



Valuation of the GrainSense Patent Portfolio

Determination of the Fair Market Value of the GrainSense Patent Portfolio

**Valuation of the GrainSense Patent Portfolio is
€1.1 Million as of August 5, 2014**

Report Date: August 5, 2014

The opinion of IncreMental Advantage, LLC in this report is valid
only for the stated purpose and as of the date of the valuation.

David Wanetick
Managing Director
IncreMental Advantage, LLC
4390 Route 1
Suite 214
Princeton, New Jersey 08540
United States of America



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August 5, 2014

Mr. Timo Joutsenoja
IPR Manager

Mr. Timo Sallinen
Patent Attorney

VTT TECHNICAL RESEARCH CENTRE OF FINLAND
IPR Management
Vuorimiehentie 3, Espoo
P.O. Box 1000, FI-02044 VTT
Finland

DESCRIPTION OF THE ASSIGNMENT

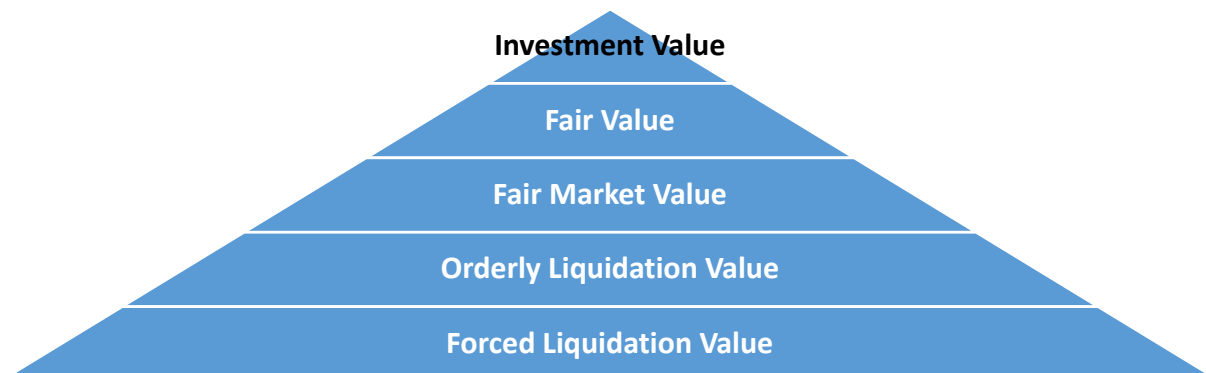
IncreMental Advantage, LLC has been retained by VTT TECHNICAL RESEARCH CENTRE OF FINLAND ("VTT") to provide a valuation of its patent applications described below and in Exhibit A. The reason for commissioning this Patent Valuation Report is to determine the Fair Market Value of the afore-referenced patent families.

The near-term envisioned monetization event is the transference of title of the PCT/IB2013/060139 and EP14151756.5 patent applications and the licensing of VTT's WO/2014/080322 patent application to GrainSense in return for a share of GrainSense's equity commensurate with the value of such patent applications. The terms for the aforementioned license are that GrainSense is to have a worldwide, exclusive license to develop, manufacture, have manufactured, market, use and sell the licensed products covered by the WO/2014/080322 patent application in the Agriculture Field.

For purposes of this report, the afore-referenced patent applications are collectively called "the GrainSense Patent Portfolio". The GrainSense Patent Portfolio was valued as of August 5, 2014. The date of this Patent Valuation Report is August 5, 2014.

STANDARDS OF VALUATION

As illustrated below, there are a multitude of Standards of Value, each of which applies to specific situations.

Hierarchy of Standards of Valuation

In view of GrainSense wishing to raise capital on an arms-length basis from sophisticated investors—based, in part, on the value of its patent portfolio—the Fair Market Value is the appropriate Standard of Valuation. However, it is important to realize that Fair Market Valuations are almost always lower than Investment Valuations. Thus, any Investment Value that a counterpart to GrainSense may have in the subject patent portfolio is not expressly included in this valuation.

DEFINITIONS OF STANDARDS OF VALUE

Forced Liquidation Value “An opinion of the gross amount, expressed in terms of money, that typically could be realized from a properly advertised and conducted public auction, with the seller being compelled to sell with a sense of immediacy on an as-is, where-is basis, as of a specific date.”¹

Orderly Liquidation Value “An opinion of the gross amount, expressed in terms of money, that typically could be realized from a liquidation sale, given a reasonable period of time to find a purchaser (or purchasers), with the seller being compelled to sell on an as-is, where-is basis, as of a specific date.”²

Fair Market Value “The price, expressed in terms of cash equivalents, at which property would change hands between a hypothetical willing and able buyer and a hypothetical willing and able seller, acting at arm’s length in an open and unrestricted market, when neither is under compulsion to buy or sell and when both have reasonable knowledge of the relevant facts.”³

Fair Value “...the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants in the market which would be the most advantageous for the asset or liability.”⁴ Fair Value can be more easily understood as Fair Market Value before discounts (for lack of control and/or lack of marketability).

Investment Value Investment value is the value of an asset to the owner or a prospective owner for individual investment or operational objectives.⁵

SUMMARY DESCRIPTION OF THE ASSETS VALUED

Valuation of Patent Applications The subject GrainSense patent portfolio consists of those patent applications described below and on Exhibit A. As the claims scope of the subject patent applications are quite broad, it is conceivable that from these patent applications, “children” patents such as continuations, continuations-in-part and divisionals may arise. The jurisdictions in which these patent applications will seek to become issued patents include the European Union, the United States, Canada, Australia and perhaps Russia / Ukraine.

GrainSense may own intangible assets other than the subject patent portfolio. The value of these intangible assets is not reflected in this report. The intangible assets—other than the subject patent

¹ Definitions of Value Relating to MTS Assets (<http://www.appraisers.org/MTSHome/DefinitionsOfValue.aspx>, number 10), the American Society of Appraisers

² Definitions of Value Relating to MTS Assets (<http://www.appraisers.org/MTSHome/DefinitionsOfValue.aspx>, number 9) American Society of Appraisers

³ This definition is included in the International Glossary of Business Valuation Terms and has been adopted by American Institute of Certified Public Accountants, American Society of Appraisers, National Association of Certified Valuation Analysts, The Canadian Institute of Chartered Business Valuators, and The Institute of Business Appraisers.

⁴ Financial Accounting Standards Board Accounting Standards Codification Topic 820 (ASC 820) definition of Fair Value.

⁵ International Valuation Standards 2011

portfolio—that may be owned by GrainSense include, but are not limited to, research; data collected during research; trade secrets; relationships with vendors; know-how; and, negative know-how. If GrainSense as an enterprise were being valued, value would have to be apportioned to the Company's skilled and experienced management team.

GrainSense Patent Valuation				
August 5, 2014				
Summary of the GrainSense Patent Portfolio				
Patent Number	Filing Date	Publication Date	Title	Disposition to GrainSense
WO/2014/080322 (PCT/IB2013/060140)	November 14, 2013	May 30, 2014	An optical sampling apparatus and method for utilizing the sampling apparatus	Exclusive license to the "Agricultural field, farm and laboratory based measurements" field-of-use
PCT/IB2013/060139	November 14, 2013	NA	Optical analyzer, optical analyzing method and sample preparation device	To be transferred to GrainSense
EP14151756.5	January 20, 2014	NA	Grain sampling wheel, optical analyzer with a grain sampling wheel, grain processing	To be transferred to GrainSense

VALUATION METHODOLOGIES

In preparing this Patent Valuation Report on the GrainSense patent portfolio, I applied the Cost, Market Comparables, and the Income Methods of valuation. Within the Market Comparables Method, I calculated the implied valuations of the GrainSense patents by taking into account Assertion Comparables, Acquisitions Comparables, Publicly-Traded Comparables and Venture Capital Comparables. The Cost, Market Comparables and Income Methods are the three primary methods of valuation.

In reviewing the subject patent applications, I considered their claims scope; claims construction; specifications; drawings; sustainability in opposition scores; prior art; inventor quality; patent families; quality of the lawyers that drafted and prosecuted such patents; prosecutorial status, as well as many other patent-specific factors.

VALUATION CONCLUSION

The standard practice in the valuation profession is to present Conclusions of Value as of a specified date based on what is known or knowable on that date. Below is a summary of the valuations that resulted from employing the Cost, Market Comparables and Income Methods of valuation. The Conclusions of Value for the Cost and Market Methods were substantially the same (roughly €1.4 million). The Valuation resulting from the Income Method was much lower (€700,000) but important in that it addresses the commercial opportunities afforded by the subject patents going forward. I weighted the calculated valuations under the Cost, Market Comparables and Income Methods equally because the comparability and the reliability of information was roughly similar in all of the aforementioned methodologies.

I have conducted an analysis of the GrainSense patent portfolio (as encapsulated above and as illustrated in Exhibit A) and my conclusion is that the subject patent portfolio had a Fair Market Value of €1.1 million as of August 5, 2014.

GrainSense Patent Valuation August 5, 2014 Summary of Conclusions of Value					
Methodology	Calculated Value	Rounded Value	Instant Weighting	Methodology Weighting	
Cost Method	€1,417,463	€1,400,000		1	
Market Method	€1,349,519	€1,350,000		1	
Assertion Method	€717,503	€700,000		1	
Pioneer Hi-Bred v. Holden Foundation	€ 62,532,764	€ 62,500,000	1		
Pioneer Hi-Bred v. Cargill	€ 338,368,872	€ 338,000,000	1		
Pioneer Hi-Bred, Monsanto and LG Seeds v. DNB Group	€ 29,600,000	€ 29,600,000	1		
Acquisitions Method	€1,881,419	€1,900,000		1	
Precision Planting	€ 1,881,419	€ 1,900,000	1		
The Climate Corporation	€ 103,746,812	€ 103,700,000	0		
Publicly-Traded Method	€1,083,555	€1,100,000		1	
Trimble Navigation	€ 1,083,555	€ 1,100,000	1		
Venture Capital Method	€1,715,597	€1,700,000		1	
Blue River Technology	€ 2,797,780	€ 2,800,000	1		
Conservis	€ 1,692,675	€ 1,700,000	1		
Granular	€ 656,337	€ 700,000	1		
Income Method	€651,072	€700,000		1	
Conclusion of Value Based on a Variety of Weighted Average Methods	€1,139,351	€1,100,000			

USE OF THIS REPORT

This report was prepared only for the purpose of determining the Fair Market Value of the GrainSense patent portfolio as of August 5, 2014. No other use of this report—or assertions, opinions or conclusions contained therein—is permitted.

I remain,

A handwritten signature in black ink, appearing to read "David Wanetick", with a stylized flourish at the end.

David Wanetick
Managing Director
IncreMental Advantage, LLC

GRAINSENSE – COMPANY OVERVIEW

VTT is expected to assign the PCT/IB2013/060139 and EP14151756.5 patent applications and to exclusively license its WO/2014/080322 patent application to GrainSense. It is expected that GrainSense will be incorporated in Finland and the United Kingdom within one month of the release of this Patent Valuation Report. GrainSense is a play on precision agriculture. GrainSense's overriding mission will be to complete the development of a handheld device that will measure four characteristics (protein, moisture, oil and carbohydrate content) of grains (initially wheat and then barley and later others).

GRAINSENSE'S HANDHELD DEVICE

The handheld protein meter is expected to initially retail to customers for €2,000. As production ramps up, GrainSense's management believes retail prices will approach €1,000 per unit. The device will initially be targeted towards measuring the protein content of wheat and barley but will be able to measure kernels of similar or smaller size—such as oats, rye and soybeans. The GrainSense device will also measure the moisture, oil and starch / fiber content in grains.

As the device will be overwhelmingly used outdoors in a variety of weather conditions, it will be ruggedized. The device is expected to be reliable as it will be battery-powered and therefore will have no moving parts. The device is expected to warm up in less than three seconds and take measurements of 100 kernel samples in less than five seconds. This speed is complemented with protein accuracy of 0.2%w Standard Error of Prediction (SEP) which is the same accuracy achievable in laboratories. The repeatability of such measurements is in excess of 0.07%w while the reproducibility (for the same 100 kernels re-filled) is better 0.14%w. The results from such measurements may be integrated with smart phone applications in the future.

The near infrared (NIR) spectroscopic analysis that is expected to drive the GrainSense device was originally invented at VTT for measuring pharmaceutical powder blends. The basic idea of the technology incorporated into the handheld measuring device is to present the grain sample into a uniform and isotropic optical field in such a way that the sample remains “optically thin”. This means that the radiation intensity at the center or “most inside” position in the measured kernels is still almost as high (usually more than 80%) as the intensity at the surface of the kernels. In this way, there is virtually no “hidden mass” effect and several advantages result. To wit:

- First, the spectroscopic analysis ‘sees’ nearly 100% of the sample mass, eliminating any question of representative sampling.
- Second and more importantly, the effective radiation-density weighted volume sampled of each kernel becomes independent of wavelength because the effective volume approaches the true geometric volume at all wavelengths. As a consequence, the concentration measurement becomes independent of the kernel's geometry and scatter properties.
- Third, the calibration of the instrument can be more easily transferred from one unit to another and the measurement result becomes traceable to national standards.
- Fourth, the method produces a relatively high radiance (high intensity) field of light on the detector, so that a small detector is sufficient to produce the needed signal-to-noise ratio.

- Fifth, GrainSense's optical inspection method works in the low-cost silicon detector wavelength range and does not require any complicated mechanics, so that small, low-cost devices can be built. The same accuracy as achieved in today's expensive laboratory instruments is possible in a compact handheld device.

The following are among the advantage of GrainSense over other technologies:

- One advantage of a handheld protein measuring device is that farmers that use the device in the field are more likely to be able to track where high content protein grains lie.
- Competing grain analyzing devices are much more expensive than the initial €2,000 expected price for the GrainSense device. For instance, Foss's (a privately held Danish company) Infratec 1241 which measures grain and flour using NIR transmission spectroscopy sells for roughly €40,000. PERTEN, from Sweden, sells its Inframatic 9500 for roughly €30,000. Even PERTEN's less expensive Sofia instrument is believed to cost €15,000, or 15 times the long-term target price of the GrainSense device.
- Competing devices require larger numbers of samples than GrainSense.
- Competing optical inspection instruments require skilled operators whereas learning how to use the GrainSense device is expected to be virtually intuitive.
- The use of competing grain analysis machines requires that samples be mailed to laboratories which means that results are not known for at least a week. GrainSense provides results on its screen within seconds and without the expense of shipping samples to laboratories.
- In contrast to on-harvester sensors, GrainSense is not expected to be adversely affected by dust, light contamination or mechanical fatigue.
- Unlike the Kjeldahl method (one of the two primary legacy methods for determining protein in flour or wheat), GrainSense does not involve the use of caustic and toxic chemicals.

Below is a comparative analysis of the GrainSense device and traditional protein analysis systems.

GrainSense Patent Valuation August 5, 2014 GrainSense Comparative Analysis		
Key Metric (Protein Analysis)	Dumas or Kjeldahl	GrainSense
Cost of Device	Very Expensive	Very Inexpensive
Sampling	Destructive	Non-destructive
Sample Preparation	Yes	No
Actual Analysis Time	2-12 hours	5 seconds
Data Turnaround Time	Days	1 minute
Consumables Cost per Test	High	None
Technical Analyst	High	Low
Location of Analyst	Lab	Field
Hazardous Chemicals	Yes	No
Hazardous Temperatures	Yes, 900° C for Dumas, 420° C for Kjeldahl	No

One potential concern with the GrainSense device is that the glare of the sun could make it difficult to read the measurements on the screens.

THE TRAJECTORY OF PRECISION AGRICULTURE

There is tremendous variability in the fertility and nutrient makeup of soil. The characteristics of soil can vary greatly even from one meter to another. With this phenomena in mind, precision agriculture is a farming management concept based on observing, measuring and responding to inter- and intra-field variability in crops.

The precision agriculture industry is expected to grow at a compound annual growth rate of 13.4% from 2013 to 2018, at which time industry-wide revenues are expected to reach \$3.72 billion.⁶ Players ranging in size from start-up mobile application developers to the largest farm equipment manufacturers in the world are positioning themselves for precision agriculture.

At the smaller end of the spectrum, Brian Arnall, Precision Nutrient Management Extension Specialist for Oklahoma State University, discussed over 50 smartphone and tablet apps available for agriculture news and production at InfoAg's 2013 conference in Springfield, Illinois.⁷ (In view of the extremely high level of interest in agriculture technology, the InfoAg conference is now held every year and is now covered by Farm Industry News.⁸) The largest agriculture companies are aggressively jockeying for favorable positions in precision agriculture. For instance, in early 2014, Germany's BASF and Illinois' John Deere announced a partnership to develop precision products, including field scouting and "tailored agronomic advice." Switzerland-based Syngenta has its AgriEdge Excelsior program, designed to help growers manage data and produce stronger yields.⁹

Monsanto plans to launch its FieldScripts analytics program in Illinois, Indiana, Iowa and Minnesota later in 2014. DuPont Pioneer (the agricultural seed unit of DuPont) has aligned with farm machinery company Deere & Co in a race against rival Monsanto to provide farmers with enhanced "precision agriculture" analyses aimed at maximizing crop production.¹⁰

Of course, the underlying driver for the interest in precision agriculture is the potential returns on investment. The following are two markers for such returns:

Lux Research conducted a study that was designed to determine how the profitability of growing wheat is affected by various technologies on farms of different sizes. (See below.) The best case scenario is that farms of 5,000 acres would use wireless transmitting soil moisture sensors, combined with weather forecasting service and integrated decision support. While savings from input costs average \$24.50 per acre, output gains average \$42 per acre.¹¹

6 <http://www.cnbc.com/id/101202142>

7 <http://farministrynews.com/crop-protection/7-smartphone-and-tablet-apps-scouting>

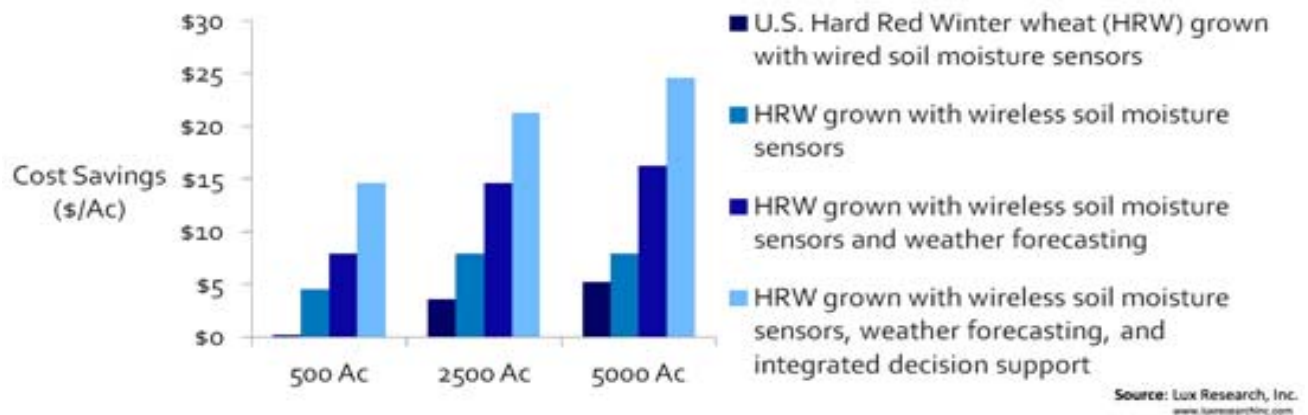
8 <http://farministrynews.com/blog/leaders-precision-ag-technology-gather-infoag>

9 See here.

10 <http://www.kansas.com/2013/11/10/3107890/duPont-deere-launch-precision.html#storylink=cpy>

11 <http://www.environmentalleader.com/2013/12/19/precision-agriculture-beneficial-to-large-farms-report-says/?graph=full&id=1>

Precision Agriculture Pays for Itself, but Farm Size and Integration are Keys to Success



Also, a recent survey of soybean growers was conducted by the PrecisionAg Institute in cooperation with the American Soybean Association to gain insight into the return on investment yielded by precision farming tools and technology.¹² Key learnings from this survey are that:

- Growers report an average savings of about 15% on several crop inputs such as seed, fertilizer and chemicals.
- Savings on inputs often pay for the technology within a year for a large cropping operation and within two to three years for smaller operations.

