Ag Leader® INSIG HTS PRECISION FARMING MAGAZINE



THE EVOLUTION OF FARM DATA

WINTER 2017

Dear Readers,

Twenty-five years in the precision farming industry is really an eternity. I marvel at the fact that what started back in 1992 (and actually several years earlier before starting Ag Leader) has evolved into what Ag Leader is today. We often spend so much of our time looking ahead and planning for the future. But sometimes it's worthwhile to look back and reflect on all that we've accomplished.

As a kid growing up on a grain and livestock farm in eastern Illinois, I knew a couple things: I knew I liked grain farming much better than raising livestock. I also knew the reason I liked the grain side was because I liked the machinery. I didn't realize it then, but I was destined to become an engineer because of my curiosity about how machinery worked.

The engineering thing worked out, as I graduated with bachelor's and masters degrees in ag engineering from the University of Illinois. I wanted to work for a large machinery manufacturer, but poor economic conditions at the time meant the big manufacturers weren't hiring, so I took a job with a hydraulics manufacturing company in Rockford, Illinois and was transferred to their hydrostatic transmission division in Ames, Iowa less than a year later.

I worked for that company in different capacities from engineer to management roles for more than 20 years. But the last six, I was also working from my house in the off hours designing what would become the world's first widely successful combine yield monitor. I was basically working on a shoestring. To save money, I did everything myself. I sourced electronics, machined parts, programmed, assembled and tested. In all, I spent six years and \$50,000 building what would become Ag Leader's first 50 yield monitors. I also signed up as many equipment dealers as I could within an 80-mile radius of Ames.

The first year the plan was to sell at least 40 yield monitors. I sold a total of 10, including two that my dad bought and one that his neighbor bought. Both were my initial field testers of the yield monitor.

After harvest in 1992 and early 1993, funded primarily by credit cards, I worked some trade shows and partnered with some independent reps. The following year, I rented an 1,800-squarefoot office space with a small garage, hired my first employee, a part-time Iowa State University student, and manufactured and sold 125 monitors. In 1994, we sold 500. In 1995 and 1996, we sold 1,500 and 2,350 aftermarket units respectively. We also began supplying monitors for factory installation on Case IH combines in 1996.

What drove our early success? Part of it was our frugal bootstrapping. But more importantly, we worked hard to engineer a product that worked and proved itself. It was the



right product at the right time. Early adopters were surprised at how much yield variation there was in their fields — and when they realized that, their neighbors learned about it as well.

Over the next several years, our monitor systems evolved with increasingly sophisticated displays, and Ag Leader introduced its fifth generation display in late 2015. From 1996 on, we saw great growth, adding GPS, mapping software and guidance products. Growth accelerated even more after the 2004 introduction of our third generation display, the Insight, which used CAN Bus architecture allowing us to create highly modular systems. From 2005 forward, we rapidly expanded our product line by providing CAN Bus control systems for sprayers, dry spreaders, planters, steering and tile plows.

The new frontier today is internet connectivity of displays in the field to our AgFiniti cloud-based platform. I certainly did not imagine the sophistication of products or the ability to communicate between products that Ag Leader provides today when I started Ag Leader with the Yield Monitor 2000 as my only product. But it was a great product for its time that provided the springboard to success in the 25 years to follow.

Al Myers

Al Mvers



Contents









5

THE EVOLUTION OF FARM DATA

10

MANAGING DATA BEYOND SURVIVAL

12

THE NEXT STEP IN DATA VISIBILITY

16

AND THE SURVEY SAYS...

19

INNOVATION UPDATE

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THE EVOLUTION OF FARM DATA

Celebrating 25 years of Innovation

Editor's Note: This story contains excerpts and interviews from stories that appeared in past issues of Insights.

Insights reflects on the early days of precision agriculture and spotlights key Ag Leader innovations that have made collecting, protecting, sharing and utilizing data easier and more efficient over the past 25 years.





Basement Beginnings

Ag Leader entered the agriculture equipment market with the world's first widely adopted yield monitor. Unbeknownst at the time, that yield monitor started a data revolution and the beginning of the precision farming industry.

