

Turning Data into Food

How Monsanto is using predictive analytics and the Internet of Things to unlock digital yield

By Martha Heller

Monsanto, the \$15.8B sustainable agriculture company, develops products that allow farmers to produce more with less. In addition to providing seeds for fruits, vegetables and other key crops, Monsanto helps farmers improve soil health, farming practices and farmers' ability to conserve natural resources. "To meet the world's population needs in 2050, farmers will need to be producing double their yields," says Jim Swanson, CIO. "As part of the solution, we are using information technology to get them there. We are turning data into food."



Swanson and his IT organization see predictive analytics and the Internet of Things (IoT) as the pathway to unlocking digital yield. "Our own footprint contains millions of acres that we harvest," says Swanson. "This is our learning lab. How do we produce more yield? How do we conserve more?"

Monsanto has combined over five years of field performance data with genomic analysis to understand which combinations of their existing seed varieties will produce new varieties with higher yield. "We use location and weather data to test our products before they are sold to farmers," Swanson says. "We use predictive analytics to focus our efforts on the products with the highest market potential. The more we can predict an outcome, the more efficient we are at delivering the products that farmers will need."

To accelerate the rate of decision making and to streamline operations, Swanson and his team are deploying a global IoT platform that connects Monsanto's combines,

planters, mobile devices, shipping scales, and barcode scanners. "This fall, our North American corn harvester fleet was connected in real-time giving us access to the telematics, logistics and actual harvest data for the fleet," Swanson says. "This allowed us to optimize our harvest operations and to make critical advancement decisions in a more timely manner."

Three Approaches to Innovation

Swanson takes three approaches to developing and delivering predictive analytics and IoT technologies.

Developing Internal – Example: FieldDrive

First, Swanson looks to his own IT organization, for new ideas.

In early 2013, for example, the IT team developed a proof of concept for

"FieldDrive," a program that puts sensors into combines (machines that harvest grain crops) to collect real-time data on yields, soil quality and moisture as well as imagery data on the routes that the combines were taking. With FieldDrive, that data was then streamed via satellite back to the company's big data environment. By the following fall, growers were able to use the data to make key decisions about soil topology and combine routes, all of which improved harvest quality. FieldDrive was so successful in North America that Monsanto is now deploying it in Europe, South America and South Africa.

"We've collected more than 100 million machine metrics which allow us to make better decisions about quality and operations," says Swanson. "We've shaved days per harvest through this information collected from the field."



Leveraging External – Example: Cargo View

Second, Swanson looks to partnerships with companies in other industries for technologies with useful applications in agronomy.

“With AT&T, we discussed the possibilities of utilizing their Cargo View product, a sensor technology that AT&T developed to help companies monitor their shipments around the world,” says Swanson. “Think about a product coming off a farm and going to a manufacturing plant. Using sensor technologies, we can track that shipment, look at quality and change routing logistics based on distance. This would allow us to prevent product quality loss, which is an important objective for us.”

Monsanto’s IT teams worked with their US business partners in supply chain to complete a rapid proof of concept for the new capability; they tested the APIs and validated the platform compatibility. They then placed the sensors within a load of corn during harvest. The devices streamed data real time, allowing the operations teams to adjust and mitigate risk due to adverse conditions. The sensors also provided the location of the trucks, which gave Monsanto supply chain people the ability to reposition truck traffic and pickers to optimize operations. The entire proof of concept took three weeks to execute.

Cargo View has been so effective in reducing seed loss and increasing seed shelf life in the US, that Monsanto now deploying in Mexico and Brazil where distances between fields and plants are even greater.

Acquisitions and Partnerships– Example: Climate Corporation

Finally, Monsanto seeks out technology acquisitions that can bring in whole new capabilities.

For example, Monsanto recently acquired Climate Corporation, a leading-edge analytics company that provides local weather monitoring. “One of the key decisions that a grower makes is weather,” says Swanson. “By acquiring Climate, we can now combine sophisticated information about weather with our understanding of hybrids and disease. This information helps farmers both increase and protect their yield.”

A Culture of Innovation

This kind of innovation requires vision and focus on the part of IT. Swanson offers advice:

Know your North Star. “Our greatest priority is unlocking digital yield for our farmers” says Swanson. “In IT, we are always asking ‘How do we turn information into food?’ That is our North Star and it gives us the freedom to think broadly. Vision should be something you never attain; you are always just driving toward it.”

Speed up. “With so many opportunities in big data and IoT, we have to move much more quickly,” says Swanson. “Stan Dotson, our IT lead for R&D, led the charge to move us from waterfall to agile, scrum and other more iterative development approaches. That shift was game changing and we are now delivering a new product every two weeks. We had to change the mindset around how IT shows up differently to deliver value.”

Look outside. Some companies still suffer from the “not invented here” syndrome where they believe that they alone must be the source of new ideas. “I am pushing on my organization to take an external lens and rewarding those activities that bring in insights from the outside,” says Swanson. “There is a lot of innovation going on in the world. If we spend some time on the outside, we may learn something.”

About Jim Swanson

Jim Swanson joined Monsanto in November 2013 as Chief Information Officer. Before coming to Monsanto, he was a divisional CIO with Merck, where he was for more than eight years. Prior to that, he was CIO/Vice-President with Johnson & Johnson Pharmaceutical R&D for more than nine years. Jim graduated from Drexel University with a Bachelor of Science in BioScience and BioTechnology, and then received a MS in Computer Science, also from Drexel. In November 2014, Jim was recognized as one of Computerworld’s Premier 100 IT leaders.

About Monsanto

Monsanto is a sustainable agriculture company that delivers agricultural products that support farmers all over the world. The company is focused on empowering farmers to help them produce more from their land, creating farm efficiencies, and reducing on-farm costs. Additionally, the company strives to conserve more of the world’s natural resources, such as water and energy. Monsanto is headquartered in St. Louis, Missouri.