¹² <http://www.precisionag.com/institute/precision-agriculture-higher-profit-lower-cost/>

THE IMPORTANCE OF MEASURING GRAIN PROPERTIES

The three most important grain attributes—which are used by farmers and people buying from farmers on a regular basis—are moisture content, protein content, and hectoliter weight (“test weight”). The universal moisture measurement has the greatest impact on price, followed by protein, and then test weight. The latter two parameters are measured on most grains. Low-cost portable meters are commercially available for moisture and test weight, but so far not for protein. This is the need that GrainSense is positioned to fill.

Another benefit of measuring the characteristics of grain is that the use of fertilizer, water and pesticides can be optimized.¹³ Also, enabling the seller to ensure that the grain meets the buyer’s requirements mitigates the risk of delaying shipments. The more expedient analysis of grain can accelerate the loading of grain in granaries which reduces demurrage penalties (fees incurred because of the longer use of the transport vessels during loading and unloading).¹⁴

The Importance of Measuring Moisture in Grain

Moisture content in grain is important for shelf-life and storage. Very high moisture content (greater than 14.5%) attracts mold, bacteria, and insects, all of which can result in storage issues or baking quality deterioration. The primary method for determining moisture content is weight loss by oven drying which requires multiple steps and a wait period of several hours for results.¹⁵ Drying is an energy intensive process and the interest of the farmer is to be just under the legal limit of 14.0%w.

Depending on the weather at the time of harvest, grain kernels can contain 20%w moisture and in extreme cases even up to 30%w. To safely store grain over periods of several months, the moisture content of grain must be below a certain cutoff. In Finland, in order for grain to be legal for trading, the content must be 14.0%w d.b. (by weight on a dry basis). In Southern Europe, freshly harvested grain can often be moved directly into the storage silos, but in the more Northern countries grain must usually be dried before storing.

The Importance of Measuring Protein in Grain

Quite simply, measuring the protein content in grain is important because such measurements are an important factor in the price of such grain and because grains must be sorted for end use by their protein quotients. (For more insight into grain classification, please see Exhibit B beginning on page 85.)

Protein content is the basis for judging flour quality and is vitally important to its functionality and finished-product attributes. For example, low protein content is desired for crisp or tender products, such as snacks or cakes, and high protein content is desired for products with a chewy texture, such as breads and pizza crust. Flours with higher protein concentrations tend to have higher water absorption, stronger and more extensible dough properties, and higher loaf volume.

Historically, the price premiums or discounts across the protein spread have moved around quite a bit. For example, Canadian Wheat Board payments for the 2006/07 crop year—a year of abundant high-

¹³ http://www.cie-eic.com/Zeltex/PDF/On-harvester_Protein_web.pdf

¹⁴ <http://www.grainews.ca/2014/01/06/moving-the-grain/>

¹⁵ See source.

grade, high-protein milling wheat production in Canada—provided a premium of \$4.56 per ton (\$0.12 per bushel) for #1 CWRS 14.5% protein over 13.5% protein. At the other extreme, the 2010/11 crop year produced well below average quality and protein content due to excessive moisture and cool conditions in many prairie regions. The resulting payment spread for #1 CWRS 14.5% protein over 13.5% protein was \$42.82 per / ton (\$1.17 per bushel).¹⁶ Similarly, in Australia, protein content is an important consideration in grain sales prices, particularly wheat varieties. A bonus / discount payment is made on a 0.1% sliding scale beyond the base rate for each grade.

The Importance of Reliable Grain Measurements

It is my understanding that many governments in countries where grain is grown make efforts to monitor the accurate measurement of characteristics of grain produced within their borders. For instance, in the United States, the Grain Quality Improvement Act was promulgated in 1986 to address end-use quality of grain measurement. This Act charged the United States Department of Agriculture (USDA's) Federal Grain Inspection Service (FGIS) with supervising methods for the grading of grains.¹⁷ Ideally, these methods should be fast, objective, capable of characterizing end-use functionality—and in cases where mixture detection is important—capable of operating on single kernels of grain.

The chart below illustrates the sensitivity of grain prices to protein weight content. Numbers are for illustration purposes only.

GrainSense Patent Valuation					
August 5, 2014					
Sensitivity of Grain Premia Based on Protein Weight					
Protein Content % by Weight		Premium			
14.0%		€ 10.00			
13.5%		€ 7.50			
less than 13.5%		€ 5.00			
less than 12.0%		€ 0.00			
Total Grain Produced (tons)		200			
Scenario		1	2	3	4
Tons	14%	150			
	13.5%		200		
	less than 13.5%			200	
	less than 12%	50			200
Premium		€1,500	€1,500	€1,000	€0.00

¹⁶ [http://www1.agric.gov.ab.ca/\\$Department/deptdocs.nsf/all/sis14235](http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/all/sis14235)

¹⁷ http://www.aaccnet.org/publications/cc/backissues/1995/Documents/72_11.pdf

Despite the efforts of the FGIS, grain measurement has not been flawless. One related study evaluated the contribution of measurement errors in giving a false indication of protein change during storage. Eleven bins of wheat were sampled during one storage season and five of these bins were refilled and sampled during the second season to evaluate differences in protein measurements. Samples were analyzed for protein content using four measurement instruments. Additional wheat was stored in the laboratory and evaluated over two years with two instruments. Data showed that the variation between protein measuring instruments was significant with an expected variation of 0.74% protein content (95% confidence interval) during the field tests. The variation over time for measurements with the FGIS instrument was 0.3% protein for an eight-month period, when measuring successive samples taken from the same positions. Measurements from the other three instruments varied by 0.8% protein or more during the same time.¹⁸

In view of the price disparity that can result from even slightly misreading the protein content found in grain and in view of the imperfections in buyers' ability to measure such protein content (despite concerted governmental efforts), it seems to me that farmers would embrace a hand-held device that can easily and accurately measure characteristics of grain such as its protein, moisture and oil content.

WHEAT PRODUCTION AND CONSUMPTION

Cereal grains are an important food supply for both humans and livestock, providing 75% of the calories consumed by the world's population.

World wheat production set a new record in 2011 of 25.5 billion bushels. The EU-27 countries are the largest wheat producers (5 billion bushels) followed by China (4.3 billion bushels), India (3.1 billion bushels), the Russian Federation (2.1 billion bushels), the United States (2 billion bushels), Australia (1 billion bushels) and Canada (0.9 billion bushels).¹⁹

Global wheat production in 2014/15 is projected to reach 701.6 million tons. With lower projected wheat output in the United States, non-U.S. production is up 5.2 million tons to 648.8 million. The European Union and Russia have increased production prospects and wheat outputs are expected to be higher in both India and China. In fact, the 2014 wheat crop in China is expected to be a record, at 124.0 million tons. Wheat production in China has been steadily increasing every year since 2004/05, and wheat yields have been reaching new records each of the last four years (since 2011/12).

Per capita wheat consumption has been declining for more than a century. In 1879, wheat flour consumption in the United States was 225 pounds/capita. Per capita consumption reached a low of 110 pounds in 1972. Consumption rebounded to 146 pounds by 2000, as flour-based foods such as pizza became more popular and because of the advent of bread machines. Over the past several years, however, per capita consumption of wheat flour has hovered around 134.5 pounds.²⁰

¹⁸ <http://herman.marc.usda.gov/SP2UserFiles/Place/54300520/300Protein.pdf>

¹⁹ http://www.agmrc.org/commodities__products/grains__oilseeds/wheat/

²⁰ See here.

VALUATION OF THE SUBJECT PATENT PORTFOLIO

In arriving at a conclusion of value for the subject patent portfolio, I employed the Cost Method, a variety of permutations of the Market Method, and the Income Method. These methods constitute the three pillars of valuation.

THE COST METHOD

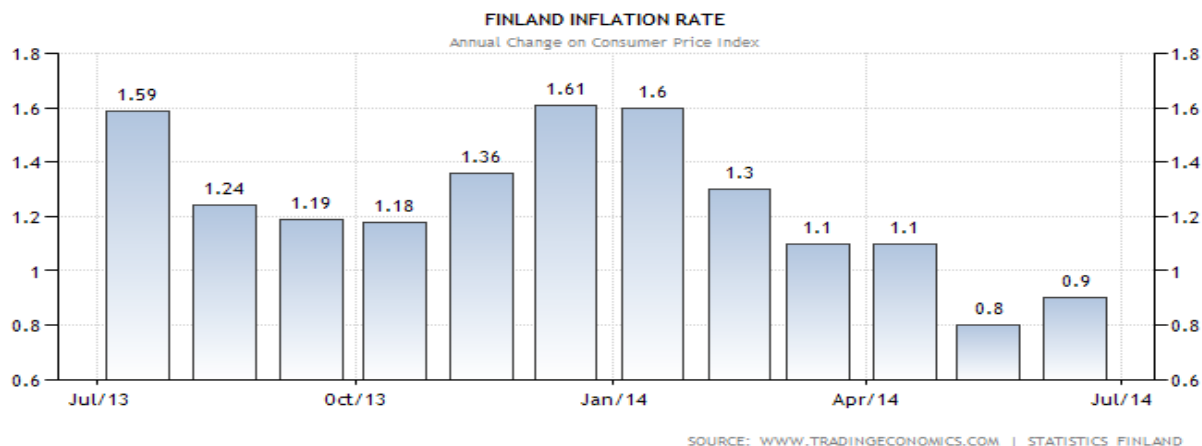
The Cost Method of Valuation takes into account the costs and efforts that went into producing the subject asset. The Cost Method approximates the expenditures someone else would have to bear in trying to replicate or replace the subject asset. As illustrated and discussed below, the Cost Method reveals a valuation of the subject patent portfolio of €1.4 million.

GrainSense Patent Valuation							
August 5, 2014							
The Cost Method of Valuation							
Notes		2013				2014	
		Q1	Q2	Q3	Q4	Q1	Q2
1	Investment in Research	€ 155,833	€ 155,833	€ 155,833	€ 155,833	€ 155,833	€ 155,833
2	Investment in Patent Applications	€ 5,333	€ 5,333	€ 5,333	€ 5,333	€ 5,333	€ 5,333
	Total Investment	€161,167	€161,167	€161,167	€161,167	€161,167	€161,167
3	Inflation Rate in Finland	1.25%	1.25%	1.25%	1.25%	1.25%	1.25%
	Present Value	€164,192	€163,684	€163,177	€162,672	€162,169	€161,667
	Total Present Value of Investment	€977,561					
4	Return Factor	45%					
	Return Adjusted Present Value	€1,417,463					

Notes 1, 2 – It was intimated to me that the total investments in research borne by VTT related to GrainSense from January 2013 until May 2014 totalled €935,000 and the total investments in the subject patent applications was €32,000. Thus, I applied the average of these numbers to the six quarters during the period of investment.

Note 3 – I calculated the average inflation rate over the past 12 months as reported by Statistics Finland. See the chart below.²¹

²¹ <http://www.tradingeconomics.com/finland/inflation-cpi>



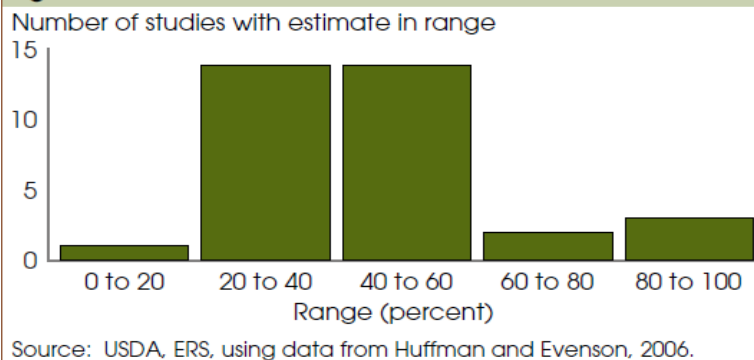
Note 4 – In determining a reasonable return factor to apply to the investment made in the GrainSense patent applications, I used 45% which was both the average and median number resulting from 39 studies that were designed to measure the rates of return achieved when investing in agriculture research. These studies were reviewed in a report compiled by the United States Department of Agriculture's Economic Research Service.²² Summations of these reports are provided below.

Table 1–Summary estimates of the rate of return to U.S. agricultural research

Item	Studies, 1965-2005	Mean estimate	Median estimate
Social rate of returns to public agricultural research	35	53	45
Social rate of returns to private agricultural research	4	45	45

Source: USDA, ERS, using data from Huffman and Evenson, 2006, and Fuglie et al., 1996.

Range of estimates of the rate of return to public agricultural research in the United States



²² See [here](#).

Studies on the aggregate crop-animal sector

Study	Authors	Pub. year	Publication	Period	Coverage	ROR estimate		
						Mid	Low	High
1	Huffman & Evenson	2006	Am J Ag Econ	1970-1999	Crops & animals	56	49	62
2	Gopinath & Roe	2000	Econ Innov & Tech	1960-1991	Crops & animals	37		
3	Makki et al.	1999	J Policy Modeling	1930-1990	Crops & animals	27		
4	White	1995	J Ag Appl Econ	1950-1991	Crops & animals	40		
5	Chavas & Cox	1992	Am J Ag Econ	1950-1982	Crops & animals	28		
6	Norton & Ortiz	1992	J Production Agric	1987, state-level comp.	Crops & animals	58		
7	Yee	1992	J Ag Econ Res	1931-1985	Crops & animals	54	49	58
8	Braha & Tweeten	1986	Tech. Bull., Ok SU	1959-1982	Crops & animals	47		
9	Lyu, White, Liu	1984	S J Ag Econ	1949-1981	Crops & animals	66		
10	White & Havlicek	1982	Am J Ag Econ	1943-1977	Crops & animals	22	7	36
11	Davis	1979	PhD thesis, UMN	1949-1959	Crops & animals	83	66	100
11	Davis	1979	PhD thesis, UMN	1964-1974	Crops & animals	37		
12	Knutson & Tweeten	1979	Am J Ag Econ	1949-1972	Crops & animals	38	28	47
13	Lu et al.	1979	Tech. Bull., ERS	1939-1972	Crops & animals	27	23	30
14	Bredahl & Peterson	1976	Am J Ag Econ	1937-1942	Crops & animals	56		
14	Bredahl & Peterson	1976	Am J Ag Econ	1947-1957	Crops & animals	51		
14	Bredahl & Peterson	1976	Am J Ag Econ	1957-1962	Crops & animals	49		
14	Bredahl & Peterson	1976	Am J Ag Econ	1967-1972	Crops & animals	34		
15	Cline	1975	PhD thesis, Ok SU	1939-1948	Crops & animals	46	41	50
16	Evenson	1968	PhD thesis, U Chic	1949-1959	Crops & animals	47		
17	Peterson	1967	J Farm Econ	1915-1960	Crops & animals	23	21	25
18	Griliches	1964	Amer Econ Rev	1949-1959	Crops & animals	33	25	40

Studies on components of the agricultural sector

Study	Authors	Pub. year	Publication	Period	Coverage	ROR estimate		
						Mid	Low	High
6	Norton & Ortiz	1992	J Production Agric	1987, state-level comp.	Beef & swine	55		
6	Norton & Ortiz	1992	J Production Agric	1987, state-level comp.	Dairy	95		
6	Norton & Ortiz	1992	J Production Agric	1987, state-level comp.	Poultry	46		
6	Norton & Ortiz	1992	J Production Agric	1987, state-level comp.	Grain crops	31		
6	Norton & Ortiz	1992	J Production Agric	1987, state-level comp.	Potatoes, cotton & tobacco	34		
6	Norton & Ortiz	1992	J Production Agric	1987, state-level comp.	Vegetables & melons	19		
6	Norton & Ortiz	1992	J Production Agric	1987, state-level comp.	Fruits & nuts	33		
23	Haygreen et al.	1986	Forest Prod J	1972-1981	Forest products	25	14	36
22	Bengston	1984	Forest Science	1975, state-level comp.	Forest products	21	19	22
19	Smith et al.	1983	J NE Ag Econ	1978, state-level comp.	Beef & swine	22		
19	Smith et al.	1983	J NE Ag Econ	1978, state-level comp.	Dairy	25		
19	Smith et al.	1983	J NE Ag Econ	1978, state-level comp.	Poultry	61		
21	Schmitz & Seckler	1970	Am J Ag Econ	1958-1969	Tomato harvester	42	37	46
17	Peterson	1967	J Farm Econ	1915-1960	Poultry	23	21	25
20	Griliches	1958	J. Poli. Econ	1940-1955	Corn	38	35	40
20	Griliches	1958	J. Poli. Econ	1940-1957	Sorghum	20		

THE MARKET METHOD

The Market Method holds that the value of a patent can be determined by reviewing comparable transactions. It is very rare to find recent data (and this data should consist of numerous data points) relative to comparable patent sales. Thus, the patent valuation analyst must find proxies for recent patent sales. With respect to this Patent Valuation Report, such proxies include, in order of presentation:

- Assessing similarly asserted intellectual property;
- Reviewing recent acquisitions of similar patentees;
- Assessing the implied value of patents owned by publicly-traded comparable companies; and,
- Reviewing recent venture capital investments in similarly situated patentees.