It began in 1986 in founder Al Myers' basement. "I had been brainstorming a lot of product concepts and kept spiral notebooks of ideas," said Myers. "After carefully weighing the pros and cons of every idea, I decided there was one that stood out to me as the one that was undoubtedly going to happen and that every farmer would want: the on-the-go yield monitor."

After six years of development and six generations of prototypes, Myers was ready to go to market with his first product in 1992: the Yield Monitor 2000.

Myers sold just 10 yield monitors that first year, but it was enough to convince him that farmers sought the ability to collect accurate field data in order to make better farm management decisions. This conclusion was validated over the next few years as sales of the Yield Monitor 2000 jumped to over 1,500 units per year.



The Trials of Early Adopters

Early on, Al Myers tested his invention, formally known as the Yield Monitor 2000, on his family farm in Illinois, but also recruited a handful of early adopters that were ready for harvest data. One of which was Dennis Friest, still an Ag Leader customer today.

It was the early 1990s and Dennis Friest was on the hunt for technology capable of providing real-time yield data. The first system he purchased placed censors on the auger of his grain cart in order to collect yield data. It was a step in the right direction, though it didn't deliver the real-time, in-cab data that he wanted. Then in 1993 he came across a product from an upstart company called Ag Leader Technology.

"The serial number of my first Yield Monitor 2000 was number 15, and my first tech support person was Al Myers himself," said Friest, who farms with his son Brent near Radcliffe, Iowa. "I have always had a desire to keep track of my yields. When I started test plotting different varieties, and weighing them across the field, this technology was something I knew would help me a lot."

Today, Friest continues to utilize Ag Leader precision tools to collect data to improve efficiency, profitability and environmental stewardship.

"Having this data helps me to be a better environmentalist and also a better economist. So we value any tools that can help us gather data to make better decisions."





SMS Mobile exports data directly into SMS desktop software.

2000

Sending Out an SMS

With all this data, Ag Leader quickly realized farmers needed a robust, but user-friendly way to analyze it. And so SMS was born. Today, SMS Software is a widely used platform for indepth data analysis by both farmers and crop consultants.

It takes a lot of data to maximize profitability across 6,000 acres. So for the past 20 years, Jeff Hodel has been using precision farming software to implement a site-specific, data-driven approach to managing his sizeable farm in central Illinois. This includes Ag Leader SMS software, which he implemented back in 2000.

"We use the software to compare yields with different applications and different practices to find out what makes money and what doesn't," Hodel said.

Data Means Decisions

Meanwhile, GPS mapping entered the industry and added new capability to bring additional data to farmers.

Don Vos started using his first Ag Leader yield monitor in the mid 1990s, though it was when he added GPS and mapping in 1997 that he realized how the field data he was collecting could really impact his operation.

"Once we figured out mapping, then it was all about the information. There was so much information there that we could use," said Vos, who farms roughly 2,000 acres of corn and soybeans in southeast Iowa. "We probably gathered about three years of information before we started making big decisions. Then we started testing things on 50 to 70 acres at a time."

Variable rate fertilizer, planter speed, auto-steering, variable rate seeding, applying nutrients based on crop sensing and managing planting depth using hydraulic down force were just some of the technologies Vos experimented with as they became available.





2009

The Color of Data

While products were being designed with row crop production in mind, customers and dealers quickly found uses for the products in specialty crops, and creatively adapted the technology to fit.

For several years now Mike Houghtaling has used OptRx crop sensors to optimize inputs across 2,500 acres of corn, sugarbeets, edible beans and cucumbers at his farm in Michigan. OptRx crop sensors measure and record data about crops in real time using the reflectance of light shined on the growing plants.

This is important when rotating crops, especially ones like sugarbeets that require just the right amount of nitrogen to maximize yield. An excessive amount of nitrogen actually has a negative effect on beet quality as it results in more leaf growth. Not enough nitrogen means a loss in yield. Getting it right, then, can mean as much as \$100 per acre in revenue.

Into the Cloud

Up until the mid 2000s, moving data happened by way of a USB device in the farmer's pocket. While other industries had long before adopted cloud technology for data storage and transfer, soon the agriculture industry followed. Ag Leader introduced AgFiniti, its cloud-based data management platform, in 2014.

Willard Agri-Service makes its home near Chesapeake Bay, with five locations covering Delaware, Maryland, New Jersey, Pennsylvania and Virginia.

