are not directed to an abstract idea, the Court need not proceed to step two of the patent eligibility analysis. *Enfish*, 822 F.3d at 1339.

Two starting points for the patent eligibility analysis are largely undisputed.

First, Beacon does not dispute that the asserted claims "involve" an abstract idea. BMW's arguments appear to raise the issue of whether the mathematical algorithms exception to patent eligibility is applicable to the asserted claims. According to the claim language, the navigation system receives the GPS velocity information from the GPS receiver, and interrogates the map database to obtain the map heading. The navigation system then updates the GPS velocity information with the map heading, and uses the updated GPS velocity information to propagate the previous position to the current position. Specifically, as shown in Figure 7c, reproduced above, if the difference between the GPS heading and the map heading is within a threshold, the navigation system rotates the GPS velocity to align with the map heading, integrates the rotated GPS velocity to obtain displacements, and applies the displacements to the previous position to obtain the current position. In the written description, the '511 Patent describes that the navigation system uses various equations to implement the disclosed propagation techniques. '511 Patent 6:32-43, 8:51-11:20, 13:28-15:7. While BMW also argues that the asserted claims are directed to other types of abstract ideas, discussed below, the Court finds that the claim language most naturally raises the issue of whether the mathematical algorithms exception to patent eligibility applies to the asserted claims.

Second, Beacon does not dispute that the asserted claims recite conventional navigation system components. Specifically, the '511 Patent describes the

navigation system against a background where prior navigation systems included a GPS receiver, motion sensors, and a map database. *Id.* 1:16-18 ("Current vehicle navigation systems use GPS, such as an electromagnetic wave positioning system, to determine a vehicle's position."); 1:56-58 ("This equipment allows users to receive, decode, and process the information necessary to obtain accurate position, velocity and timing measurements."); 1:64-67 ("Currently, land-based navigation systems use vehicle speed sensor, rate gyro and a reverse gear hookup to 'dead reckon' the vehicle position from a previously known position."); 2:13-14 ("Prior systems use a road network stored in a map database to calculate current vehicle positions.").

What Beacon does dispute is that the asserted claims are "directed to" an abstract idea. Rather than only performing a mathematical algorithm on generic navigation system components, Beacon cites the written description of the '511 Patent to argue that the asserted claims focus on an improvement to vehicle navigation technology. The Court agrees.

In the written description, the '511 Patent explains that the navigation system uses information from a GPS, motion sensors, and a map database differently than prior navigation systems. As well, the '511 Patent makes clear that the navigation system uses GPS velocity information and map matching for propagation in the specific way set forth in the asserted claims to more accurately determine the current

position, as well as use cheaper motion sensors. Before turning to the written description, the Court notes that the Federal Circuit has provided guidance on conducting the patent eligibility analysis at the pleadings stage. *CardioNet*, 955 F.3d at 1369. In *CardioNet*, the Federal Circuit observed that the written description identified "a number of advantages gained by" the claimed invention. *Id.* In reversing the district court and holding at step one that the claims were not directed to an abstract idea, the Federal Circuit "accept[ed] those statements as true and consider[ed] them important in [its] determination that the claims are drawn to a technological improvement." *Id.* at 1370.

As set forth in the written description, the benefits of using GPS velocity information for propagation apply to two contexts. The first context is when GPS is available, and the navigation system uses GPS velocity information for propagation rather than GPS position information for positioning. Specifically, as opposed to using a GPS position as a known current position, the navigation system uses a GPS velocity to propagate the current position from the previous position. '511 Patent 1:5-12, 2:32-36, 6:27-36, 13:38-39. The '511 Patent explains that using GPS velocity information for propagation enables the navigation system to more accurately determine the current position because GPS velocities are more accurate than GPS positions. *Id.* 13:39-42, 16:51-55. By using GPS velocity information for propagation, the navigation system can accurately and smoothy track the movement

of the vehicle for turn-by-turn navigation. *Id.* 16:55-59. The second context is when GPS is unavailable, and the navigation system then uses information from the motion sensors for propagation. Specifically, the navigation system uses a speed and heading from a multiple axis accelerometer, an odometer, and a gyro to propagate the previous position to the current position. *Id.* 2:36-40, 6:27-32, 6:38-53, 14:41-45. The '511 Patent explains that, since GPS is almost always available, using GPS velocity information for propagation enables the navigation system to use cheaper motion sensors because it does not have to rely on them very often. *Id.* 2:40-44, 13:46-48.[1]