I weighted the calculated valuations under the Assertion Method, Acquisitions Method, Publicly-Traded Method and Venture Capital Method equally because the comparability and the reliability of information was roughly similar in all of the aforementioned methodologies.

The Market Method of Analysis indicates that the GrainSense patent portfolio deserves a valuation of €1.35 million.

GrainSense Patent Valuation					
August 5, 2014					
Summary of Conclusions of Value					
Methodology	Calculated Value	Rounded Value	Instant Weighting	Methodology Weighting	
Market Method	€1,349,519	€1,350,000		1	
Assertion Method	€717,503	€700,000		1	
Pioneer Hi-Bred v. Holden Foundation	€ 62,532,764	€ 62,500,000	1		
Pioneer Hi-Bred v. Cargill	€ 338,368,872	€ 338,000,000	1		
Pioneer Hi-Bred, Monsanto and LG Seeds v. DNB Group	€ 29,600,000	€ 29,600,000	1		
Acquisitions Method	€1,881,419	€1,900,000		1	
Precision Planting	€ 1,881,419	€ 1,900,000	1		
The Climate Corporation	€ 103,746,812	€ 103,700,000	0		
Publicly-Traded Method	€1,083,555	€1,100,000		1	
Trimble Navigation	€ 1,083,555	€ 1,100,000	1		
Venture Capital Method	€1,715,597	€1,700,000		1	
Blue River Technology	€ 2,797,780	€ 2,800,000	1		
Conservis	€ 1,692,675	€ 1,700,000	1		
Granular	€ 656,337	€ 700,000	1		

ASSERTION COMPARABLES

Values of patents can be revealed by reviewing the damages awards that similar patents receive when they are asserted. I found no comparable damages awards relating to seed patents. However, I found several damages awards relating to the misappropriation of trade secrets covering seeds. These cases are reviewed below and constitute the basis for my Assertion Comparables analysis.

Damages awards relating to trade secret misappropriation date back to at least 1994. On July 12 of that year, \$46,703,230 was awarded to Pioneer Hi-Bred International based on Holden Foundation Seeds, Inc.'s misappropriation of the genetic make-up of certain seed corn.²³

In May of 2000, Cargill, Inc. was found to have misappropriated genetic corn seed trade secrets belonging to then Pioneer Hi-Bred International and was forced to pay \$300 million.²⁴

As recently as July of 2014, several employees (including the wife of the chairman) of Beijing Dabeinong Technology Group (also known as DNB Group) were arrested in California and were charged with conspiracy to steal trade secrets from U.S. seed corn companies. These Chinese citizens were alleged to have stolen patented seed corn from fields in Iowa and Illinois and to have shipped them to China to try to reproduce such traits. The efforts to take corn from Pioneer Hi-Bred, Monsanto and LG Seeds were initially detected in 2011. According to United States Attorney Nicholas Klinefeldt, the loss to a U.S. seed corn manufacturer of a patented seed line is a minimum of \$30 million to \$40 million and from five to eight years of research time.²⁵

GrainSense Patent Valuation						
August 5, 2014						
Comparable Assertion Analysis						
Notes	Trade Secret Owner	Misappropriator	Date of Award	Award (Nominal)	Award (Present Value)	
1						
2	Pioneer Hi-Bred	Holden Foundation Seeds	July 12, 1994	\$46,703,230	\$84,503,736	
3	Pioneer Hi-Bred	Cargill, Inc.	May 1, 2000	\$300,000,000	\$457,255,232	
4,5	Pioneer Hi-Bred, Monsanto and LG Seeds	DNB Group	August 4, 2014	\$40,000,000	\$40,000,000	
	Average Value of Award				\$193,919,656	
6	Discount Factor				99.5%	
	Imputed Value of the GrainSense Patents (\$)				\$969,598	
	Currency Conversion Rate (\$ to €)				0.74	
	Imputed Value of the GrainSense Patents (€)				€717,503	

Below is commentary relating to the numbered notes above.

²³ <http://openjurist.org/35/f3d/1226/pioneer-hi-bred-international-v-holden-foundation-seeds-inc-pioneer-hi-bred-international>

²⁴ www.finance-commerce.com/recent_articles/051700b.htm

²⁵ <http://abcnews.go.com/US/wireStory/chinese-woman-charged-trade-secrets-theft-case-24400004>

Note 1 – In grossing up the nominal awards to their present values, I used 3% as the annual inflation rate.

Notes 2, 3, 4 – Please see discussions above.

Note 5 – The \$40 million nominal award may seem aggressive as it is on the high end of U.S. Attorney Klinefeldt's range. However, there are factors other than lost profits and reasonable royalties that are included in the calculation of damages for misappropriating trade secrets. For instance, the "five to eight years of research time" cited by Attorney Klinefeldt as well as negative know-how (the value associated with knowing what not to do) are legitimate factors in calculating total trade secrets damages. Thus, the \$40 million figure used in this analysis is quite conservative.

Note 6 – The main considerations that I used for discounting the average value of the discussed trade secrets awards by 99.5% are that the cited companies were exponentially larger than GrainSense and that they are not perfect comparables. This is because, in the cited examples, the issue was trade secret misappropriation and the focus of this Patent Valuation Report is on valuing the subject patent applications. In addition to the reasons discussed in Note 5 above as to why damages awards for trade secret misappropriation may be more lucrative than damages awards for patent infringement is the fact that damages awards for unjust enrichment (clawing back the income made by the misappropriator) can factor into trade secrets damages awards but not in patent infringement awards. Also, the subject of the cited examples of trade secret misappropriation was corn while GrainSense is targeting grains (initially wheat and then barley). There is a big difference in the risk of misappropriation / infringement when it comes to corn versus wheat: corn is much more highly valued as it is much more likely to be genetically modified whereas with wheat, seed from the previous year's crop can be used for seeding.

ACQUISITION COMPARABLES - OVERVIEW

Another way of utilizing the Market Method for determining the value of patents is to review the valuations at which similar companies were acquired and to apportion value to the patents and patent applications owned by such acquired companies. Over the past three years, at least 13 companies comparable—in terms of being involved with grain or measurement / inspection, or both—to GrainSense were acquired. A summary of these recent (attempted) acquisitions of grain-related or measurement / inspection companies is presented below. The two most instructive of these 13 relevant transactions are discussed below.

GrainSense Patent Valuation					
August 5, 2014					
Comparable Acquisitions Analysis					
Note	Acquiror	Acquiree	Date	Purchase Price	Comments
1	Milner Milling Co. Pendleton Flour Mills	Cereal Food Processors	May 8, 2014	Not Disclosed	Milling company
2	Raven Industries	SBG Innovatie BV	May 1, 2014	Not Disclosed	GPS for enhancing crop yields
3	Hexagon AB	Arvus	April 28, 2014	Not Disclosed	Applying nutrients with sensors and GPS
4	RoboFlight Systems	Aerial Precision Ag	April 11, 2014	Not Disclosed	Agricultural unmanned aerial systems
5	China National Cereals, Oils and Foodstuffs	Nidera	February 28, 2014	Between \$1 and \$2 billion for a 51% stake	Largest seller of seeds in Argentina
6	Archer-Daniels-Midland	GrainCorp Ltd.	November 28, 2013	\$2 billion for a 80.1% stake	Rejected by Australian regulators
7	Monsanto Company	The Climate Corporation	October 2, 2013	\$930 million cash	Acquiree involved with monitoring and analytics
8	BASF	Becker Underwood	September 20, 2012	\$1.02 billion	Acquiree involved with crop protection
9	Bayer CropScience	AgraQuest	July 3, 2012	\$425 million plus milestone payments	Acquiree involved with biological pest management solutions
10	Marubeni Corp.	Gavilon Group LLC	May 29, 2012	\$3.6 billion	Gavilon was a grain trader
11	Monsanto Company	Precision Planting	May 23, 2012	\$210 million plus a potential \$40 million in milestones	Meters for better seed management
12	Glencore International	Viterra Inc.	March 20, 2012	\$6.2 billion; including the assumption of debt, \$7.56 billion	Acquiree involved with grain marketing and distribution
13	AGCO	GSI Holdings Corp.	October 3, 2011	\$940 million	GSI was a manufacturer of grain storage and protein production systems

Note 1 – On May 8, 2014, Milner Milling Co. and Pendleton Flour Mills completed their acquisition of Cereal Food Processors, Inc. The new company is expected to have a daily milling capacity of 164,000

cwts of flour. The combined company was subsequently renamed Grain Craft. Terms of this transaction were not disclosed.²⁶

Note 2 - On May 1, 2014, Raven Industries announced its purchase of SBG Innovatie BV and its affiliate Navtronics BVBA. The acquired firm is located in Middenmeer, Netherlands. The Dutch firm is known for its high-end RTK GPS precision systems geared to high-value crops. The move by Raven will broaden the U.S. firm's line of product by adding the high-accuracy steering applications available from SBG. Rik van Bruggen, managing director, SBG, notes the combined firm will "...help customers increase yields and efficiencies."²⁷

Note 3 - On April 28, 2014, Hexagon AB from Sweden, a leading global provider of design, measurement and visualization technologies, signed an agreement to acquire Arvus. Arvus is headquartered in Florianópolis, Brazil and is a manufacturer of precision agriculture solutions for closer, more site-specific management of the factors affecting crop production. This means different parts of a field can be managed separately, where the application of essential nutrients and various other inputs can be fine-tuned through the use of sensors and GPS technologies.²⁸

Note 4 - On April 11, 2014, RoboFlight Systems Inc. (a geo-referenced aerial data company that processes, analyzes, and manages multi-spectral aerial imagery data) agreed to acquire Aerial Precision Ag (a manufacturer of agricultural unmanned aerial systems). Aerial Precision Ag will be the company's division that is focused on the agriculture and livestock industries.²⁹

Note 5 - On February 28, 2014, it was announced that China National Cereals, Oils and Foodstuffs Corporation paid between \$1 billion and \$2 billion for a 51% stake in Nidera, a Rotterdam-based grain trader that is also the largest seller of seeds in Argentina. The deal will give China's largest grain trader access to South American soybean, corn, wheat and biofuel seeds. Nidera trades more than 33 million tons of grains annually.³⁰

Note 6 - Archer-Daniels-Midland Co. (ADM) attempted to acquire the remaining 80.1% of GrainCorp Ltd. that it did not own for A\$2.2 billion (or \$2.0 billion) in the fall of 2013. GrainCorp is an international leader in food ingredients and agribusiness. However, the Australian Federal Treasurer blocked this attempt on November 28, 2013.³¹

Note 7 - On October 2, 2013, Monsanto Company announced it signed a definitive agreement to acquire The Climate Corporation for a cash purchase price of approximately \$930 million. The Climate Corporation built the agriculture industry's most advanced technology platform combining hyper-local weather monitoring, agronomic data modeling, and high-resolution weather simulations to deliver a complete suite of full-season monitoring, analytics and risk-management products. The acquisition will

²⁶

http://www.foodbusinessnews.net/articles/news_home/Business_News/2014/05/With_CFP_acquisition_Milner_re.aspx?ID={7781FF44-56B7-4C03-AE27-AC5EC4F8547E}&cck=1

²⁷ <http://farmprogress.com/story-raven-buys-dutch-precision-ag-firm-13-111945>

²⁸ <http://uk.reuters.com/article/2014/04/28/hexagon-idUKnBw275072a+100+BSW20140428>

²⁹ <http://www.precisionag.com/data/roboflight-systems-acquires-aerial-precision-ag/>

³⁰ <http://www.scmp.com/business/companies/article/1436935/china-buys-majority-stake-grain-trader-nidera-reports>

³¹ <http://www.bloomberg.com/news/2013-11-28/australian-treasurer-hockey-rejects-adm-takeover-of-graincorp.html>

combine The Climate Corporation's expertise in agriculture analytics and risk-management with Monsanto's R&D capabilities. The Climate Corporation will provide farmers access to more information about the many factors that affect the success of their crops.³²

The Climate Corporation, founded by a couple of former Google employees, sells crop and weather insurance. But it was the promise of its climate modeling that attracted Monsanto despite the fact that it has, to date, failed to turn a real profit. Climate Corp. says it can look at a wide range of factors—including historical weather trends, annual farm yields, insect populations, disease projections and soil characteristics—to guide key farming decisions. This tool helps figure out things such as when to plant, what to plant, how much fertilizer to use and when to harvest. The Climate Corporation also provides models showing how changes in those variables could impact yields. Among other things, The Climate Corporation touts its ability to tell—within a hundredth of an inch—how much rain has fallen on a specific field, without ever setting foot on that chunk of land.³³

Note 8 - On September 20, 2012, German chemicals company BASF agreed to acquire U.S. crop-technology company Becker Underwood from private-equity company Norwest Equity Partners for €785 million (\$1.02 billion). This deal was expected to bolster BASF's existing business in protecting crops from pests and other harm. Becker Underwood was expected to generate \$240 million in annual sales for the fiscal year ended September 30, 2012.³⁴

Note 9 - On July 3, 2012, Bayer CropScience announced that it signed an agreement to purchase AgraQuest, Inc. for a purchase price of \$425 million plus milestone payments. AgraQuest, headquartered in Davis, California, USA, is a global supplier of innovative biological pest management solutions based on natural microorganisms. This acquisition will enable Bayer CropScience to build a leading technology platform for green products, while also opening new opportunities in other crops and markets. Green products control a broad spectrum of pests and diseases and offer farmers integrated pest management programs to minimize development of resistance and maximize crop yields.³⁵

Note 10 - On May 29, 2012, Marubeni Corp. agreed to buy U.S.-based Gavilon Group LLC for \$3.6 billion in a deal that would make the Japanese company one of the world's largest grain traders. At the time of the acquisition, Gavilon's grain-handling volume was 30 million tons. Gavilon had group revenue totaling \$17.85 billion in 2011.³⁶

Note 11 - On May 23, 2012, Monsanto Company acquired Precision Planting Inc. for \$209 million and an additional, performance-based payment of as much as \$40 million.³⁷ Precision Planting's technology contributes to better seed spacing, better depth control and better root systems. The scope of Precision Planting has changed to include proprietary meter components, the MeterMax meter calibration system, and a broad range of Keeton Seed Firmers. Plus, Precision Planting introduced new planter electronic

³² <http://news.monsanto.com/press-release/corporate/monsanto-acquire-climate-corporation-combination-provide-farmers-broad-suite#sthash.KiDJ650V.dpuf>

³³ http://www.stltoday.com/business/local/monsanto-expands-precision-agriculture-offerings-for-farmers/article_c39fd6c4-fcac-5f2a-9692-dde5dab6b0e6.html

³⁴ <http://online.wsj.com/news/articles/SB10001424052702303807404577433622017227912>

³⁵ <http://beecare.bayer.com/media-center/news/news-detail/bayer-cropscience-acquires-us-based-biological-company-agraquest-for-close-to-us-500-million>

³⁶ <http://www.bloomberg.com/news/2012-05-29/marubeni-climbs-on-speculation-it-s-agreed-to-buy-gavilon.html>

³⁷ <http://www.precisionplanting.com/Contact-Us/About.aspx>

systems that give customers new ways to manage planters by understanding singulation, impact of speed, and down force.³⁸

Note 12 - On March 20, 2012, Switzerland's Glencore International PLC said it would buy Canadian grain handler Viterro Inc. for \$6.2 billion (including the assumption of debt this deal was worth \$7.56 billion). Viterro operates grain-marketing and distribution businesses across Canada, the U.S., Australia, New Zealand and China. It controls 45% of the grain trade in Canada, the world's sixth-largest exporter, and has a large operation in Australia, the third-largest grain-exporting country.³⁹

Note 13 - On October 3, 2011, AGCO agreed to acquire GSI Holdings Corp. from New York-based Centerbridge Partners, L.P. for \$940 million. At the time of its acquisition, GSI was a leading global manufacturer of grain storage and protein production systems with annual revenue of over \$700 million. GSI sold its products globally through more than 500 independent dealers. Martin Richenhagen, AGCO's Chairman, President and Chief Executive Officer, stated, "With its high quality products and services, recognized brands and global capabilities, GSI gives us strong positions in the grain storage and protein production segments and is well-positioned to benefit from increases in global grain and food demand."⁴⁰

ACQUISITIONS COMPARABLES - ANALYSIS

Of the 13 acquisitions described above, the two most comparable to GrainSense are Monsanto's acquisitions of Precision Planting and The Climate Corporation. The implied valuations of the patents owned by these two companies are useful for deriving the valuation of the GrainSense patent portfolio and is discussed below. As only the implied valuation of the Precision Planting patent portfolio is instructive, the Acquisitions Comparables Analysis indicates that the GrainSense patent portfolio should be valued at €1.9 million.

The Precision Planting Comparable

Below is an analysis of the valuation of GrainSense's patent portfolio based on the Precision Planting comparable. This analysis indicates that the GrainSense patent portfolio deserves a valuation of €1.9 million.

Note 1 – IncreMental Advantage research.

Note 2 – Please see Note 11 on page 26.

Note 3 - In arriving at an apportionment of Precision Planting's acquisition price to its patent portfolio, I began by considering the well-established and oft-cited 25% Rule.⁴¹ The 25% Rule holds that the patent-

³⁸ <http://online.wsj.com/news/articles/SB10001424052702304707604577422162132896528>

³⁹ <http://blogs.wsj.com/deals/2012/03/20/deal-profile-glencore-to-buy-viterro-for-6-2-billion/>

⁴⁰ <http://investors.agcocorp.com/phoenix.zhtml?c=108419&p=irol-newsArticle&ID=1612457&highlight>

⁴¹ The 25% Rule is based on royalty rate analysis conducted in the 1950s and championed by the late Robert Goldscheider. Richard Razgaitis has called it the "most famous heuristic, or rule of thumb, for licensing valuation." Despite the *Uniloc v. Microsoft*⁴¹ decision, the 25% Rule is still a legitimate starting point for apportionment.

holder is entitled to 25% of the earnings that a commercializer derives from selling products that incorporate the patented feature. This is tantamount to stating that 25% of the success of a product is due to its corresponding patents.