The company uses a heavy fleet of sprayers to deliver spraying services across 300,000 acres of corn, soybeans, wheat and barley, as well as some vegetable crops. Keeping track of how each applicator machine is performing requires tremendous data analysis, a process that was streamlined by implementing AgFiniti and the Ag Leader Integra display back in 2014.

In the past, a USB stick would need to be pulled from the machines and physically transported to the office, where the data could be uploaded and analyzed. With AgFiniti — Ag Leader's secure cloud-based platform — that data could be transmitted wirelessly.

"With AgFiniti we control the data and can delete the data as we want, which gives a sense of security and control other platforms can't match. One of our biggest selling points is privacy, and AgFiniti keeps us true to our word. It falls in line with our core values," said Dave Yannacci, Willard Agri-Service.





2015

All the Variables

Ag Leader got its start in the Midwest, but quickly found a need for its precision farming solutions worldwide. As the market matured, additional technologies were added to the company's line-up to further assist farmers in all aspects of their operation, including steering and application control.

The larger the operation the more data there is to manage. Such is the case for Dairy Holdings Limited of South Island, New Zealand, which operates 58 dairy units on 34,000 acres (13,800 hectares), milking 46,000 cows to produce 35.8 million pounds (16.26 million kilograms) of milk.

Farming 34,000 acres is much more manageable when using the right equipment and technology.

For starters, a SteerCommand automated steering controller paired with a GPS 6500 receiver gives them best-in-class integrated steering performance right down to the sub-inch. DirectCommand simplifies the application management process, providing reliable application rate control to minimize waste. A Versa display with AutoSwath and Liquid Control Module helps them manage both field data collection and implement control duties. The company also counts on Ag Leader products to manage all of its farm data.



The Future of Data

While farming data existed 25 years ago, nobody imagined how it would transform the agriculture industry. Today, data is a common buzzword, but few understand how to harness its power. True to its beginnings, Ag Leader is focused on bringing straightforward, user-friendly tools to farmers to help them collect and manage their data.

John Shaff and his son Peter once utilized an on-farm scale to weigh grain loads as they came and left their 800-acre farm near Clinton, Iowa. That changed in 1996 when they purchased a new combine equipped with a Yield Monitor 2000.

"Before the yield monitor, you never really had any idea what your yields were like until you got back and weighed them. You looked at the corn going through the corn head and thought, 'well, that looks pretty good,' but you never knew for sure," Peter said. "Once we got the yield monitor, all of that data was right there in front of you. We could start picking out the spots in the field that were good or bad and think about how we might treat those places."

Over the years, the Shaff's have added several new Ag Leader tools in an effort to collect as much data as possible. Peter said precision agriculture makes their operation more efficient and he foresees things only getting better. 25 years ago, Ag Leader got its start with the first widely adopted on-the-go yield monitor. Since then, Ag Leader has introduced yearround tools to help farmers plant, apply and harvest more efficiently and accurately, along with cutting-edge data management tools for more visibility of information to make superior decisions for their operation. A lot has changed in 25 years, but one thing has stood the test of time — they're still leading the way! And to think, it all started in a basement with a crazy idea and a lot of gumption.





Managing data beyond survival

t is hard to go anywhere without hearing a mention of data or technology. That's because the use of data has drastically improved the way we operate and make decisions in our daily life. Precision agriculture is no different. Today, farmers are using data in ways previous generations of agriculturalists could only dream of. However, with so much data being created, a larger issue has come about: how to manage it.

Managing data can mean different things. It can mean to run or direct, but it can also mean to cope, survive or muddle through. While the first definition is the goal, the second definition is likely more common among farmers of all ages. With this understanding in mind, Ag Leader continues to take AgFiniti beyond a data management platform and into a full-featured, user-friendly tool that allows farmers to not only take control of their data, but also to use it to make on-the-go decisions that impact the bottom-line. Check out the new features!

Check out AgFiniti's new features!

Reports Made Easy

Summary reports are automatically generated based on your maps. Utilize the filter options to see reports of a single product, farm, or a report of your entire operation. Reports are now available on any mobile device, including your smartphone, laptop, Android tablet or on the dedicated AgFiniti Mobile app for iPad.