The benefits of using map matching for propagation apply regardless of GPS availability and independently of benefits related to GPS velocity information. According to the rotate–then–integrate sequence, in Claim 1, the navigation system

[1] Beacon cites additional benefits, including benefits of including certain motion sensors, and other benefits related to GPS velocity information. The Court has considered the additional benefits but will not incorporate them into the patent eligibility analysis. For both step one and step two, the Federal Circuit has "repeatedly held" that unclaimed features are "irrelevant." *Am. Axle & Mfg., Inc. v. Neapco Holdings LLC*, 967 F.3d 1285, 1293 (Fed. Cir. 2020) (collecting cases). The additional benefits relate to embodiments where the navigation system includes a multiple axis accelerometer in place of other motion sensors and/or uses a GPS velocity to calibrate the motion sensors. '511 Patent 2:36-3:5. In contrast to the claims of the '511 Patent that Beacon does not assert in this case, the asserted claims do not capture the additional benefits by specifying that the navigation system includes accelerometers or uses GPS velocity information for calibration. *Id.* 18:12-22:35 (non-asserted Claims 5-17 reciting an orthogonal axes accelerometer, using lateral and longitudinal calibration information from GPS velocity information for calibration, or both).

rotates the GPS velocity to align with the map heading, and integrates the rotated GPS velocity to obtain displacements. Likewise, in Claim 3, the navigation method determines the velocity of the vehicle, rotates the vehicle velocity to align with the map heading, and integrates the rotated vehicle velocity to obtain a displacement. The Court notes that on the face of the '511 Patent, the claim language embodies the use of map matching for propagation, as distinguished from positioning, and not, as BMW suggests, a reordering of conventional steps. Specifically, in prior navigation systems, map matching involved matching information from the motion sensors to a position in the map database, and using the resulting map-matched position as a known current position. *Id.* 2:13-18. The '511 Patent explains that, when used for positioning, map matching is inherently inaccurate because it must look back in time to match data to a location. *Id.* 2:18-20. In contrast, in the '511 Patent, in the absence of a good match, the navigation system updates the initial velocity with the map heading, and then uses the updated velocity to propagate the current position from the previous position. *Id.* 3:6-13, 6:36-38, 6:52-55, 7:64-8:10, 15:53-65. As with using GPS velocity information, the '511 Patent explains that using map matching for propagation enables the navigation system to more accurately determine the

current position, as well as use cheaper motion sensors, because headings can be corrected with map headings. *Id.* 16:4-7.[2]

Against the above disclosure of the '511 Patent, the Court finds the Federal Circuit's *Thales* decision instructive to the step one determination in this case. In *Thales*, the Federal Circuit addressed claims on an inertial tracking system for tracking the motion of an object (e.g., a helmet) on a moving platform (e.g., a vehicle). *Thales Visionix, Inc. v. United States*, 850 F.3d 1343, 1344-45 (Fed. Cir. 2017). The claims recited two inertial sensors, one mounted on the object and one mounted on the moving platform, and using the measurements from the inertial sensors to determine the object's motion relative to the moving platform. *Id.* at 1345-46. The patent explained that the inertial sensors did not use the conventional approach of measuring inertial changes relative to earth. *Id.* at 1345. Instead, the platform-based inertial sensor measured the gravitation field in the moving reference frame, and the object-based inertial sensor measured the object's motion relative to

[2] As noted above, the USPTO has issued four reexamination certificates confirming the novelty and non-obviousness of Claims 1 and 3. For context, in the last reexamination, Beacon identified the rotate–then–integrate sequence as the "basis for allowance" during prosecution and the "point of novelty" confirmed in the previous reexaminations. ECF No. 73-2, PageID.3909 (Dec. 2, 2019 Appeal Brief p. 8 (Beacon arguing that the prior art "must contain an algorithm for rotating, then integrating" to support the Examiner's rejections)). *See also* ECF No. 73-4, PageID.3942-3943 (Mar. 31, 2021 Decision on Appeal pp. 7-8 (Patent Trial and Appeal Board reversing the Examiner's rejections because the prior art did not disclose "rotating a velocity" and "integrating the rotated velocity")).