I believe that the Precision Planting's patent portfolio deserves to be apportioned with the same apportionment factor suggested by the 25% Rule. (Also, see Apportionment Considerations on Exhibit C.) While Precision Planting most likely had significant intangible assets other than patents at the time of its acquisition by Monsanto, the relatively large size of Precision Planting's patent portfolio is in itself a compelling value driver. There is usually a premium placed on the value of large portfolios in a given space.

Note 4 – Please see the schedule of Precision Planting's patent portfolio beginning on page 29. Also, in view of the GrainSense patent portfolio consisting of two patent applications and one patent application licensed in exclusively for one field-of-use, the GrainSense patent portfolio effectively consists of three patent applications. Assigning patent applications with 33.3% of the value of one issued patent indicates that the GrainSense patent portfolio has one patent equivalent.

GrainSense Patent Valuation		
August 5, 2014		
Comparable Acquisitions Analysis		
The Precision Planting Comparable		
Notes	Today	8/4/2014
1	Inflation Factor	3%
2	Acquisition Date	5/23/2012
2	Acquisition Amount	\$209,000,000
	Years Ago	2.2
	Acquisition Amount (current \$s)	\$223,024,473
3	Apportionment to Patents	25%
	Value Apportioned to Patents	\$55,756,118
4	Patent Equivalents	22
	Value per Patent Equivalent (\$)	\$2,542,459
	Currency Conversion Rate (\$ to €)	0.74
	Value per Patent Equivalent (€)	€1,881,419

GrainSense Patent Valuation August 5, 2014 Precision Planting's Patent Portfolio					
Document	Title	Priority Date	Filing Date	Publication Date	Patent Status on Acquisition Date
WO 2014018717	SYSTEMS, METHODS AND APPARATUS FOR MULTI-ROW AGRICULTURAL IMPLEMENT CONTROL AND MONITORING	7/25/2012	7/25/2013	1/30/2014	Application
WO 2014018716	INTEGRATED IMPLEMENT DOWNFORCE CONTROL SYSTEMS, METHODS, AND APPARATUS	7/25/2012	7/25/2013	1/30/2014	Application
US 8738243	Planter monitor system and method		1/28/2013	5/27/2014	Application
US 20140090585	AGRICULTURAL ROW UNIT APPARATUS, SYSTEMS AND METHODS	6/3/2011	6/4/2012	4/3/2014	Application
US 20130317696	METHODS, SYSTEMS, AND APPARATUS FOR MONITORING YIELD AND VEHICLE WEIGHT	12/22/2010	12/22/2011	11/28/2013	Application
US 6748885	Vacuum seed meter and dispensing apparatus	12/21/2001	1/7/2003	6/15/2004	Issued
US 6681706	Apparatus and method for controlled delivery of seeds to an open furrow	2/26/2002	2/26/2002	1/27/2004	Issued
US 6729249	Seed belt housing with impact absorbing material to reduce seed skip and method for same	3/5/2002	3/5/2002	5/4/2004	Issued
US 6918342	Planter bracket assembly for supporting appurtenances in substantial alignment with the seed tube	9/18/2003	9/18/2003	7/19/2005	Issued
US 7086269	Apparatus and method for testing seed singulation of a seed meter	7/15/2004	7/15/2004	8/8/2006	Issued
US 7798080	Adjustable singulating brush assembly and method of singulating seeds	8/16/2004	1/15/2007	9/21/2010	Issued
US 7549383	Planter meter suspension system and method of improving seed spacing	1/7/2005	1/6/2006	6/23/2009	Issued
US 7152540	Seed tube for an agricultural planter	8/19/2005	8/19/2005	12/26/2006	Issued
US 7631606	Seed belt for an agricultural planter	8/19/2005	8/19/2005	12/15/2009	Issued
US 7584707	Wear resistant seed tube for an agricultural planter	8/19/2005	8/17/2006	9/8/2009	Issued
WO 2007024646	SEED SINGULATOR	8/19/2005	8/17/2006	3/1/2007	Issued
WO 2008086318	PLANTER MONITOR SYSTEM AND METHOD	1/8/2007	1/7/2008	7/17/2008	Issued
EP 2104413	PLANTER MONITOR SYSTEM AND METHOD	1/8/2007	1/7/2008	9/30/2009	Issued
WO 2008086283	LOAD SENSING PIN	1/8/2007	1/7/2008	7/17/2008	Issued

GrainSense Patent Valuation August 5, 2014 Precision Planting's Patent Portfolio					
Document	Title	Priority Date	Filing Date	Publication Date	Patent Status on Acquisition
WO 2008086283	LOAD SENSING PIN	1/8/2007	1/7/2008	7/17/2008	Issued
US 8113132	Method of retrofitting a pneumatic on-demand seed delivery system and an improved pneumatic on-demand seed delivery system	4/30/2007	8/5/2010	2/14/2012	Application
US 20100198529	SYSTEM AND METHOD FOR DETERMINING PROPER DOWNFORCE FOR A PLANTER ROW UNIT	9/26/2007	1/7/2008	8/5/2010	Issued
WO 2012015957	SEEDING CONTROL SYSTEM AND METHOD	7/27/2010	7/27/2011	2/2/2012	Application
US 8550020	Variable pressure control system for dual acting actuators	12/16/2010	12/16/2010	10/8/2013	Application
US 8201507	Planter bracket assembly for supporting appurtenances in substantial alignment with the seed tube	9/18/2003	3/4/2011	6/19/2012	Application
WO 2012088405	METHODS, SYSTEMS, AND APPARATUS FOR MONITORING YIELD AND VEHICLE	12/22/2010	12/22/2011	6/28/2012	Application
US 8631749	Seed tube egress-mounted seed sensor	1/4/2011	1/4/2011	1/21/2014	Application
US 20140002489	METHODS FOR GENERATING SOIL MAPS AND APPLICATION PRESCRIPTIONS	1/4/2011	12/30/2011	1/2/2014	Application
US 8634992	Dynamic supplemental downforce control system for planter row units	1/26/2011	1/26/2011	1/21/2014	Application
WO 2012129442	SEED METER	3/22/2011	3/22/2012	9/27/2012	Application
WO 2012167244	AGRICULTURAL ROW UNIT APPARATUS, SYSTEMS, AND METHODS	6/3/2011	6/4/2012	12/6/2012	Application
WO 2012167258	AGRICULTURAL TOOLBAR APPARATUS, SYSTEMS, AND METHODS	6/3/2011	6/4/2012	12/6/2012	Application
WO 2012174134	SYSTEMS AND METHODS FOR CREATING PRESCRIPTION MAPS AND PLOTS	6/13/2011	6/13/2012	12/20/2012	Application
WO 2013049198	SEED DELIVERY APPARATUS, SYSTEMS, AND METHODS	9/27/2011	9/26/2012	4/4/2013	Application
WO 2013078328	STALK SENSOR APPARATUS, SYSTEMS, AND METHODS	11/22/2011	11/21/2012	5/30/2013	Application
WO 2013112929	AGRICULTURAL TOOLBAR APPARATUS, SYSTEMS, AND METHODS	1/25/2012	1/25/2013	8/1/2013	Application

GrainSense Patent Valuation					
August 5, 2014					
Precision Planting's Patent Portfolio					
Document	Title	Priority Date	Filing Date	Publication Date	Patent Status on Acquisition
US 20140026748	INTEGRATED IMPLEMENT DOWNFORCE CONTROL SYSTEMS, METHODS, AND APPARATUS	7/25/2012	7/25/2013	1/30/2014	Application
Patent Portfolio					
Patent Families Issued*			15		
Patent Applications			21		
Value of Applications Relative to Issued Patents			33%		
Patent Equivalents			22		
Note: Some of the patent families are extensive.					

The Climate Corporation Comparable

Below is an analysis of the valuation of GrainSense's patent portfolio based on The Climate Corporation comparable.

GrainSense Patent Valuation August 5, 2014 Comparable Acquisitions Analysis The Climate Corporation Comparable		
Notes	Today	8/4/2014
1	Inflation Factor	3%
2	Acquisition Date	10/2/2013
2	Acquisition Amount	\$930,000,000
	Years Ago	0.8
	Acquisition Amount (current \$s)	\$953,349,084
3	Apportionment to Patents	5%
	Value Apportioned to Patents	\$47,667,454
4	Patent Equivalents	34%
	Value per Patent Equivalent (\$)	\$140,198,395
	Currency Conversion Rate (\$ to €)	0.74
	Value per Patent Equivalent (€)	€103,746,812

I find it hard to believe that The Climate Corporation had only one patent application on file at the date of its acquisition by Monsanto. (See Note 4.) Because of the uncertainty of The Climate Corporation's patent portfolio and the astronomical value of €103.7 million that would have to be attached to that one patent application, I am disregarding this value from my conclusion of GrainSense's patent portfolio value.

Note 1 – IncreMental Advantage research.

Note 2 – Please see Note 7 on page 25.

Note 3 – In arriving at an apportionment of The Climate Corporation's acquisition price to its patent portfolio, I began by considering the well-established and oft-cited 25% Rule.⁴² (Also, see Apportionment Considerations on Exhibit C.) The 25% Rule holds that the patent-holder is entitled to 25% of the earnings that a commercializer derives from selling products that incorporate the patented feature. This is tantamount to stating that 25% of the success of a product is due to its corresponding patents.

I believe that The Climate Corporation's patent portfolio deserves to be apportioned with far less value than suggested by the 25% Rule as Note 7 on page 25 indicates that The Climate Corporation had many other assets that could claim value at the time of its acquisition.

Note 4 – The only patent records I could locate relating to The Climate Corporation was one patent application. This patent application is titled "Automatically Generating a Crop Insurance Policy". This patent application has a U.S. patent application number US20130332205 and was filed with the USPTO on June 5, 2013. Its Patent Cooperation Treaty number is PCT/US2013/044328.

PUBLICLY-TRADED COMPARABLES

Another permutation of the market method is to infer the implicit valuation that the stock market places on comparable patents. In the analysis below, I reviewed the implicit valuation being placed on Trimble Navigation's patents. I chose to analyze Trimble Navigation (NASDAQ: TRMB) because it is the most comparable large publicly-traded pure play on precision agriculture.

Below is an analysis of the valuation of GrainSense's patent portfolio based on the Trimble Navigation comparable. This analysis indicates that the GrainSense patent portfolio deserves a valuation of €1.7 million.

Notes 1 and 3 – Source: Yahoo!Finance

Note 2 – IncreMental Advantage research.

Note 4 – Source: Patent Buddy

Note 5 – It is my understanding that the number of patents owned by Trimble Navigation as reported by Patent Buddy includes multiple members of the same patent family. I am modeling that, on average, each of Trimble Navigation's patent families consists of seven members.

Note 6 – I am modeling in that each known patent application is worth the equivalent of 33% of one issued patent. Patent applications may never issue (due to continued examiner rejections, pre-issuance

⁴² The 25% Rule is based on royalty rate analysis conducted in the 1950s and championed by the late Robert Goldscheider. Richard Razgaitis has called it the "most famous heuristic, or rule of thumb, for licensing valuation." Despite the *Uniloc v. Microsoft*⁴² decision, the 25% Rule is still a legitimate starting point for apportionment.

challenges from third parties or applicant abandonment, for instance) and some of those applications that issue only do so with significant claims amendments.

Note 7 - In arriving at an apportionment of Trimble Navigation's market capitalization to its patent portfolio, I began by considering the well-established and oft-cited 25% Rule.⁴³ (Also, see Apportionment Considerations on Exhibit C.) The 25% Rule holds that the patent-holder is entitled to 25% of the earnings that a commercializer derives from selling products that incorporate the patented feature. This is tantamount to stating that 25% of the success of a product is due to its corresponding patents.

I believe that Trimble Navigation's patent portfolio deserves to be apportioned with far less value than suggested by the 25% Rule as Trimble Navigation had many other intangible assets that could claim value at the time of preparing this Patent Valuation Report. As a general rule, the longer a product has been on the market, the less valuable the associated patents become. While early in the launch of a new product it is patents that preclude competitors, in later years it is the brand equity, customer loyalty, customer service, financing, relationships with distributors, contracts and the like that are responsible for the success of a product. Thus, as a more established company, Trimble Navigation's patents are likely to account for a small portion of its commercial success.

GrainSense Patent Valuation		
August 5, 2014		
Publicly-Traded Comparables		
The Trimble Navigation Comparable		
Notes		
1	Market Capitalization	\$8,200,000,000
2	Private Company Discount	20%
	Adjusted Market Capitalization	\$6,560,000,000
3	Total Assets	\$3,700,000,000
	Intangible Allocation	\$2,860,000,000
4	Patents Issued	896
5	Average Number per Family	7
4	Patent Applications	204
6	Conversion Ratio	33%
	Total Patent Equivalents	195
7	Apportionment	10%
	Apportionment to Patents	\$286,000,000
	Value per Patent Equivalent (\$)	\$1,464,264
	Currency Conversion Rate (\$ to €)	0.74
	Value per Patent Equivalent (€)	€1,083,555

⁴³ The 25% Rule is based on royalty rate analysis conducted in the 1950s and championed by the late Robert Goldscheider. Richard Razgaitis has called it the "most famous heuristic, or rule of thumb, for licensing valuation." Despite the *Uniloc v. Microsoft*⁴³ decision, the 25% Rule is still a legitimate starting point for apportionment.

VENTURE CAPITAL COMPARABLES

The valuations of companies that receive venture capital funding are another starting point for determining the value of GrainSense's patent portfolio. In the analyses below, I calculated the valuation of comparable companies based on their announced capital raises. Then, with the same kinds of considerations discussed throughout the Acquisitions Comparables section of this report, I apportioned those companies' valuations to their patent portfolios. Finally, I credited GrainSense with having only one patent equivalent family even though GrainSense will have two patent applications assigned to it and will be a field-of-use exclusive licensee for a third patent application. The reason that I am crediting GrainSense for having one patent equivalent is the same as discussed on Note 5 on page 32.

Over the past two years, three companies comparable to GrainSense received venture capital investments. Based on such comparables, GrainSense's patents have a valuation of €1.7 million.

The Blue River Technology Comparable

Blue River Technology uses robotics and computer vision to optimize agriculture by, for instance, determining which lettuces to thin out of a row and which to keep. Blue River Technology's main premise is to reduce the use of chemicals in food production by optimizing agricultural methods via robotics systems that can automatically recognize plants and make decisions about which seedlings to thin or identify weeds to eliminate. Investors in Blue River Technology include Eric Schmidt's (former Chief Executive Officer of Google) Innovation Endeavors and Khosla Ventures.⁴⁴

Below is an analysis of the valuation of GrainSense's patent portfolio based on the Blue River Technology comparable. This analysis indicates that the GrainSense patent portfolio deserves a valuation of €2.8 million.

Note 1 – IncreMental Advantage research.

Note 2 – Please see footnote number 44 below.

Note 3 – According to a robust database of more than 6,000 venture capital transactions maintained by Noam Wasserman, Associate Professor and Tukman Faculty Fellow at Harvard Business School and author of *The Founder's Dilemmas*, the average venture capital ownership was 34% of companies they funded post A-round.

Note 4 – Venture capitalists typically receive preferential rights (via their preferred shares) that cannot be attributed to the subject company's patents. For instance, if a venture capitalist has a two-time liquidation preference, the venture capitalist will receive two times his investment before the common shareholders participate. The two times liquidation preference comes from IncreMental Advantage research and incorporates other unique benefits that inure to venture capitalists such as board representation, tag-along rights and veto rights.

⁴⁴ <http://techcrunch.com/2014/03/19/blue-river-technology-series-a-1/>

GrainSense Patent Valuation					
August 5, 2014					
Venture Capital Comparables					
The Blue River Technology Comparable					
Note	Today	8/4/2014	Note	Implied Market Value	\$39,383,165
1	Inflation Factor	3%			
				Series A Round	\$13,390,276
2	Round	A (Tranche 2)		Multiplier for Preferential Rights	
2	Date	3/19/2014	4	Liquidation Preferences	2.0
	Years Ago	0.4		Value of Preferential Rights	\$26,780,552
2	Amount Raised (nominal \$s)	\$10,000,000			
	Amount Raised (current \$s)	\$10,111,462		Implied Market Value	\$12,602,613
				Post Preferential Rights	
2	Round	A (Tranche 1)			
2	Date	9/11/2012	5	Apportionment to Patents	10%
	Years Ago	1.9			
2	Amount Raised (nominal \$s)	\$3,100,000		Value of Blue River's Patent Portfolio	\$1,260,261
	Amount Raised (current \$s)	\$3,278,814			
				Blue River's Patent Portfolio	
	Total Raised (current \$s)	\$13,390,276		Issued Patents	0
3	Implied Percent Ownership	34%	6	Patent Applications	1
	of Investors, Post Money				
	Valuation (current dollars)	\$39,383,165		GrainSense's Patent Portfolio	
				Issued Patents	0
				Patent Applications	3
				Value of GrainSense's Patent Portfolio (\$)	\$3,780,784
				Currency Conversion Rate (\$ to €)	0.74
				Value of GrainSense's Patent Portfolio (€)	€2,797,780

Note 5 – I am apportioning 10% of Blue River Technology's residual value to its patents. (Also, see Apportionment Considerations on Exhibit C.) As per Note 6 below, it does not seem as though Blue River Technology had a major focus on its patent portfolio. Also, it was stated that that company's first product is currently being used by some eight customers in different parts of the U.S. Also, it was stated that Blue River Technology plans to use its new financing to further expand its engineering team and product offering. Specifically, it was stated that Blue River Technology is working on improving its lettuce precision thinning machine with a next-gen version of the product in the works that is wider, faster and more accurate. These statements indicate that patents were not of paramount importance to Blue River Technology.

Note 6 – My research indicates that Blue River Technology only had one patent application at the time of its most recent venture capital raise. This patent application (number US 20130238201 A1) is titled "Method and Apparatus for Automated Plant Necrosis" and was filed with the United States Patent and Trademark Office on March 7, 2013.

The Conservis Comparable

Conservis's cloud-based software expertly matches its clients' farming workflow to Conservis's system by tracking field activities, recording inputs, managing inventories and yields for accurate analysis of cost per acre, and yield per acre from planting through storage. Conservis tracks farm activity such as suppliers used, contracts with suppliers, location of inventory, and ownership of inventory. Conservis offers a cloud and mobile enabled data hub that helps farmers reduce costs, grow revenues and manage risk and eliminate compliance headaches.⁴⁵

Below is an analysis of the valuation of GrainSense's patent portfolio based on the Conservis comparable. This analysis indicates that the GrainSense patent portfolio deserves a valuation of €1.7 million.