Dig Out the Inkjet

With the latest updates to AgFiniti Mobile, you can now print your maps, stats and reports, right from the app. Print any map on your iPad and even include the notes you made during the season. Don't forget about summary reports - printing reports is just as easy.

Ask Your Field

Why did this spot of the field yield so well? How can I duplicate that across the entire field? Find answers to these types of questions by using the query function in AgFiniti Mobile or AgFiniti Cloud. Simply select an area, and your stat cards will show totals for that specific spot. Quickly and easily determine what the area yielded, what rate was applied during fertilizing or which variety was planted.



AgFiniti

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Location Icons Make it Hard to Hide

Ever wondered how much of the field Dad has done? Or which side of the field you should park the wagons on? Now you can see right where displays are running in the field and where any iPads are that are logged into AgFiniti or AgFiniti Mobile. See information like: who's logged in, what operation the display is performing, how fast they're going, and even latitude and longitude.

Display/Device Info	
DigRy	assessing (procession)
Agricul User	Joint Smith
Courses	Spreading
Heading	2711.010
Speed	3 SR righ
Localies	42 278772 (40,726535



Take Note

You can now add notes and pictures to your maps using AgFiniti and AgFiniti Mobile. Just tap and hold anywhere on your maps to add a text note. Easily add a picture to your notes for added detail. These notes seamlessly sync to AgFiniti Cloud with the rest of your data, so no matter where you're at or what device you're using, you have the most up-to-date information.

Note Spacing losses Date Creat 6/22/2016 8:55 AM 42.8087171-95.071152 Longitude (day)



Get a New Perspective

AgFiniti and AgFiniti Mobile now have the ability to show maps in a gridded or contoured view, in addition to the current swath and spatial views. Find and determine management zones faster and easier with a different perspective.





THE NEXT STEP IN DATA VISIBILITY:

Display-to-Display Communication Across Your Entire Operation

The next step of instantaneous data visibility is available to further assist with critical decision-making right from the field. The powerful duo, InCommand and AgFiniti, have expanded their capabilities to bring you DisplayCast, a new display-to-display communication feature for InCommand displays. InCommand displays now talk between each other in sharing information like guidance lines, coverage maps, yield summary information, planting and application maps during harvest, etc. Whether you have two displays working in one field, or need information from another display parked at your operation, DisplayCast is the ticket to speed and efficiency on your farm.

Several lucky InCommand customers got to preview the new DisplayCast feature during harvest and shared their experiences:



"The display itself is more reactive to your finger. It's definitely the next step up."



TED HAMER

Hamer co-owns a commercial spraying operation in Hudson, Iowa. He's currently using DisplayCast on his family farm where he grows corn and soybeans.

"It's been interesting; it's been fun to use (DisplayCast). The display itself is more reactive to your finger. It's definitely the next step up. Once people try it, they probably won't look back. In the past I couldn't see what was left in the field late at night. (The other person combining) thought I did a section, and I thought he did it and it just didn't get done. With DisplayCast we can look and immediately know if we've got everything in the combine."

Continued >>

GLEN SOHRE

Sohre is currently using DisplayCast in his custom manure application business with his sons in Good Thunder, Minnesota. He currently applies manure to around 8,000 acres. Sohre also farms close to 500 acres in corn and soybeans rotations. 5 9. 0.0

Ag Leader

8 5 0

"DisplayCast has been working really seamlessly. The data sharing is nice because I can get it to my customers faster. Before I was always having to put everything on a thumb drive and take it home and pull all three tractors' data onto my computer and create my maps, but now they're all made. I can just take a screenshot and email it to my customers or their local co-op to show them what we did or where we're at. There's just a lot of perks to it. We can see each other and where we've been. Sometimes when we're applying (manure) to cornstalks, it's hard to physically see, especially at night. From what I've seen so far, I think (DisplayCast) will be a really good thing."

The data sharing is nice because I can get it to my customers faster."

JD DULANEY

Dulaney is currently using DisplayCast on his 4,000-acre farm in Clarksdale, Mississippi. He grows soybeans, rice and corn with a five-man team.

"(DisplayCast) is well worth it. This is the stuff that most of us have been waiting on for the last 15 years. When we get into planting season, I think it's going to be a great asset to have planters starting on opposite ends of the fields and so forth. Being able to know exactly how many acres one machine has planted versus the other, especially if you're doing multiple (soybean) varieties in a field. It's going to be a wonderful tool." "This is the stuff that most of us have been waiting on for the last 15 years."