the moving reference frame. *Id.* Among other advantages, changing the reference frame enabled the tracking system to more accurately track the object's motion on the moving platform. *Id.*

The Federal Circuit held at step one that the claims were not directed to a "using mathematical equations" type abstract idea. *Id.* at 1348. "Rather, the claims are directed to systems and methods that use inertial sensors in a non-conventional manner to reduce errors in measuring the relative position and orientation of a moving object on a moving reference frame." *Id.* at 1348-49. The Federal Circuit explained that the claims specified "a particular configuration of inertial sensors and a particular method of using the raw data from the sensors in order to more accurately calculate the position and orientation of an object on a moving platform." *Id.* at 1349. "That a mathematical equation is required to complete the claimed method and system does not doom the claims to abstraction." *Id.* While the tracking system used equations to determine the object's motion, the equations were "a consequence of the arrangement of the sensors and the unconventional choice of reference frame." *Id.* "Far from claiming the equations themselves," the Federal Circuit explained, "the claims seek to protect only the application of physics to the unconventional configuration of sensors as disclosed." *Id.*

In accordance with these principles, the Court finds that the asserted claims are not directed to an abstract mathematical algorithm. On the face of the '511

Patent, whose disclosure the Court accepts as true at the pleadings stage, *CardioNet*, 955 F.3d at 1370, it is evident that the asserted claims are focused on a technological improvement. Specifically, the asserted claims focus on new and useful propagation techniques in a navigation system for using information from a GPS, motion sensors, and a map database differently than prior navigation systems to more accurately determine the position of a vehicle on a mapped path, as well as use cheaper motion sensors. *Thales*, 850 F.3d at 1349 ("Just as claims directed to a new and useful technique for defining a database that runs on general-purpose computer equipment are patent eligible, so too are claims directed to a new and useful technique for using sensors to more efficiently track an object on a moving platform.") (citation omitted) (citing *Enfish*, 822 F.3d at 1337-38).

While they involve a mathematical algorithm, the asserted claims do not purport to patent the equations for implementing the disclosed propagation techniques. Rather, the asserted claims specify that the navigation system uses particular information from particular navigation system components to implement specific propagation techniques that improve the way the navigation system performs its basic function of determining the current position. *Diehr*, 450 U.S. at 188 ("Arrhenius' equation is not patentable in isolation, but when a process for curing rubber is devised which incorporates in it a more efficient solution of the equation, that process is at the very least not barred at the threshold by § 101.").

As such, the asserted claims recite patent eligible subject matter because the disclosed propagation techniques involve the application of math to make an improvement in navigation systems as tools, not the use of generic navigation system components as tools to perform math. *CardioNet*, 955 F.3d at 1371. *See also id.* at 1368-69 (holding at step one that claims on a cardiac monitoring device were not directed to an abstract idea because the device more accurately detected cardiac arrythmias by analyzing variability in beat-to-beat timing); *XY, LLC v. Trans Ova Genetics, LC*, 968 F.3d 1323, 1331 (Fed. Cir. 2020) (holding at step one that claims on an "otherwise-known" flow cytometry process were not directed to an abstract idea because the process more accurately classified and separated individual particles "through specific application of mathematical algorithms") (citing *Diehr*, 450 U.S. at 184).

The Court has considered Claims 1 and 3 separately and reaches the same step one determination for both asserted claims. Although only Claim 1 captures the additional benefits of using GPS velocity information for propagation, Claim 3, like Claim 1, captures the independent benefits of using map matching for propagation, as embodied by the rotate–then–integrate sequence. As discussed above, using map matching for propagation, as distinguished from positioning, also enables the navigation system to more accurately determine the current position and use cheaper motion sensors.

In an effort to show that the asserted claims do not focus on a technological improvement, BMW makes two arguments for disregarding benefits related to GPS velocity information.

First, BMW argues that the step one determination should begin only "after removing the admittedly conventional components." BMW argues that the asserted claims are "a textbook abstraction" because "all that remains is applying math to information obtained from systems or sensors someone else invented." ECF No. 76, PageID.3963 (BMW's Reply Br. 1). The Court need not address this argument beyond pointing out that it is contrary to law. *Diehr*, 450 U.S. at 188 ("It is inappropriate to dissect the claims into old and new elements and then to ignore the presence of the old elements in the analysis."); *id.* at 188-89 ("The 'novelty' of any element or steps in a process, or even of the process itself, is of no relevance in determining whether the subject matter of a claim falls within the § 101 categories of possibly patentable subject matter."); *CardioNet*, 955 F.3d at 1372 ("The analysis under *Alice* step one is whether the claims as a whole are 'directed to' an abstract idea, regardless of whether the prior art demonstrates that the idea or other aspects of the claim are known, unknown, conventional, unconventional, routine, or not routine.").