GrainSense Patent Valuation					
August 5, 2014					
Venture Capital Comparables					
The Conservis Comparable					
Note	Today	8/4/2014	Note	Implied Market Value	\$23,827,063
1	Inflation Factor	3%			
				Series A Round	\$8,101,201
2	Round	A (Tranche 2)		Multiplier for Preferential Rights	
2	Date	6/17/2013	4	Liquidation Preferences	2.0
	Years Ago	1.1		Value of Preferential Rights	\$16,202,403
2	Amount Raised (nominal \$s)	\$2,000,000			
	Amount Raised (current \$s)	\$2,067,965		Implied Market Value	\$7,624,660
				Post Preferential Rights	
2	Round	A (Tranche 1)			
2	Date	6/17/2011	5	Apportionment to Patents	10%
	Years Ago	3.1			
2	Amount Raised (nominal \$s)	\$5,500,000		Value of Conservis's Patent Portfolio	\$762,466
	Amount Raised (current \$s)	\$6,033,236			
				Conservis's Patent Portfolio	
	Total Raised (current \$s)	\$8,101,201		Issued Patents	0
3	Implied Percent Ownership	34%	6	Patent Applications	1
	of Investors, Post Money				
	Valuation (current dollars)	\$23,827,063		GrainSense's Patent Portfolio	
				Issued Patents	0
				Patent Applications	3
				Value of GrainSense's Patent Portfolio (\$)	\$2,287,398
				Currency Conversion Rate (\$ to €)	0.74
				Value of GrainSense's Patent Portfolio (€)	€1,692,675

⁴⁵ <http://tech.mn/news/2013/09/17/minnesota-ag-tech-startup-conservis-is-reaping-more-cash/#sthash.hH1gpbnl.dpuf>

Note 1 – IncreMental Advantage research.

Note 2 – Please see footnote number 45 above. Do to the incomplete nature of the capital raising disclosures, some inferences had to be made.

Note 3 – According to a robust database of more than 6,000 venture capital transactions maintained by Noam Wasserman, Associate Professor and Tukman Faculty Fellow at Harvard Business School and author of The Founder's Dilemmas, the average venture capital ownership was 34% of companies they funded post A-round.

Note 4 – Venture capitalists typically receive preferential rights (via their preferred shares) that cannot be attributed to the subject company's patents. For instance, if a venture capitalist has a two-time liquidation preference, the venture capitalist will receive two times his investment before the common shareholders participate. The two times liquidation preference comes from IncreMental Advantage research and incorporates other unique benefits that inure to venture capitalists such as board representation, tag-along rights and veto rights.

Note 5 – I am apportioning 10% of Conservis's residual value to its patents. As per Note 6 above, it does not seem as though Conservis had a major focus on its patent portfolio. Also, it was stated that Conservis had 25 employees in Minneapolis, not counting sales reps and contractors. Their customers are in 26 states across the US, Canada, and include a large distributed farm system in Australia. Conservis's employees and customers as well as all of the efforts that go into serving its customers must account for the majority of assets.

Note 6 – My research indicates that Conservis only had one patent application at the time of its most recent venture capital raise. This patent application (number US 20130024330 A1) is titled "Ticket Based Harvest Management System and Method" and was filed with the United States Patent and Trademark Office on July 18, 2012.

The Granular Comparable

Granular is an online software and analytics service for farmers. It supports planning, production, marketing and accounting in a fully integrated solution. Investors include Andreessen Horowitz, Google Ventures and Khosla Ventures.⁴⁶

Below is an analysis of the valuation of GrainSense's patent portfolio based on the Granular comparable. This analysis indicates that the GrainSense patent portfolio deserves a valuation of €656,000.

Note 1 – IncreMental Advantage research.

Note 2 – Please see footnote number 45 below. Do to the incomplete nature of the capital raising disclosures, some inferences had to be made.

Note 3 – According to a robust database of more than 6,000 venture capital transactions maintained by

⁴⁶ <http://recode.net/2014/02/20/solum-sells-one-division-to-monsanto-raises-cash-for-another-from-andreessen-google/>

Noam Wasserman, Associate Professor and Tukman Faculty Fellow at Harvard Business School and author of *The Founder's Dilemmas*, the average venture capital ownership was 34% of companies they funded post A-round.

Note 4 – Venture capitalists typically receive preferential rights (via their preferred shares) that cannot be attributed to the subject company's patents. For instance, if a venture capitalist has a two-time liquidation preference, the venture capitalist will receive two times his investment before the common shareholders participate. The two times liquidation preference comes from IncreMental Advantage research and incorporates other unique benefits that inure to venture capitalists such as board representation, tag-along rights and veto rights.

Notes 5 and 6 – I did not detect that Granular owns any patents or patent applications. Perhaps, some patents and/or patent applications exist. Perhaps, some patent applications have not yet been published. Even if there are no patents or patent applications, Granular must certainly own some trade secrets (which can be viewed as a proxy for patents). In light of this situation, I am apportioning only 5% of Granular's residual value to its patents (trade secrets). Also, assigning only one patent application to Granular is consistent with the average patent portfolio size of the other two Venture Capital Comparables.

GrainSense Patent Valuation					
August 5, 2014					
Venture Capital Comparables					
The Granular Comparable					
Note	Today	8/4/2014	Note	Implied Market Value	\$18,477,953
1	Inflation Factor	3%			
				Series A Round	\$6,282,504
2	Round	A		Multiplier for Preferential Rights	
2	Date	2/23/2014	4	Liquidation Preferences	2.0
	Years Ago	0.4		Value of Preferential Rights	\$12,565,008
2	Amount Raised (nominal \$s)	\$6,200,000			
	Amount Raised (current \$s)	\$6,282,504		Implied Market Value	\$5,912,945
				Post Preferential Rights	
	Total Raised (current \$s)	\$6,282,504			
3	Implied Percent Ownership of Investors, Post Money	34%	5	Apportionment to Patents	5%
	Valuation (current dollars)	\$18,477,953		Value of Granular's Patent Portfolio	\$295,647
				Granular's Patent Portfolio	
				Issued Patents	0
			6	Patent Applications	1
				GrainSense's Patent Portfolio	
				Issued Patents	0
				Patent Applications	3
				Value of GrainSense's Patent Portfolio (\$)	\$886,942
				Currency Conversion Rate (\$ to €)	0.74
				Value of GrainSense's Patent Portfolio (€)	€656,337

THE INCOME METHOD

The Income Method holds that the value of an asset is the sum of the future streams of benefits that such asset will produce, discounted by a factor commensurate with the asset-holder's opportunity costs, risk of not receiving such benefit streams and the erosion of such benefits streams due to inflation. I began the Income (or Discounted Cash Flow Analysis) by reviewing the size of the addressable markets. This analysis later reviewed issues such as penetration rates; unit sales volumes; unit pricing; unit profitability; relief from royalties; discount rates; and, a patent risk factor.

By application of the Income Method, the subject patent portfolio is expected to yield a Net Present Value of €1.18 million. After discounting this value by 45% to reflect the Patent Risk Factor, the Income Method indicates that a value of €650,000 for the subject patent portfolio is appropriate.

Addressable Market Analysis

As indicated in the tables below, I assessed the production levels of wheat, barley and other potential crops whose farmers are targeted customers of the GrainSense device.

GrainSense Patent Valuation					
August 5, 2014					
World Top 10: Wheat Production Statistics - 2012					
Rank	Country	Million Metric Tons	Expected Pursuit of Patent Coverage	Infringement Risk	Risk Adjusted Million Tons
1	China	125.6	No	NA	
2	India	94.9	No	NA	
3	United States	61.8	Yes	Low	68,122,140
4	France	40.3	Yes	Low	
5	Russia	37.7	Possibly	High	10,389,178
6	Australia	29.9	Yes	Low	32,958,770
7	Canada	27	Yes	Low	29,762,100
8	Pakistan	23.5	No	NA	
9	Germany	22.4	Yes	Low	
10	Turkey	20.1	No	NA	
European Union		134.5	Yes	Low	148,259,350
Expected Million Tons of Patent Protected Addressable Wheat					289,491,538
Expected Pursuit of Patent Coverage		Infringement Risk			
Yes	100%	High	50%		
Possibly	50%	Moderate	25%		
		Low	100%		

In the tables above and below, I adjusted the addressable tons of wheat⁴⁷ and barley⁴⁸ by the regions in which patent protection is expected to be pursued as well as the risk of infringement occurring in such regions.

GrainSense Patent Valuation					
August 5, 2014					
World Barley Production					
Rank	Country	Million Tons (2011)	Expected Pursuit of Patent Coverage	Infringement Risk	Risk Adjusted Million Tons
1	Russia	16,938,000	Possibly	High	4,234,500
2	Ukraine	9,097,700	Possibly	High	2,274,425
3	France	8,775,000	Yes	Low	8,775,000
4	Germany	8,733,800	Yes	Low	8,733,800
5	Spain	8,328,200	Yes	Moderate	2,082,050
6	Australia	7,994,720	Yes	Low	7,994,720
7	Canada	7,755,700	Yes	Low	7,755,700
9	United Kingdom	5,494,000	Yes	Low	5,494,000
12	United States	3,391,710	Yes	Low	3,391,710
13	Poland	3,325,900	Possibly	Moderate	415,738
14	Denmark	3,264,100	Yes	Low	3,264,100
17	Belarus	2,012,600	Possibly	High	503,150
18	Czech republic	1,813,680	Yes	High	906,840
22	Finland	1,520,600	Yes	Low	1,520,600
23	Ireland	1,412,000	Yes	Low	1,412,000
24	Sweden	1,389,500	Yes	Low	1,389,500
26	Romania	1,329,690	Possibly	Moderate	166,211
Total Million Tons of Patent Protected Addressable Barley					79,834,730
Expected Pursuit of Patent Coverage		Infringement Risk			
Yes	100%	High	50%		
Possibly	50%	Moderate	25%		
		Low	100%		

47 http://en.wikipedia.org/wiki/International_wheat_production_statistics

48 http://en.wikipedia.org/wiki/List_of_countries_by_barley_production

GrainSense Patent Valuation			
August 5, 2014			
Production of Non-Core Targeted Crops			
	World	Europe	World Excluding Europe
Maize	926,271,508	93,810,139	832,461,369
Oats	21,630,433	13,170,280	8,460,153
Rice	767,557,945	4,763,038	762,794,907
Rye	13,639,860	11,789,099	1,850,762
Total	1,729,099,747	123,532,556	1,605,567,190
(tons)	Source: FAO 2012		

Below is an estimate of the size of the addressable production (in tons) of the commodities targeted by GrainSense.

GrainSense Patent Valuation August 5, 2014												
Addressable Production of Targeted Commodities (tons)												
(tons in 1000s)	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
Europe												
Wheat	157,288	158,861	160,450	162,054	163,675	165,312	166,965	168,634	170,321	172,024	173,744	
Barley	61,532	62,148	62,769	63,397	64,031	64,671	65,318	65,971	66,631	67,297	67,970	
Other	78,775	79,563	80,359	81,162	81,974	82,794	83,622	84,458	85,302	86,155	87,017	
Total	297,596	300,572	303,578	306,613	309,680	312,776	315,904	319,063	322,254	325,476	328,731	
USA												
Wheat	72,271	72,993	73,723	74,461	75,205	75,957	76,717	77,484	78,259	79,041	79,832	
Barley	5,829	5,887	5,946	6,005	6,065	6,126	6,187	6,249	6,312	6,375	6,438	
Other	28,116	28,397	28,681	28,968	29,257	29,550	29,845	30,144	30,445	30,750	31,057	
Total	106,215	107,277	108,350	109,434	110,528	111,633	112,750	113,877	115,016	116,166	117,328	
Canada												
Wheat	31,575	31,890	32,209	32,531	32,857	33,185	33,517	33,852	34,191	34,533	34,878	
Barley	8,228	8,310	8,393	8,477	8,562	8,648	8,734	8,822	8,910	8,999	9,089	
Other	14,329	14,472	14,617	14,763	14,911	15,060	15,210	15,363	15,516	15,671	15,828	
Total	54,132	54,673	55,220	55,772	56,330	56,893	57,462	58,036	58,617	59,203	59,795	
Australia												
Wheat	34,966	35,316	35,669	36,025	36,386	36,750	37,117	37,488	37,863	38,242	38,624	
Barley	8,482	8,566	8,652	8,739	8,826	8,914	9,003	9,093	9,184	9,276	9,369	
Other	15,641	15,798	15,956	16,115	16,276	16,439	16,603	16,769	16,937	17,106	17,278	
Total	59,089	59,680	60,276	60,879	61,488	62,103	62,724	63,351	63,985	64,624	65,271	
Russia												
Wheat	44,088	44,528	44,974	45,423	45,878	46,336	46,800	47,268	47,740	48,218	48,700	
Barley	27,621	27,897	28,176	28,458	28,743	29,030	29,321	29,614	29,910	30,209	30,511	
Other	25,815	26,073	26,334	26,597	26,863	27,132	27,403	27,677	27,954	28,234	28,516	
Total	97,524	98,499	99,484	100,479	101,484	102,499	103,524	104,559	105,604	106,661	107,727	
Grand Total	614,555	620,701	626,908	633,177	639,509	645,904	652,363	658,886	665,475	672,130	678,851	
Addressable Market												
(tons of production)												

Below is an estimate of the size of the addressable production (in bushels) of the commodities targeted by GrainSense.

GrainSense Patent Valuation											
August 5, 2014											
Addressable Production of Targeted Commodities (bushels)											
(numbers in 1000s)	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Europe											
Wheat	5,242,945	5,295,374	5,348,328	5,401,811	5,455,829	5,510,388	5,565,492	5,621,146	5,677,358	5,734,132	5,791,473
Barley	2,051,073	2,071,584	2,092,300	2,113,223	2,134,355	2,155,699	2,177,256	2,199,028	2,221,019	2,243,229	2,265,661
Other	2,625,847	2,652,105	2,678,626	2,705,412	2,732,466	2,759,791	2,787,389	2,815,263	2,843,416	2,871,850	2,900,568
Total	9,919,865	10,019,063	10,119,254	10,220,446	10,322,651	10,425,877	10,530,136	10,635,438	10,741,792	10,849,210	10,957,702
USA											
Wheat	2,409,026	2,433,116	2,457,447	2,482,022	2,506,842	2,531,910	2,557,230	2,582,802	2,608,630	2,634,716	2,661,063
Barley	194,286	196,229	198,191	200,173	202,175	204,197	206,239	208,301	210,384	212,488	214,613
Other	937,192	946,564	956,030	965,590	975,246	984,999	994,849	1,004,797	1,014,845	1,024,993	1,035,243
Total	3,540,504	3,575,909	3,611,669	3,647,785	3,684,263	3,721,106	3,758,317	3,795,900	3,833,859	3,872,198	3,910,920
Canada											
Wheat	1,052,487	1,063,012	1,073,642	1,084,378	1,095,222	1,106,174	1,117,236	1,128,409	1,139,693	1,151,090	1,162,600
Barley	274,267	277,010	279,780	282,578	285,404	288,258	291,140	294,052	296,992	299,962	302,962
Other	477,632	482,408	487,232	492,104	497,025	501,996	507,016	512,086	517,207	522,379	527,602
Total	1,804,386	1,822,430	1,840,654	1,859,061	1,877,651	1,896,428	1,915,392	1,934,546	1,953,892	1,973,430	1,993,165
Australia											
Wheat	1,165,532	1,177,187	1,188,959	1,200,849	1,212,857	1,224,986	1,237,236	1,249,608	1,262,104	1,274,725	1,287,472
Barley	282,720	285,547	288,403	291,287	294,200	297,142	300,113	303,114	306,145	309,207	312,299
Other	521,371	526,584	531,850	537,169	542,540	547,966	553,445	558,980	564,570	570,215	575,918
Total	1,969,623	1,989,319	2,009,212	2,029,304	2,049,597	2,070,093	2,090,794	2,111,702	2,132,819	2,154,147	2,175,689
Russia											
Wheat	1,469,584	1,484,280	1,499,122	1,514,114	1,529,255	1,544,547	1,559,993	1,575,593	1,591,349	1,607,262	1,623,335
Barley	920,709	929,916	939,215	948,608	958,094	967,675	977,351	987,125	996,996	1,006,966	1,017,036
Other	860,505	869,111	877,802	886,580	895,445	904,400	913,444	922,578	931,804	941,122	950,533
Total	3,250,798	3,283,306	3,316,139	3,349,301	3,382,794	3,416,622	3,450,788	3,485,296	3,520,149	3,555,350	3,590,904
Grand Total Addressable Market (bushels)	20,485,176	20,690,028	20,896,928	21,105,898	21,316,956	21,530,126	21,745,427	21,962,882	22,182,510	22,404,336	22,628,379

GrainSense Patent Valuation August 5, 2014												
Income Method of Analysis												
Notes	(numbers in 1000s)	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
1	Grand Total Addressable Market (bushels)	20,485,176	20,690,028	20,896,928	21,105,898	21,316,956	21,530,126	21,745,427	21,962,882	22,182,510	22,404,336	22,628,379
2	Penetration Rate	0%	0%	0%	0%	1.0%	2.0%	3.0%	4.0%	5.0%	6.0%	7.0%
	Cumulative Penetration Rate	0%	0%	0%	0%	1.0%	3.0%	6.0%	10.0%	15.0%	21.0%	28.0%
	Penetration (Bushels)	0	0	0	0	213,170	430,603	652,363	878,515	1,109,126	1,344,260	1,583,987
3	WTP for Protein Sorting (\$)	\$0.057	\$0.059	\$0.060	\$0.062	\$0.064	\$0.066	\$0.068	\$0.070	\$0.072	\$0.074	\$0.076
	Conversion Rate (\$ to €)	0.740	0.740	0.740	0.740	0.740	0.740	0.740	0.740	0.740	0.740	0.740
	WTP for Protein Sorting (€)	€0.042	€0.043	€0.045	€0.046	€0.047	€0.049	€0.050	€0.052	€0.053	€0.055	€0.057
4	Bushel Payback Point					10,263	9,267	8,367	7,555	6,821	6,159	5,561
5	Maximum Measurable Bushels per GrainSense Device					2,126	2,083	2,041	2,001	1,960	1,921	1,883
	Ratio of Bushel Payback to Maximum Measurable Bushels					4.8	4.4	4.1	3.8	3.5	3.2	3.0
(actual numbers)												
	Number of GrainSense Devices Required					4,301	10,445	19,022	30,793	46,732	68,085	96,439
6	Retail Price of GrainSense					€ 1,700	€ 1,581	€ 1,470	€ 1,367	€ 1,272	€ 1,183	€ 1,100
7	Discount to Distributors					50%	50%	50%	50%	50%	50%	50%
	Revenues to GrainSense					€ 3,656,251	€ 8,256,670	€ 13,984,120	€ 21,052,944	€ 29,714,047	€ 40,260,762	€ 53,035,630
8	Operating Profit Margin - %					15%	15%	15%	15%	15%	15%	15%
	Operating Profit Margins - €					€ 548,438	€ 1,238,501	€ 2,097,618	€ 3,157,942	€ 4,457,107	€ 6,039,114	€ 7,955,345
9	Implied Royalty as Per 25% Rule					25%	25%	25%	25%	25%	25%	25%
10	Relief from Royalty Payments					€137,109	€309,625	€524,405	€789,485	€1,114,277	€1,509,779	€1,988,836
11	Patent Related Fees	€ 7,500	€ 7,500	€ 7,500	€ 7,500	€ 7,500	€ 7,500	€ 7,500	€ 7,500	€ 7,500	€ 7,500	€ 7,500
10	Net Relief from Royalties	(€7,500)	(€7,500)	(€7,500)	(€7,500)	€129,609	€302,125	€516,905	€781,985	€1,106,777	€1,502,279	€1,981,336
12	Discount Rate			20%								
	Pre-Risk Adjusted Net Present Value			€1,183,767								
13	Patent Risk Factor			45%								
	Risk Adjusted Net Present Value			€651,072								

Below is my analysis related to the notes included in the above Income Method:

Note 1 – Please see the table entitled Addressable Production of Targeted Commodities (bushels) on page 43.