And the Survey Says... Data Management is Here to Stay

It's no secret that precision technology has risen in the ranks as one of the most essential tools within the industry, but just as this technology has continued to evolve, so has the use of the data gathered by its many users. A recent study conducted by Meredith Agrimedia surveyed 444 members of its agriculture market research panel to take the temperature of the current precision tech users and their expectations. *Insights* analyzed the report and highlighted some of the more intriguing findings.



Surveyed users indicated that crop sensors, variable-rate chemical application, aerial imagery, GPS-assisted crop scouting and wireless data transfer were among their top five planned uses for precision technology in the immediate or distant future. Other uses included variable-rate seeding, desktop software data management, equipment monitoring, assisted steering and more.









Use of Data Gathered

Most of the data currently gathered by farmers goes toward increasing productivity and analyzing harvest results. Ag Leader anticipates that data usage to minimize input purchases will rise significantly in the next few years.

Who Helps You Analyze the Data?

Nearly half of all farmers surveyed said that an agronomist helps them analyze their precision data while 33 percent regularly interpret the data themselves. These numbers show a drastic increase in understanding for the technology in comparison to previous years. With more precision tech resources than ever, we hope to see these figures reversed in the years to come.

ROI Expectations

A solid 72 percent of surveyed users said that precision farming tools have met their return on investment expectations. After the investment of capital and time in the initial purchase of precision technology, most users see cost savings and improved yields through more precise management of inputs; these tools generally pay for themselves over time.

SHARE YOUR STORY!

What has been the biggest change in your farming practices since you started using precision farming?

Tell us your answer by visiting **www.agleader.com/readerfeature**. You might be featured in the Insights 25th Anniversary edition!

THE INNOVATION UPDATE

API to Open AgFiniti to Third-Party Integration

Ag Leader recently enhanced its AgFiniti cloud-based platform with the announcement of an Application Program Interface (API). This API will allow third-party farm management information systems (FMIS) to transfer files to and from AgFiniti.

The ability to transfer AGDATA, AGSETUP, shapefile prescriptions, ISOXML files and even .PDF smart reports to various FMIS allows seamless integration for growers and trusted advisors to access any and all of their data, regardless of the FMIS being used.

True to Ag Leader's stance on data ownership, growers will have full control over which thirdparty software has access to their data, ensuring the data stays with the property of the grower.

SMS Basic / Advanced v17.0 is Now Available!

Version 17.0 of SMS has been released! Updates include:

- Enhanced support for Ag Leader and Precision Planting file formats.
- Added support for high resolution displays.
- Added support to use the mouse scroll wheel to zoom in/out.
- Added the ability to select and move an object in an editor by only using the selection tool. No longer necessary to use the Move tool in certain modes.
- Improved Watershed ID generation in Terrain Analysis (Advanced only).





InCommand Displays Talk

Ag Leader fortifies its vision of complete data connectivity with the latest addition to the powerful InCommand displays and AgFiniti cloud-based platform. DisplayCast adds real-time, display-todisplay communication to InCommand 1200 and InCommand 800.

Display information, including maps and guidance lines, synced across field activities increases productivity and immediate decision-making. Sharing data between multiple displays running in the same field, running in different fields, or running across the operation is now seamless.

InCommand displays will share coverage maps for swath control, guidance lines, field summary information, yield and planting maps and more. No matter the season, there is always a short window of time to optimize productivity. Having guidance lines, coverage maps and other valuable decision-making data helps growers run at full speed.

Find us at a farm show near you this winter!

Ag Leader has an extensive schedule of major farm shows across the country this winter.

Find us at these action-packed shows! http://www.agleader.com/farm-shows/

SO SIMPLE EVEN DAD CAN TEACH YOU







Unlocking the power of your field data shouldn't be complicated. That's why we built InCommand[™] — an all-in-one display that connects your entire operation — every display, field, and row. Plus, instantly take maps with you anywhere on any device with AgFiniti[®], and see your field data like you've never seen before.

It's really that simple. And Dad approved.



Visit AgLeader.com/InCommand