Second, BMW argues, in essence, that benefits related to GPS velocity information were obvious. ECF No. 76, PageID.3964 (BMW's Reply Br. 2 (BMW

arguing that "under *Alice* step one, using a combination of conventional components in a conventional way to achieve an expected result is abstract") (quotation and alteration omitted)), PageID.3967 (BMW's Reply Br. 5 (BMW arguing at step one that "the use of GPS information that another invented to achieve expected results" cannot constitute a technological improvement)). However, a careful reading reveals that BMW's reliance on the Federal Circuit's *Universal Secure Registry* decision is misplaced. The Federal Circuit did not articulate a rule that an obviousness inquiry under 35 U.S.C. § 103 controls at step one of the patent eligibility analysis. Specifically, although the Federal Circuit stated at step one that the claimed invention "uses a combination of conventional components in a conventional way to achieve an expected result," the Federal Circuit was only addressing an argument in the context of the particular facts of the case, not holding that claims are abstract when the advantage of combining features was obvious. *Universal Secure Registry LLC v. Apple Inc.*, 10 F.4th 1342, 1349-50 (Fed. Cir. 2021) (after holding that the claims were directed to an abstract idea, citing the written description to refute the patentee's argument that using certain features "in combination" was a specific technique "that departs from earlier approaches" to solve a specific problem). *See also Bilski v. Kappos*, 561 U.S. 593, 602 (2010) (instructing courts that patent eligibility is "only a threshold test" that precedes consideration of whether the claimed invention satisfies the Patent Act's novelty, non-obviousness, enablement,

and written description requirements) (citing 35 U.S.C. §§ 101, 102, 103, and 112 (pre-AIA)).

BMW also argues that, in addition to a mathematical algorithm, the asserted claims are directed to a mental process. However, beyond citing various equations that the navigation system uses to implement the disclosed propagation techniques, BMW does not identify any support in the '511 Patent for the proposition that the asserted claims only recite mental steps.

Contrary to BMW's argument, the asserted claims do not recite "computational methods which can be performed *entirely* in the human mind." *CyberSource*, 654 F.3d at 1373. In Claim 1, the claim language recites that the GPS receiver "provides GPS velocity information including a heading," and that the navigation system "interrogates said map database to obtain said map heading information." Similarly, in Claim 3, the claim language recites the step of "determining the velocity of the vehicle, the velocity including a heading," and the step of "interrogating a map database to obtain a map heading of said mapped path." In the written description, the '511 Patent does not contemplate that obtaining the initial velocity or obtaining the map heading as set forth in the asserted claims could be performed in the human mind. Instead, as to the initial velocity, the '511 Patent explains that when GPS is available, the navigation system, the GPS receiver, or both receive, decode, and process measurements from space-based satellites to

calculate a GPS velocity. ’511 Patent 1:56-58, 4:26-52, 6:7-19. When GPS is unavailable, the navigation system then uses measurements from a multiple axis accelerometer, an odometer, and a gyro to calculate a speed and heading. *Id.* 6:27-32, 6:38-53. As to the map heading, the ’511 Patent explains that the navigation system uses information from the GPS receiver or the motion sensors to determine an initial current position and velocity. The navigation system then uses map matching to determine the mapped path segment on which the vehicle is traveling based on the initial current position and velocity, and uses the heading of the mapped path segment as the map heading. *Id.* 7:64-8:3, 15:22-34.

Construing the disclosure of the ’511 Patent in the light most favorable to Beacon, *United Food*, 51 F.4th at 202, the Court finds that the asserted claims are not directed to a mental process. *CyberSource*, 654 F.3d at 1373 (explaining that there is not “anything wrong with claiming mental method steps as part of a process containing non-mental steps”). The Court notes that BMW cites the Federal Circuit’s *Intellectual Ventures I* decision to argue at step one that a mental process does not exclude non-mental steps related to “conventional” tools or “simple” devices. ECF No. 76, PageID.3965 (BMW’s Reply Br. 3). However, the conventionality of the recited navigation system components goes to whether they supply an inventive concept at step two, not whether they can be disregarded to find that the asserted claims only recite mental steps at step one. *Intellectual Ventures I LLC v. Capital*

One Bank (USA), 792 F.3d 1363, 1368 (Fed. Cir. 2015) (holding at step two that claims directed to the abstract idea of budgeting did not contain an inventive concept in the recited "communication medium" because the budgeting calculations "could still be made using a pencil and paper with a simple notification device") (quotation omitted).