Note 2 – IncreMental Advantage estimates. I understand that GrainSense will likely begin selling its devices far before 2018. However, I project that GrainSense will not have secured patent protection in all of the regions that it pursues until the beginning of 2018. Thus, any revenues generated before patents are secured cannot be attributed to the subject patent portfolio. Also, it is projected that the subject patents will not terminate until the 2033 timeframe. Nevertheless, I modeled that the patents will generate value only through 2024 because the useful life of farm equipment and machinery, according to the Internal Revenue Service (of the United States), is seven years.⁴⁹ Thus, the useful patent protected life of GrainSense would endure from 2018 through 2024.

Note 3 – In 2011, research was undertaken by David A. Hennessy (Professor, Department of Economics) and Ruiqing Miao (PhD Candidate) of Iowa State University. This research studied U.S. wheat farmers' willingness to pay (WTP) for near infrared (NIR) sensors that segregate wheat grains according to their protein concentration. The findings from this research showed that a typical wheat farmer's willingness to pay for such protein sorting was \$0.056 per bushel for hard red winter (HRW) wheat and \$0.048 per bushel for hard red spring (HRS) wheat.⁵⁰

In the analysis below I brought the willingness to pay (WTP) up to the present levels. In the above model, I increased the WTP by 3% in each successive year.

GrainSense Patent Valuation	
August 5, 2014	
Willingness to Pay (WTP) for Protein Analysis	
Year of Research	2011
Hard Red Winter	\$0.056
Hard Red Spring	\$0.048
Average (WTP, per bushel)	\$0.052
Annual Inflation Rate	3%
Years Since Study	3
Current WTP - Protein Sorting	\$0.057
Currency Conversion Rate (\$ to €)	0.74
Current WTP - Protein Sorting	€0.042

Note 4 – It seems to me that the anticipated price points of GrainSense are low enough that operators of large farms will not preform rigorous analysis of the payback from purchasing GrainSense devices. Once the merits of performing rapid and virtually cost-free protein measurement are understood—together with an understanding of the price sensitivity relating to protein content—GrainSense could become an impulse purchase for some farmers. Nevertheless, below is a rough payback analysis that some farmers might implicitly consider when contemplating the purchase of GrainSense.

⁴⁹ <http://www.irs.gov/publications/p225/ch07.html>

⁵⁰ http://ageconsearch.umn.edu/bitstream/103974/2/WheatProtein_AAEA_May3rd2011.pdf

GrainSense Patent Valuation	
August 5, 2014	
Bushel Payback Analysis	
Year (example)	2018
Retail Price of GrainSense	€ 1,700
Return-on-Investment Sought by Buyer	2
Years of Utilizing GrainSense	7
WTP per Bushel	€ 0.047
Bushels to Achieve Targeted	10,263
Return-on-Investment	

Note 5 – Due to the condensed window for harvesting wheat, barley and other targeted commodities, there is a very limited time to measure the related grain content. Thus, as farmers endeavor to optimize their output, they could encounter bottlenecks during the roughly seven optimum days per growing season in terms of having sufficient measuring devices available. According to my calculations, farmers will not be able to measure more than 42.5 acres of grains, or more than 2,126 bushels, per GrainSense device.

GrainSense Patent Valuation	
August 5, 2014	
Protein Measurement Bottleneck Analysis	
Notes	
	Square Meters per Hectare 10,000
1	Frequency of Measurement (Square Meters) 5,000
	Measurements per Hectare 2
	Hectares per Acre 2.47
	Measurements Per Acre 4.94
2	Bushels per Acre 50
3	Window for Measurement (days) 7
3	Hours per Day Worked During Peak Window 10
3	Measurements per Hour 3
	Measurements During Peak Window 210
	Acres Measured During Peak Window 42.5
	Bushels Measured During Peak Window 2,126

Note 1 – Taking one measurement per 5,000 square meters (or two measurements per hectare) is a very conservative estimate. It is not unreasonable to expect large farmers to take one measurement every 20 to 30 meters.

Note 2 – European production averages 59.6 bushels of wheat per acre while the United States is averaging 40 bushels per acre.^{51,52} Thus, I modeled in an average of 50 bushels per acre.

⁵¹

http://www.agweb.com/article/2013_average_yields_158.8_bu.acre_corn_43.3_bu.acre_soybeans_NAA_AgWebcom_Editors/

⁵² <http://www.wheatworld.org/wheat-info/fast-facts/>

Note 3 – Discussions with GrainSense management and IncreMental Advantage estimates.

Note 6 –While it is the intention of GrainSense to initially launch its device at €2,000 per unit, the goal is to reduce the price to €1,000 per unit. I modeled in that by 2018 unit prices will have fallen to €1,700 and will decline 7% annually thereafter. By way of comparison, Monsanto planned to launch its FieldScripts analytics program in Illinois, Indiana, Iowa and Minnesota in 2014 at a price of roughly \$10 per acre.⁵³ Based on my attempt to determine the cost to deploy GrainSense per acre, it seems that the unit cost of €1,700 seems reasonable.

GrainSense Patent Valuation			
August 5, 2014			
GrainSense & FieldScripts Cost per Acre Analysis			
GrainSense Price (2018)	€ 1,700	FieldScripts - Cost per Acre	\$10.00
Acres Measured During Peak Window	42.5	Conversion Ratio (\$ to €)	0.74
Multiple of Acres Measured During Non-Peak	5	FieldScripts - Cost per Acre	€7.40
Total Acres Measures (Yr.)	213		
Investment per Acre with GrainSense	€8.00		

Note 7 – IncreMental Advantage estimates.

Note 8 – My estimate of a 15% operating profit margin for GrainSense seems reasonable in light of the combined three-year average operating profit margin for Trimble Navigation and Monsanto amounting to 16.8%.

GrainSense Patent Valuation				
August 5, 2014				
Comparative Profitability Analysis				
Trimble Navigation				
Period Ending	2011	2012	2014	
Revenues	\$1,644,065	\$2,040,113	\$2,288,124	
Operating Profits	\$156,402	\$212,586	\$251,737	
Operating Profit Margin (OPM)	9.5%	10.4%	11.0%	
Three-Year Average OPM		10.7%		
Monsanto				
Period Ending	2011	2012	2014	
Revenues	\$11,822,200	\$13,504,000	\$14,861,000	
Operating Profits	\$2,502,000	\$3,148,000	\$3,570,000	
Operating Profit Margin (OPM)	21.2%	23.3%	24.0%	
Three-Year Average OPM		22.8%		
Three Years Average OPM - Trimble		16.8%		
Navigation and Monsanto				

⁵³ <http://www.kansas.com/2013/11/10/3107890/duPont-deere-launch-precision.html#storylink=cpy>

Note 9 – In arriving at an apportionment of GrainSense’s profit attributable to its patents, I relied on the well-established and oft-cited 25% Rule.⁵⁴ The 25% Rule holds that the patent-holder is entitled to 25% of the earnings that a commercializer derives from selling products that incorporate the patented feature. This is tantamount to stating that 25% of the success of a product is due to its corresponding patents.

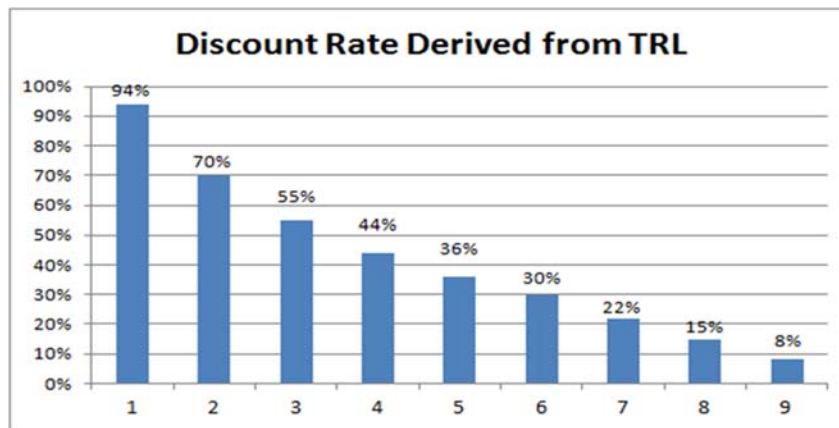
Note 10 – The Relief from Royalty Method is a suitable paradigm when—in situations like the one at hand—no royalties will be paid. The Relief from Royalty Method holds that the value of a patent is the relief the owner of that patent derives by not having to pay another entity a royalty had that other entity been the patent owner. (Here, I am deeming GrainSense to be the patent owner.) Had another entity owned the GrainSense patents, GrainSense would have had to pay that entity for the use of the subject patents. These annual royalty savings accrue to the benefit of GrainSense. However, had another entity owned the GrainSense patents, that entity would have had to pay for the patent related expenses (see Note 11). Thus, the net value of the relief that GrainSense is realizing is the imputed annual royalty payments minus the patent related expenses.

Note 11 – IncreMental Advantage estimates for the anticipated patent filing, prosecution and maintenance / annuity payments with the five targeted patent filing authorities (i.e. those located in Europe, the United States, Canada, Australia, and perhaps Russia). As per the Non-Binding Term-Sheet, GrainSense is responsible for reimbursing VTT for its out-of-pocket patent related disbursements and an additional 20% of VTT’s internal administration fee.

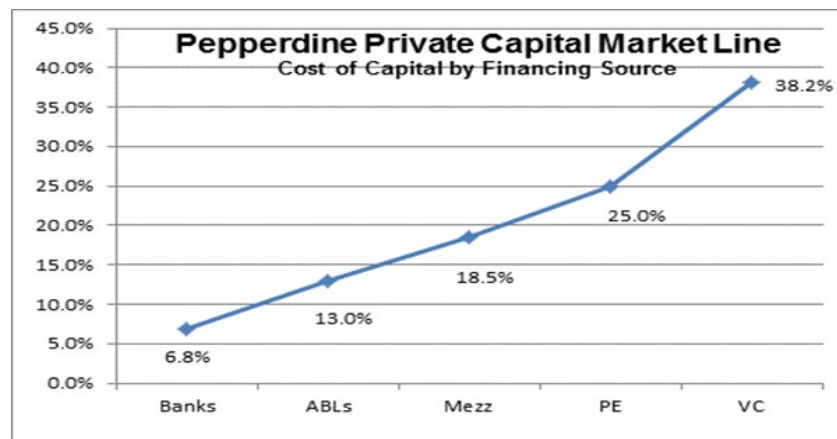
Note 12 – At its early stage of development, GrainSense would normally deserve an extremely high discount rate. One could begin the discount rate analysis by relying on guidance provided by The National Aeronautics and Space Administration’s (“NASA”) Technology Readiness Levels (“TRLs”). NASA uses nine TRLs to indicate where its various projects are in the commercialization process. I converted the TRL schedule into a schedule of discount rates. (The slope of the discount rates imputed on the chart below approximates guidance provided by the American Institute for Certified Public Accountants in terms of discounts that should be applied to pharmaceuticals making their way through the Food and Drug Administration’s approval process. I have submitted this schedule of discount rates for peer review to many sessions of the Valuation of Emerging Technologies course that I teach on behalf of The Business Development Academy.)

NASA TRL	Definition
1	Basic principles observed and reported
2	Technology concept and/or application formulated
3	Analytical and experimental critical function and/or characteristic proof-of-concept
4	Component and/or subsystem validation in laboratory environment
5	Component and/or subsystem validation in relevant environment
6	System/subsystem model or prototype demonstration in a relevant environment
7	System prototype demonstration in an operational environment
8	Actual system completed and "mission qualified" through test and demonstration in an operational environment
9	Actual system "mission proven" through successful mission operations

⁵⁴ The 25% Rule is based on royalty rate analysis conducted in the 1950s and championed by the late Robert Goldscheider. Richard Razgaitis has called it the “most famous heuristic, or rule of thumb, for licensing valuation.” Despite the *Uniloc v. Microsoft*⁵⁴ decision, the 25% Rule is still a legitimate starting point for apportionment.



It is my opinion that at GrainSense's current stage of development, it warrants a TRL score of 5. Thus, the TRL analysis suggests that a discount rate of 36% is appropriate. This discount rate approximates the appropriate discount rate as per the Pepperdine Private Capital Market Line Survey.



According to a recent Pepperdine Private Capital Market Line Survey, venture capitalists seek a 38% return on their investments. I believe that at its current stage of development, GrainSense would only be successful in soliciting funding from venture capitalists. Thus, a 36% preliminary cost of capital is reasonable.

However, I am reducing this discount rate to 20% because I factored in many other risk variables elsewhere in the model. For instance, I am assuming that:

- Patents will not be granted until 2018.
- There is some uncertainty as to whether patents will be pursued in Russia and the Ukraine.
- In some targeted markets there is significant risk of patent infringement.
- Revenues related to the subject patents will cease in 2025.
- Penetration rates and unit sales estimates are conservative.
- A very substantial Patent Risk Factor was applied (see Note 12).

Note 13 - Please see Patent Analysis beginning on page 50.

ANALYSIS OF THE GRAINSENSE PATENT PORTFOLIO

Below is my analysis of the GrainSense Patent Portfolio, as defined below as well as illustrated on Exhibit A. This analysis is reflected in discounts applied in the Income Methods of Valuation. (See Note 13 on page 49.) These patents applications have been scrutinized with The Patent Valuation Gauntlet™.

To summarize, I believe the subject patent applications were well written by a very qualified patent lawyer and patent engineer, have broad claims, and have high sustainability in opposition scores. Should infringement eventually occur, such detection would be relatively easy. However, among my concerns relative to the subject patent applications are the relatively recent priority dates and the “X’s” and “Y’s” cited by the patent examiners regarding prior art concerns.

Summary of Patent Family The abstracts for the three subject patent applications are provided below:

Patent Number: WO 2014080322

Title: An optical sampling apparatus and method for utilizing the sampling apparatus

Abbreviated Abstract: Method for measuring a chemical composition of a sample, optical measuring apparatus, and method for measuring a chemical composition of a sample

Patent Number: PCT/IB2013/060139

Title: Optical analyzer, optical analyzing method and sample preparation device

Abstract: Optical analyzer comprises an optically integrating cavity, the optically integrating cavity formed by at least one optical light diffusing wall and adapted to contain a sample of a solid agricultural product, the sample consisting of one or more sample elements, a light source, emitting light into the optically integrating cavity, whereas at least one optical light diffusing wall is utilized to convert emitted light to diffused light, whereas the sample at least partially or completely converts the diffused light to spectrally filtered light and a spectral sensor. The sample is confined in the optically integrating cavity while the spectral sensor is being exposed to the spectrally filtered light. This patent application has independent claims also for optical analyzing method and sample preparation device.

Patent Number: EP14151756.5

Title: Grain sampling wheel, optical analyzer with a grain sampling wheel, grain processing

Abstract: Grain sampling wheel is characterized in that the grain sampling wheel constitutes a gas-pressured singulation wheel having at least one sample opening adapted to receive a single grain by the means of suction. The patent application has independent patent claims for an optical analyzer, grain processing machine and grain analysis method.

Patented Subject Matter The following are among the objects of the invention described on the WO/2014/080322 patent application:

- The objects of the invention are achieved by a measurement apparatus where liquid or particulate samples, in particular, a continuous stream of powder, flows through an integrating cavity in such a way that the sample is “optically thin”.
- Another object of the invention is the measurement of granules having a size and absorption that bear a hidden mass effect already within a single sample element, such as a kernel of maize. Such granules vary in size, shape and consistency
- Another advantage of the invention is that the integrating cavity can be made large enough so that in many applications virtually 100% of the sample, in particular the powder stream can be conveyed through or brought into the measurement cavity (save some minor sample loss mechanisms like dust etc.). Another advantage is that virtually 100% of the sample material present in the cavity at any moment is optically probed and analyzed. Singularly and especially in combination, the last two advantages mean that the measurement can be fully representative.

The following are among the objects of the invention described on the PCT/IB2013/060139 patent application:

- One aim of the invention is to reduce the amount of sample necessary to give a reliable measurement result.
- Another aim of the invention is to teach a handheld optical analyzer, which can be taken to agricultural production areas.

The following are among the objects of the invention described on the EP14151756.5 patent application:

- One aim of the invention is to improve upon current sampling problems in general.
- Another aim of the invention is to improve upon real time grain monitoring during processing and/or harvesting.
- Yet another aim of the invention is to optimize the real-time measuring. But at the same time the reliability of the measurement results needs to be improved, in particular by ensuring a well-defined sampling.
- Yet another aim of the invention is to generate histogram results, which include incremental data from sequentially analyzed single grains to the already acquired data.
- This patent application also describes a feeding mechanism for the measurement device, e.g. in a combine harvester.

Impact of Novelty Analysis As discussed earlier in this report, the subject patent families address an important and useful invention. There is a tremendous amount of price sensitivity associated with placing grains in their appropriate classifications. There does not currently exist another means of measuring the protein content of grains and other commodities from the convenience of a handheld device. In addition to the higher revenue that farmers may realize from the more accurate classification of their commodities, the patent pending inventions are expected to enable farmers to better manage their crops by, for example, more intelligent allocation of fertilizers and irrigation.

There were low numbers of references for the WO/2014/080322 and PCT/IB2013/060139 patent applications. In the former application, there were five patents and two non-patent pieces of prior art cited and for the latter application there were four patents cited as prior art. The low incidence of references suggests novelty. However, the WO/2014/080322 patent application is tenuously connected to a relatively late priority date of November 20, 2012. The patent application (FI20126214) with this priority date was abandoned.

Abstract Analysis The subject patent abstracts were well-written. Below are the five most common reasons for the USPTO objecting to abstracts together with commentary regarding the subject abstracts⁵⁵.

Reason for USPTO Objection	Commentary Relative to Subject Patent Abstract
The Abstract is not on a separate sheet.	The subject Abstracts are on a separate sheets.
The Abstract is too long/too short.	The subject Abstracts are between 50 and 150 words and do not exceed 15 lines.
The Abstract includes improper language.	The Abstracts are clearly written. They do not include the phraseology commonly found in claims. The Abstracts avoid phrases that can be implied.
The Abstract is non-narrative/non-descriptive.	The Abstracts efficiently describe the disclosed subject matter and encompass what is believed to be novel. The Abstracts neither discuss purported merits or speculative applications of the disclosed inventions nor do they compare the inventions with prior art.
The Abstract is more than one paragraph.	The Abstracts are one paragraph.

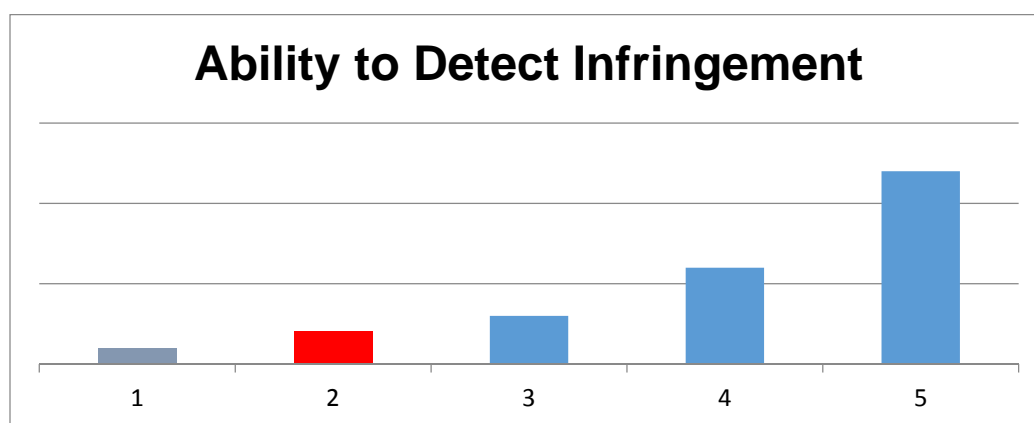
⁵⁵ <http://patentablydefined.com/2009/09/28/patent-abstracts-common-problems-with-them-and-tips-for-drafting-a-better-abstract/>

Patent Expiration Analysis Based on the filing dates for the subject patent applications, the resulting patents (should they issue) should endure until the 2033 / 2034 timeframe. This timeframe could be extended if there are delays during prosecution or could be reduced if there are terminal disclaimer issues.

Design-Around Risk I believe that it would be difficult to design-around the subject patent applications as there is a little prior art and the claims (as they now stand) are broad. Further, only one of the subject patent applications (WO/2014/080322) has been published and that only occurred on May 30, 2014.

Opposition Analysis In its Non-Binding License Term Sheet, VTT warranted that up until June 24, 2014 the validity of the WO/2014/080322 patent application had not been challenged. As the other patent applications have not been published, they have not been challenged either.

Infringement Detection Analysis I believe the ability to detect infringement of the subject patents rates a "2" as per the chart below.



Level	Explanation
1	The invention be detected without possessing an accused device.
2	The invention can be detected easily with typical consumer use of an accused device.
3	The invention can be detected with commonly available test equipment and technicians, but no significant expense.
4	The invention be detected only with specialized, uncommon test equipment or inordinately expensive procedures.
5	The invention can only be detected by the admission of an accused infringer.

Likelihood of Infringement Analysis It is not believed that the subject patent applications are currently being infringed.

Presumption of Validity Analysis Presumption of validity analysis is premature.

Prosecution History Analysis The patent prosecution process has the most bearing on patent value in the United States. In some countries, such as Germany, a patent's prosecution has essentially no impact

on its value.⁵⁶ The subject patent applications are now beginning the prosecution process. As for the WO/2014/080322 patent application, claims 1 and 11 have been clarified. The examiner stated that claims 2-10, 12-24, 26 and 27 do not meet the PCT requirements for novelty and/or inventive step. The patent examiner also noted that contrary to a PCT rule, background art was not mentioned in the description.

Forward Citation Analysis Forward citation analysis is premature.

Enforceability As the subject patent portfolio consists solely of patent applications, patent enforceability analysis is premature. While the WO/2014/080322 patent application was published on May 30, 2014, it cannot be presumed that it will be possible to assert against any possible infringers going back to the date of publication because it is possible that the variance in the published versus the issued claims could be too divergent.

Sustainability in Opposition The GrainSense patent portfolio deserves the highest sustainability in opposition score since there is only one inventor listed on the subject patent applications. In other words, since there is only one inventor listed on the patent applications there is no risk of conflicting depositions during any possible attempts to invalidate the presumptive patents. Because only one inventor could be deposed in connection with invalidity attempts, there is minimal risk of the divulging of compromising statements.

Chain of Title Analysis In the Non-Binding License Term Sheet, VTT warrants that it is the owner of the subject patent portfolio. According to Finnish law on the Right in Employee Inventions, an employee has an obligation to inform the employer about inventions, and the employer has the right to acquire rights of the employee's inventions, so long as the invention is in the field of employer's activities. VTT has notified Inventor Marbach that it will trigger this Finnish law and will thus acquire the rights to the subject inventions. Thus, I do not believe that there is any chain of title risk since there are no other assignments other than the one from Inventor Marbach to VTT. Chain of title analysis is important because there is a high correlation between patent assignments and litigation.⁵⁷

Inequitable Conduct Risk Inequitable conduct risk analysis is premature.

Prior Art Analysis With respect to the WO/2014/080322 patent application, three patents and one non-patent piece of prior art were scored "X", indicating that the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone. With respect to the PCT/IB2013/060139 patent application, two patents were scored "X" while three patent were scored "Y", indicating that the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. The now abandoned patent application also scored one "X".

Translation Error Risk There are very low translation error risks associated with the subject patent applications as they were drafted and prosecuted in English. However, it is conceivable that because Inventor Marbach's mother language is German and Mssrs. Sallinen's and Väisänen's mother language is Finnish, there could have been misunderstandings in the communication between the inventor and the patent lawyers.

⁵⁶ True Patent Value: Defining Quality in Patents and Patent Portfolios, Larry M. Goldstein, page 15.

⁵⁷ Bessen, James (2008) "The value of U.S. patents by owner and patent characteristics," Research Policy, 37, pp. 932-45.

Title Analysis The titles of the subject patent applications “An optical sampling apparatus and method for utilizing the sampling apparatus”; “Optical analyzer, optical analyzing method and sample preparation device”; and, “Grain sampling wheel, optical analyzer with a grain sampling wheel, grain processing” are moderately clear and descriptive. Thus, it is reasonable to believe that the patents will be reviewed by examiners in the appropriate art units. Also, the titles of the patent applications score satisfactory in terms of putting potential infringers on notice as to the content of the patents.

Analysis of the Summary of the Invention The Background of the Invention and Brief Description of the Invention sections of the U.S. patents were well-written summaries of the claimed invention (and should be relatively understandable to members of juries). Definitions of technical terms were not placed in the Background which is positive as it indicates sound patent drafting

Description Analysis The description of the invention was thorough and satisfactorily-written. I believe the best mode requirement was adequately addressed. The teachings contained in the description did not exceed the scope of the claims which is accretive to patent value since no proprietary knowledge was divulged other than in the claims.

Drawings Analysis The WO/2014/080322 patent application contained 12 figures on six pages; the PCT/IB2013/060139 patent application contained eight figures on four pages while the EP14151756.5 patent application contained six figures on four pages. These drawings support the descriptions. The drawings are well-labeled and I did not see any “not shown” statements relative to claimed elements. The quantity and quality of drawings should enhance patent value in that—should the anticipated patents encounter invalidity challenges and to the extent to which there were oversights in claiming the inventions—the drawings may provide clarity as to what the intended claimed inventions were.

Claims Analysis It is reasonable to believe that the claims counts and claims scopes could be reduced during prosecution which is just now getting underway. For instance, it appears that there will be a restriction requirement and then a divisional of the PCT/IB2013/060139 patent application since the examiner holds that that patent application contains two distinct inventions.

When initially submitted for examination, the WO/2014/080322 patent application contained 27 claims, three of which were independent and 24 of which were dependent claims. Of the three independent claims, two were methods claims and one was a mechanical claim.

When initially submitted for examination, the PCT/IB2013/060139 patent application contained 38 claims, three of which were independent and 35 of which were dependent claims. Of the three independent claims, two were apparatus claims and one was a methods claim.

When initially submitted for examination, the EP14151756.5 patent application contained 15 claims, four of which were independent and 11 of which were dependent claims. Of the four independent claims, three were apparatus claims and one was a methods claim.

Further:

- The claims were concise and well-written.
- I believe that covering the inventions with multiple claims will yield more strength to the patent applications as more infringers can be ensnared by the claims and each of the claims, subject to VTT

approval, could be licensed out to different licensees. Also, the dependent claims add strength to patents since they add clarity to the inventions and since dependent claims can become independent claims if their related independent claims are cancelled. Further, there was a very high incidence of the dependent claims referencing multiple dependent claims above which accrues to claims strength.

- The claims have relatively few embodiments. The most embodiments that the WO/2014/080322 patent application has is six (Claim 11 as originally filed). Having a relatively small number of embodiments renders patents easier to infringe since infringement must occur across all of the embodiments associated with a particular claim.
- When used, the preambles were concise. The preamble of the PCT/IB2013/060139 patent application used the transitory word “comprising” which usually is indicative of broad claims scope.
- The claims were supported by the descriptions.
- There is consistency between the claims and the descriptions in terms of terminology and scope.
- The claims appear to be in proper formats and appear to meet statutory standards. The claims appear to be properly dependent.
- I did not see comparative words used in the claims.
- In general the claims do not appear to have unnecessary limitations.
- I did not see the use of adjectives or adverbs used in the claims to any extent.
- I did not see the use of trade-names, identified as such, in the claims.
- I did not encounter the phrases “in this invention” or “in the present invention” in the subject patent applications which accrues to claims strength. Such phrases may be used by a court to limit the scope of the patent.
- I do not believe that the patent applications have shifting terminology risks. Shifting terminology risks arise when a claim uses two phrases for the same idea, or one phrase for two different ideas, in a way that makes understanding of the claim difficult or even impossible.
- I believe that the usage of the key terms are in keeping with industry standards. This clarity is positive for comprehension and interpretation.

Classification Analysis The WO/2014/080322 patent application was classified into three cooperative classification codes. This indicates that there is not a great deal of potential to deploy the technology covered by the aforementioned patent application beyond the agriculture space. However, classification codes are not a terribly reliable indicator of patent value because such codes are usually determined by junior patent office clerks.

Encumbrance Analysis To my knowledge and as intimated by the Non-Binding License Term Sheet, there are no encumbrances—such as prior licenses; settlements; covenants not to sue; obligations under licensing to standards programs; or, liens—placed on the subject patent portfolio.

Technology Cogency Analysis Technology cogency holds that the more inventors listed on the patent, the stronger and more persistent the underlying science becomes. As there is only one inventor listed on each of the subject patents, those patents have low Technology Cogency scores.

Inventor Analysis Based on the information that I was able to locate, Ralf Marbach, the sole inventor on all of the subject patent applications, has had success as an inventor. His patented inventions date back to a filing date of August 8, 2003. His previous four patents, illustrated below, have garnered an impressive 50 forward citations.

GrainSense Patent Valuation				
August 5, 2014				
Inventor Ralf Marbach's Previous Patented Inventions				
Publication Number	Year of Publication / Issued	Patent Title	Relevance to Subject Patent Portfolio*	Citations
7,139,076	2006	Stable optical diffuse reflection measurement	Potentially Relevant	8
6,674,526	2004	Methods and apparatus for improving the long-term stability of spectroscopic quantitative analyses	Relevant	1
6,629,041	2003	Methods to significantly reduce the calibration cost of multichannel measurement instruments	Highly Relevant	6
6,571,117	2003	Capillary sweet spot imaging for improving the tracking accuracy and SNR of noninvasive blood analysis methods	Not Relevant	35
*As reported by Ralf Marbach				

Prosecuting Lawyer Analysis The current prosecuting patent lawyer is Jaakko Väisänen. Mr. Väisänen seems to be a very qualified patent lawyer. For the past seven years, he has represented clients in all intellectual property rights matters before the European, German and Finnish Patent and Trademark Offices, German Federal Patent Court, and before the Office for Harmonization of the Internal Market in Alicante, Spain. Prior to Mr. Väisänen opening his eponymous law firm, he was a patent engineer and patent counsellor for more than 11 years, including being employed by Nokia and Siemens. In addition to his being trained as a patent lawyer, Mr. Väisänen earned a degree in physics from Helsinki University of Technology.

Also involved in the patenting process is Timo Sallinen, a patent engineer at VTT. Mr. Sallinen was educated as a physicist and began his career as an optical researcher in 1990. For almost 25 years, Mr.

Sallinen has been involved in research, patent management, and patent engineering for companies as large as Nokia.

Patent Examiner Analysis For the pursuit of patents under the Patent Cooperation Treaty, I do not have sufficient information to perform such analysis. Patent Examiner Analysis is premature with respect to patent applications filed with the United States Patent and Trademark Office.

Patent Family Analysis The initial patent application, FI20126214, from which priority was claimed was abandoned. However, it is my understanding that it is possible that the fact that the Finnish patent examiner held that none of the 24 claims (as initially submitted on the FI20126214 filing) met the requirements for inventive step, the abandoned parent application could affect the status of descendent patents. It appears that there will be a restriction requirement and then a divisional of the PCT/IB2013/060139 patent application since the examiner holds that that patent application contains two distinct inventions. It is currently envisioned that the subject patent applications will be filed with five patent authorities (those in Europe, the USA, Canada, Australia and perhaps Russia / Ukraine). Of course, it is conceivable that continuations and continuations-in-part will be pursued. As the patent portfolio now stands, I am not concerned about vulnerabilities associated with these emerging patent families.

Patent Portfolio Analysis The GrainSense patent portfolio is small but adequate to cover the targeted technologies. Since assertion and inoculation against potential counter-assertion are not the modus operandi of GrainSense, the patent portfolio need not be larger than it is.

Patent Risk Factor Statistics are not available for allowance rates in all jurisdictions. However, the United States Patent and Trademark Office reports that the allowance rate (inclusive of Requests for Continued Examination) is 52.1% thus far into fiscal year (beginning November 1) 2014. In view of this level of allowance, and in consideration of the Patent Analysis above, I believe a Patent Risk Factor of 45% is appropriate.

CONCLUSION OF VALUATION

Below is a summary of the valuations that resulted from employing the Cost, Market Comparables and Income Methods of Valuation. The Conclusions of Value for the Cost and Market Methods were substantially the same (roughly €1.4 million). The Valuation resulting from the Income Method was much lower (€700,000) but important in that it addresses the commercial opportunities afforded by the subject patents going forward. I weighted the calculated valuations under the Cost, Market Comparables and Income Methods equally because the comparability and the reliability of information was roughly similar in all of the aforementioned methodologies.

I have conducted an analysis of the GrainSense patent portfolio (as encapsulated in Exhibit A) and my conclusion is that the subject patent portfolio had a Fair Market Value of €1.1 million as of August 5, 2014.

GrainSense Patent Valuation August 5, 2014 Summary of Conclusions of Value					
Methodology	Calculated Value	Rounded Value	Instant Weighting	Methodology Weighting	
Cost Method	€1,417,463	€1,400,000		1	
Market Method	€1,349,519	€1,350,000		1	
Assertion Method	€717,503	€700,000		1	
Pioneer Hi-Bred v. Holden Foundation	€ 62,532,764	€ 62,500,000	1		
Pioneer Hi-Bred v. Cargill	€ 338,368,872	€ 338,000,000	1		
Pioneer Hi-Bred, Monsanto and LG Seeds v. DNB Group	€ 29,600,000	€ 29,600,000	1		
Acquisitions Method	€1,881,419	€1,900,000		1	
Precision Planting	€ 1,881,419	€ 1,900,000	1		
The Climate Corporation	€ 103,746,812	€ 103,700,000	0		
Publicly-Traded Method	€1,083,555	€1,100,000		1	
Trimble Navigation	€ 1,083,555	€ 1,100,000	1		
Venture Capital Method	€1,715,597	€1,700,000		1	
Blue River Technology	€ 2,797,780	€ 2,800,000	1		
Conservis	€ 1,692,675	€ 1,700,000	1		
Granular	€ 656,337	€ 700,000	1		
Income Method	€651,072	€700,000		1	
Conclusion of Value Based on a Variety of Weighted Average Methods	€1,139,351	€1,100,000			

EXHIBIT A

SUMMARY OF THE GRAINSENSE PATENT PORTFOLIO

GrainSense Patent Valuation				
August 5, 2014				
Summary of the GrainSense Patent Portfolio				
Patent Number	Filing Date	Publication Date	Title	Disposition to GrainSense
WO/2014/080322 (PCT/IB2013/060140)	November 14, 2013	May 30, 2014	An optical sampling apparatus and method for utilizing the sampling apparatus	Exclusive license to the "Agricultural field, farm and laboratory based measurements" field-of-use
PCT/IB2013/060139	November 14, 2013	NA	Optical analyzer, optical analyzing method and sample preparation device	To be transferred to GrainSense
EP14151756.5	January 20, 2014	NA	Grain sampling wheel, optical analyzer with a grain sampling wheel, grain processing	To be transferred to GrainSense

EXHIBIT B**AN EXAMPLE OF WHEAT CLASSIFICATION****Wheat Classification in the United States**

Wheat is the principal food grain produced in the United States. Wheat varieties grown in the United States are classified as “winter wheat” or “spring wheat,” depending on the season when each is planted. Winter wheat production represents 70-80 percent of total U.S. production. Winter wheat varieties are sown in the fall and usually become established before going into dormancy when cold weather arrives. In the spring, plants resume growth and grow rapidly until summertime harvest. In the Northern Plains, where winters are harsh, spring wheat and durum wheat are planted in the spring and harvested in the late summer or fall of the same year.