Moreover, BMW argues that the asserted claims are directed to the abstract idea of collecting, analyzing, and displaying information, and, in particular, organizing information through mathematical correlations. Having considered the relevant case law on the information-based category of abstract ideas, the Court finds BMW's arguments unpersuasive. The Federal Circuit has described this "familiar class of claims" as those focused on analyzing information "without more" and presenting results "without more." *Elec. Power*, 830 F.3d at 1353-54. Because the asserted claims specify particular information from particular navigation system components to implement specific propagation techniques that improve the way the navigation system performs its basic function, the asserted claims are broadly distinguishable from claims directed to collecting, analyzing, and displaying information. *Cf.*, *e.g.*, *Digitech Image Techs., LLC v. Elecs. for Imaging, Inc.*, 758 F.3d 1344, 1351 (Fed. Cir. 2014) (holding that a process of gathering and combining data was patent ineligible because it did not require "input from a physical device"); *Elec. Power*, 830 F.3d at 1354 (holding at step one that claims on a process of

gathering, analyzing, and displaying information were not focused on a technological improvement because they did not recite "any particular assertedly inventive technology for performing those functions"); *id.* at 1355 (holding at step two that the claims did not contain an inventive concept because they did not require "new techniques for analyzing" information).

Lastly, the Court notes that BMW cites the Federal Circuit's *SAP* decision to argue that the asserted claims merely limit the collection and analysis of information to "particular content" or "a particular source." *SAP*, 898 F.3d at 1168. The Court finds *SAP* instructive on the step one determination in this case, but not for the proposition that the asserted claims are an attempt to circumvent the prohibition against patenting abstract ideas. In *SAP*, the Federal Circuit held at step one that claims on a computer-implemented system for performing statistical analyses of investment information were directed to abstract ideas, finding, among other things, that they did not recite "any improved computer or network." *Id.* at 1163, 1167-68. Notably, the Federal Circuit found that the claims in *Thales* were distinguishable. *Id.* at 1168. Applicable to the asserted claims here, the Federal Circuit explained that, as distinguished from a patent ineligible "improvement in wholly abstract ideas," "[t]he use of mathematics to achieve an improvement" in "a physical tracking system" meant that the claims were focused on patent eligible "physical-realm improvement." *Id.*

D. Summary

Having considered the relevant caselaw, the Court finds that Claims 1 and 3 of the ’511 Patent are not directed to an abstract idea. Supreme Court and Federal Circuit cases make clear that the claims of a patent are not invalid as patent ineligible simply because the claimed invention uses a mathematical algorithm. *Diehr*, 450 U.S. at 188; *Thales*, 850 F.3d at 1349. In this case, the asserted claims focus on new and useful propagation techniques that involve the application of math to make an improvement in navigation systems as tools, not the use of generic navigation system components as tools to perform math. *CardioNet*, 955 F.3d at 1371. Accordingly, the Court finds that the asserted claims recite patent eligible subject matter, and that BMW is therefore not entitled to judgment on the pleadings that the asserted claims are invalid as patent ineligible.

V. CONCLUSION

For the reasons more fully stated in this opinion and order, because the Court finds at step one of the patent eligibility analysis that the asserted claims are not directed to an abstract idea, the Court will **DENY** BMW’s motion for judgment on the pleadings that the asserted claims of the ’511 Patent are invalid as patent ineligible.

SO ORDERED

Dated: December 28, 2023
Detroit, Michigan

s/Mark A. Goldsmith
MARK A. GOLDSMITH
United States District Judge

CERTIFICATE OF SERVICE

The undersigned certifies that the foregoing document was served upon counsel of record and any unrepresented parties via the Court's ECF System to their respective email or First Class U.S. mail addresses disclosed on the Notice of Electronic Filing on December 28, 2023.

s/Jennifer McCoy
Case Manager