The five major classes of U.S. wheat are hard red winter, hard red spring, soft red winter, white, and durum. Each class has a somewhat different end use and production tends to be region-specific.

- Hard red winter (HRW) wheat accounts for about 40 percent of total production and is grown primarily in the Great Plains (Texas north through Montana). HRW is principally used to make bread flour.
- Hard red spring (HRS) wheat accounts for about 20 percent of production and is grown primarily in the Northern Plains (North Dakota, Montana, Minnesota, and South Dakota). HRS wheat is valued for high protein levels, which make it suitable for specialty breads and blending with lower protein wheat.
- Soft red winter (SRW) wheat, accounting for 15-20 percent of total production, is grown primarily in States along the Mississippi River and in the Eastern States. Flour produced from milling SRW is used in the United States for cakes, cookies, and crackers.
- White wheat, accounting for 10-15 percent of total production, is grown in Washington, Oregon, Idaho, Michigan, and New York, and its flour is used for noodle products, crackers, cereals, and white-crust breads.
- Durum wheat, accounting for 3-5 percent of total production, is grown primarily in North Dakota and Montana and is used in the production of pasta.

Further, wheat milling byproducts—such as bran (outer seed coat of a wheat kernel), shorts (more inward layers of the seed coat that contain some starchy or floury components), and middlings (an intermediate fraction that consists of a combination of bran and shorts)—are used by feed manufacturers in the production of animal feeds.

GrainSense Patent Valuation				
August 5, 2014				
U.S. Wheat Classes				
Class	2011 Production, in Bushels	Location Produced	Uses	
Hard Red Winter	780 million	Great Plains (TX to MT)	Bread flour	
Hard Red Spring	398 million	Northern Plains (ND, MT, MN, SD)	High-protein blending	
Soft Red Winter	458 million	Eastern States	Cakes, cookies, crackers	
White	314 million	WA, OR, ID, MI, NY	Flour for noodles, crackers, cereals	
Durum	50 million	ND, MT	Pasta	

EXHIBIT C**Apportionment Considerations**

The following are intangible assets to which enterprise value may be apportioned.

GrainSense Patent Valuation									
August 5, 2014									
Apportionment Considerations									
• Management					• Switching Costs				
• Workforce					• Restrictive Contracts				
• Non-Compete Agreements					• Regulatory Approvals				
• Quality of Investors					• Network Effects				
• Brand Equity					• Trade Secrets				
• Trademarks					• Economies of Scale				
• Servicemarks					• Domain Name				
• Customer Relationships					• Bottlenecks				
• Data Exhaust					• Copyrights				

EXHIBIT D**VENTURE CAPITAL INVESTMENT IN AGRICULTURE COMPANIES**

There is certainly a great deal of capital being directed to agriculture-oriented companies. The following is a sampling of the venture capital and private equity funds as well as crowdfunding platforms that direct (part of) their investments to the agriculture space:

7-Ventures was launched by Dallas-based convenience store chain 7-Eleven. This new venture capital arm will to invest in food, food tech and retail technology startups. 7-Ventures has made two investments to date, including one in an undisclosed coffee company and one in customer loyalty and marketing platform Belly.

African Agricultural Capital (AAC) was established in 2004 with the vision of creating an investment vehicle for channeling finance to small and medium-sized enterprises (SMEs) in agricultural value chains. AAC was capitalized in 2005 to take advantage of these opportunities with funding from Gatsby, Rockefeller and Volksvermogen of Belgium. By April 2009, AAC had invested its initial capital of \$8 million in a portfolio of 16 businesses across East Africa. Investees cover the whole value chain, from seed sellers to service companies whose certification schemes increase the value of other agribusinesses.

African Seed Investment Fund is a fund managed by Pearl Capital Partners (PCP) which is focused on seed businesses in eight countries across eastern and southern Africa. This fund had initial investable funds of \$12 million but in 2011 PCP closed an additional fund of \$25 million, with investment from Gatsby, Rockefeller, the Bill and Melinda Gates Foundation, and JP Morgan's Social Finance unit. The new African Agricultural Capital Fund will follow the initial fund's strategy, with the primary purpose of investing in small and medium-sized agribusinesses in Africa.⁵⁸

AgFunder launched in September 2013 to bring transparency and accelerated deal flow to the \$6.4 trillion global food and agriculture industry by making it easy to syndicate agricultural investment opportunities. Through its platform, agriculture, ag tech and food processing startups with a lead investor can raise capital from accredited investors. AgFunder sources its own investments and then creates a dedicated investment fund for each company into which it can then syndicate investors. AgFunder's investments range between \$500,000 to \$1.5 million.

AgTech Innovation Fund is a \$50 million venture capital fund that is being organized in Davis, California to invest in early-stage agriculture and life science technology companies. This fund will likely invest \$250,000 to \$500,000 in initial seed rounds of funding into promising companies, and then the fund would be prepared to make a couple of follow-up investments into those companies should they become successful.

Anterra Capital is a Netherlands-based independent growth capital fund that invests in fast growing companies working to improve the global food supply chain. Its areas of focus span the entire supply chain, including everything from novel agro inputs and precision farming to smarter logistics and consumer safety. Anterra target investments of €2 million to €12 million and acts as the lead investor, taking a significant minority equity position. Formed in 2013 from the spin-out of Rabobank's proprietary

⁵⁸ <http://www.gatsby.org.uk/en/Africa/Projects/Venture-Capital-for-African-Agriculture.aspx>

food and agriculture venture capital fund Rabo Ventures, today it is backed by Moonray Investors and Rabobank Private Equity.

Aqua-Spark is a new global investment fund based in the Netherlands. Aqua-Spark makes investments of €250,000 to €5,000,000 in small-to-medium sized sustainable aquaculture businesses around the world. The fund seeks to be a minority investor in the businesses it supports, holding between 20 to 49 percent.

Arthur Ventures Growth Fund II is a North Dakota-based fund that raised a \$45 million round in 2013 to invest in a variety of sectors, including agriculture, energy, enterprise technology and web-enabled services and healthcare. Its investments in early-stage companies range from \$250,000 to \$3 million, with most falling between \$1 million and \$2 million.

Cultivian Sandbox is a newly launched venture capital fund investing in next-generation disruptive agriculture and food technology companies. A partnership between Cultivan Ventures and Sandbox Industries, the Chicago-based investment fund and incubator launched by Monsanto Co. alums, it closed its first tranche in May 2013, raising about \$70 million with plans to raise a total of \$150 million. Its areas of investment include: animal health and protein production, crop production (including robotics and precision agriculture), food safety, cleantech and water technologies.

Fair Foods Fund is an impact capital fund that provides financing and business assistance to food systems entrepreneurs. Fair Foods Fund makes investments that are focused on the middle of the supply chain, including: aggregation, storage or distribution of local food; value-added processing or marketing of local food; and information technology that benefits small- and mid-sized farms. It focuses on subordinated debt and royalty financing, with target deal size ranging from \$50,000 to \$500,000 and may be offered as a stand-alone investment or as part of a larger financing package.

Finistere II Fund, based in San Diego, California is focused on agricultural technology at the nexus of the food agricultural productivity and sustainability in food, alternative energy, human and animal health, and the digital technology sectors.

GreenSoil Investments is a Canadian venture fund dedicated to investing in Israeli food and agriculture startups. It has raised \$26 million. The fund has invested in five companies, three of which were made through its new fund, including Phenome Networks, TIPPA, Fruitura Bioscience Ltd, EcoFer and Rootility.

NextFarm Accelerator is a business accelerator program that aims to support agriculture startups and promote the development of sustainable sources of food for a growing global population.

Omnivore® Partners is a venture fund investing in early stage agriculture and food technology companies in India.

Rural Hub is Italy's first-ever rural innovation incubator and was launched with a 1.2 million euro grant from the government. Rural Hub is an incubator that offers rural food and agriculture startups mentorship, project financing and connections with venture capitalists.

Sarathi Angel Fund, based in Mumbai, is a not-for-profit angel platform to provide funds to startups focused on agriculture and food processing, consumer, cleantech, e-commerce and information technology, healthcare and media.

APPENDIX A**PATENT VALUATION GAUNTLET™ DISCLAIMER**

1. As part of my analysis in preparing this Patent Valuation Report, I utilized the Patent Valuation Gauntlet™.
2. Information about the Patent Valuation Gauntlet™ is available [here](http://www.patentvaluationgauntlet.com) (www.patentvaluationgauntlet.com).
3. As of the date of this Patent Valuation Report, I was a Certified Patent Valuation Analyst in good standing. I lawfully obtained a license to use the Patent Valuation Gauntlet™.
4. While the Patent Valuation Gauntlet™ contains a wealth of issues to consider when preparing a Patent Valuation Report, the analyst is constrained by time and budget as to the number and detail with which such issues can be considered. The selection of issues contained in the Patent Valuation Gauntlet™ is left to the discretion of the analyst and will vary from one report to another and from one analyst to another. The relevance, interpretation and perspective of any of the issues contained in the Patent Valuation Gauntlet™ is subject to the judgment of the Certified Patent Valuation Analyst preparing the subject Patent Valuation Report.
5. No liability whatsoever for the use, non-use, completeness, or perceived misuse of the Patent Valuation Gauntlet™ is in any way assumed by the creators or promoters of the Patent Valuation Gauntlet™.

APPENDIX B
ASSUMPTIONS AND LIMITING CONDITIONS

1. Information, estimates, and opinions contained in this report are obtained from sources considered to be reliable. We have not independently verified every piece of data presented by management to us or that we located from external sources. We assume no liability for such sources.
2. Information supplied by management has been accepted as correct without further verification, and we express no opinion on that information.
3. Possession of this report, or copy or electronic version thereof, does not carry with it the right of publication of all or part of it, nor may it be used for any purpose by anyone but the client without the previous written consent of the client or us and, in any event, only with proper attribution.
4. We are not required to give testimony in court or be in attendance during any hearings or depositions, with reference to the patent portfolio being valued.
5. The various estimates of value presented in this report apply to this valuation only and may not be used outside of the context presented herein. This valuation is valid only for the purposes specified herein as of August 5, 2014. Subsequent events have not been considered, and we have no obligation to update our report for such events and conditions.
6. This report was prepared under the direction of David Wanetick. Neither the professionals who worked on this engagement nor the partners of IncreMental Advantage, LLC have any present or contemplated future interest in GrainSense or VTT or any interest that might prevent us from performing an unbiased valuation. Our compensation is not contingent on an action or event resulting from the analyses, opinions, or conclusions in, or the use of, this report.

APPENDIX C

CERTIFICATIONS

We certify that, to the best of our knowledge and belief:

1. The statements of fact in this report are true and correct.
2. The reported analyses, opinions, and conclusions are limited by the reported assumptions and limiting conditions. These limiting conditions include a timeline for the completion of this report; the materials provided to us by management; and, the responsiveness of management. Statements made by representatives of VTT and GrainSense in connection with the preparation of this report have not been independently verified. This Report is a presentation of my personal, unbiased professional analyses, opinions, and conclusions.
3. The analyses, opinions, and conclusions were developed, and this report was prepared in conformity with the teachings of the Certified Patent Valuation Analysts designation.
4. No one provided significant professional assistance to the person signing this report.
5. We had, do not have, and do not anticipate having any financial interest in VTT or GrainSense.

APPENDIX D

SOURCES OF INFORMATION RELIED UPON IN THIS PATENT VALUATION REPORT

External Documents and Sources

1. Interviews with members of VTT and GrainSense management teams, namely:
 - a. Timo Sallinen, Patent Attorney – Manager IPR, VTT
 - b. Ralf Marbach, Chief Technology Officer, GrainSense
2. Information provided by GrainSense or VTT. This information includes but is not limited to:
 - a. Patent Applications and Related Files
 - b. Executive Summary / Investment Proposal
 - c. Financial Model
 - d. Investor Presentation
 - e. GrainSense - VTT Non-Binding Term Sheet
 - f. Project Plan
3. The International Grain Traders Group on LinkedIn
4. Internet and other sources as cited throughout this Patent Valuation Report
5. Course materials used in the Certified Patent Valuation Analyst training program

APPENDIX E

CURRICULUM VITAE FOR DAVID WANETICK

Current Positions

IncreMental Advantage, LLC, Managing Director Since 2005, David Wanetick has been a Managing Director at IncreMental Advantage, a valuation firm with an expertise in valuing intangible assets and emerging technologies. He is involved in all of the firm's valuation and business modeling. Clients include law firms; emerging, mid- and large-sized companies; technology transfer offices; inventors; venture capitalists and private equity firms. Valuations are primarily conducted in the context of negotiating licensing agreements, mergers and acquisitions and litigation support.

Patent Fairness Opinions Since 2011, David has begun formalizing and standardizing the preparation of patent fairness opinions that are used in a wide array of patent-related transactions all over the world.

Business Model Validation Since 2009, David has been the CEO of Business Model Validation, a firm which develops and reviews sophisticated business models for purposes of raising capital and capital budget allocation.

Certified Patent Valuation Analyst Since 2008, David has developed the curriculum and has run dozens of the courses required for applicants to earn their designations as Certified Patent Valuation Analysts. He works closely with other CPVA board members in terms of updating the course materials and updating the related exam.

Previous Positions

Earlier in his career, David was a securities research analyst and was employed by Merrill Lynch, First Albany and wrote his own newsletter, Market Maneuvers. David was the senior analyst for Gateway Reports / the Wall Street Transcript for five years.

Previous Valuations

Among the specific technologies, and related patents, and companies that David Wanetick valued are semiconductor equipment; optical inspection; micro electrical mechanical systems; keyboard, video, mouse patents; SIM card technologies; Internet applications; water separation technologies; water carbonation technologies; RF communication links; Internet traffic control technologies; payment processing technologies; Internet search applications; biometrics; electro-magnetic pulse inspection equipment; orthogonal frequency division multiplexing; robotic lawnmowers; immune system biologicals; Bluetooth applications; defibrillators; ocean thermal energy conversion technologies; oil services technologies; loyalty marketing technologies; catalytic heating; trademarks related to specialty apparel; wireless applications; software for schools; audio cables; glucose monitoring test strips; allergy vaccines; solar power patents; hydraulic fracturing; electrical current management; database software; food processing innovations; textiles for seating applications; embolism prevention devices; voice over Internet (VoIP) technologies; unstructured business intelligence software; remote braking applications; and, personal hygiene products.

Publications – Books

David is the author of three books that have achieved world-wide acclaim, including the only two books that unveil Industry Analysis. These books include Bound for Growth: How to Use Winning

Stocks Using Industry Analysis (1997) and Hot Sector Investing: How to Profit from Over 100 Emerging Opportunities (1999). He developed a textbook for his course entitled Valuation of Emerging Technologies. He is in the process of writing his fourth book entitled "Business Model Validation."

Publications – Articles

Some of the recent articles written by David Wanetick include:

- Rock Star Suicides and Patent Apportionment
- Valuation of Patent Applications with Binomial Distribution
- Patent Valuation and Baseball Players
- Costs of Capital - You Can Love More than Just One
- What is the Real Value in Real Options?
- Residual Knowledge Agreements and Neural Prosthetics
- Determining Patent Value Through Claims Analysis
- The Value of Valuing Patents
- How Patent Vulnerability Impacts Valuation
- Strategic Implications of Trade Secrets
- Opening the Kimono on Contract Valuation
- How Sun Tzu Would Outflank Patent Trolls
- The Value of Withheld Indemnifications
- Assessing the Probability of Obtaining a License
- Strategies for Negotiating Licenses
- Winning Negotiations Before They Begin

In addition to dozens of blogs that have published David Wanetick's work, his articles have appeared in:

- Les Nouvelles, published by the Licensing Executive Society
- Intellectual Asset Management
- Patent World
- CEO Magazine
- The CPA Journal
- Licensing Journal
- Willamette Insights
- Valuation Strategies
- Valuation Examiner
- Business Valuation Update
- IP Frontline
- IP Litigator
- Technology Transfer Tactics
- Inventor's Digest
- Private Equity Manager
- Research & Development Magazine
- The Canadian Institute of Chartered Business Valuators

Lecturing

David teaches the following courses through The Business Development Academy:

- Valuation of Emerging Technologies
- Negotiating License Agreements for Maximum Returns
- Financial Modeling and Projections
- Fundamentals of Business Valuation

These courses have been delivered all over the United States (New York City, Princeton, Philadelphia, Boston, Washington DC, Atlanta, Raleigh, Dallas, Miami, Austin, Chicago, Silicon Valley, San Francisco, Seattle, San Diego), in the United Kingdom, Belgium, Germany, the Netherlands, Denmark, Singapore, Kuwait, Dubai, Malaysia, India, China, Hong Kong and Israel. Attendees from all over the world have participated via webinar.

Representatives from more than 375 Fortune 500 companies have attended his programs. In addition, he has lectured on the above issues before many organizations and corporations such as the Houston Intellectual Property Lawyers Association; The Northeast Technology Council; The New York Society of Security Analysts; The Toronto Society of Security Analysts; The Montreal Society of Security Analysts; The San Francisco Financial Analysts Society; and, The Boeing Company.

From 1997 – 2004, David taught Industry Analysis at The New York Institute of Finance and at The New York Society of Securities Analysts.

Education

David received his undergraduate degree from Bucknell University in December 1988, where he double majored in economics and political science. He pursued a Master's of Science Degree in Taxation from Pace University from 1989 to 1990.

Certifications

David Wanetick earned his standing as an Accredited Valuation Analyst with the National Association of Certified Valuation Analysts. He is a Certified Patent Valuation Analyst and a Certified Emerging Company Analyst.