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Keenan and the IoT create a new kind of data farm

Intel® IoT Gateway
Internet of Things

Manufacturers of high-performance feeder wagons for dairy and beef cows, Keenan has also developed a program of nutritional support for farmers that may help improve yield by up to 25 percent without extra feed. Using IoT technology to automate data sharing and enhance nutritional analysis makes it easier for farmers to adopt, while real-time capabilities ensure animals remain in optimum health. Keenan is now working with Intel to enhance its processing capability in the gateway, improve analytics at the edge, and develop business models that will help roll the solution out to a far greater number of farmers around the world.

"There are massive stresses in the food supply chain. People are willing to change the way they do things. But they don't want to take risks. Big-name companies like Intel, with high levels of credibility, are going to be the enablers.""

**– Gerard Keenan,
Executive Chairman
Richard Keenan & Co**

Challenge

- **Improving farm efficiency:** Keenan wanted to improve delivery of its proprietary nutrition system to help even more farmers optimize the yield from dairy and beef cattle in a repeatable and reliable way

- **Real-time feeding advice:** Keenan wanted to deliver real-time feedback and advice on feeding regimes to help farmers keep cattle in optimum health and production efficiency

- **Extending geographical reach:** Keenan also wanted to make it easier for more farmers to adopt the system by increasing automation and minimizing manual inputs

Solution

- **Deploying IoT technologies:** Keenan developed InTouch*, a machine-to-machine system, that automates the collection and transmission of feeding data sent via the cloud to in-house nutritionists for immediate interpretation and feedback

- **Increasing processing capability:** Keenan is working with Intel to increase the processing power of the system by building the next version on the Intel® IoT Gateway with the Intel® Atom™ processor

- **Additional research:** Keenan is working with teams at the Intel IoT Ignition Lab in Ireland to develop new technology and business models for the InTouch solution

Impact

- **Scaling the system:** By developing an end-to-end solution based on Intel® technologies, Keenan can scale InTouch to process more data and reach more farmers around the world

- **New customer relationships:** Keenan can develop a more outcome-focused relationship with its customers and engage with other players in the supply chain for greater win-win efficiencies and consistent quality in food production

- **Global food production:** Working with Intel is helping Keenan to roll out the new business and technology model worldwide to help increase farm productivity and profitability in developing and developed countries

Improving food production with the IoT

Richard Keenan and Co's goal is to become global leaders in ethical and profitable farming solutions and it is using the Internet of Things (IoT) to help it achieve its ambitions.
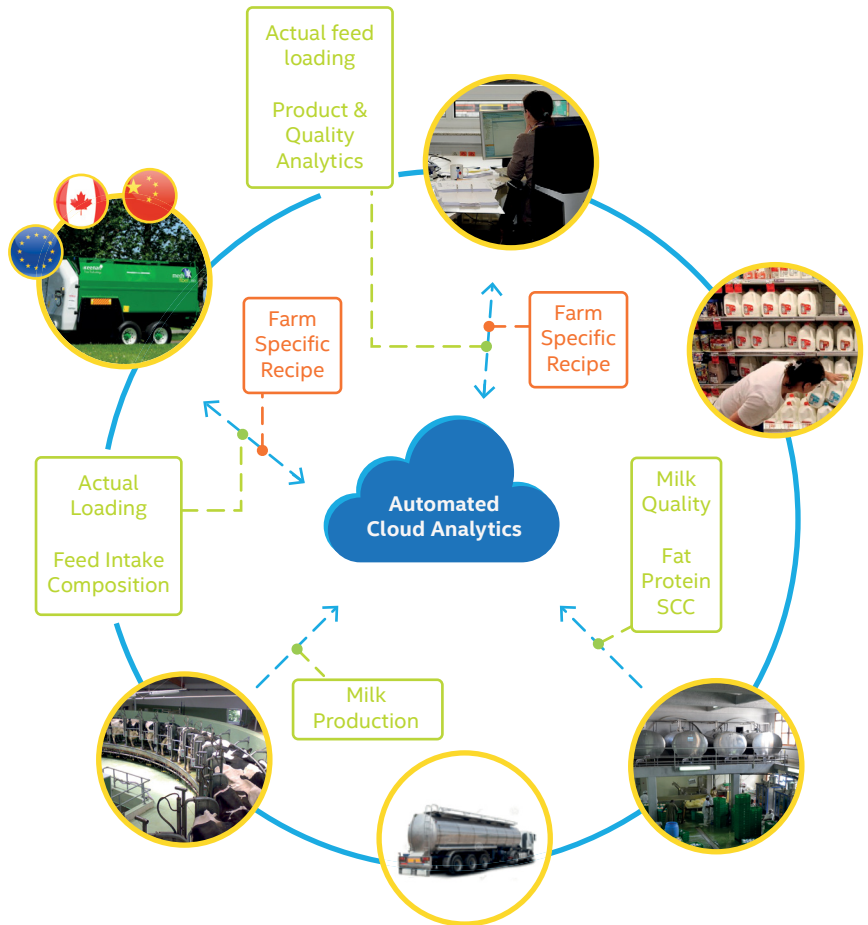
Keenan manufactures efficient, durable and high-performance feeder wagons for dairy and beef cows. The company serves more than 30,000 farms in 26 countries and feeds millions of head of cattle every day. Keenan also employs animal nutritionists, scientists and agricultural economists to develop a program of nutritional support and know-how to farmers. Known as the Keenan system the feeding program is tailored to meet the requirements of each farm and helps improve the yield from each kilogram of feed.

Executive chairman, Gerard Keenan explains the importance of nutrition in modern agriculture: "Farmers have a very fine line between profit and loss, with feed being one of the biggest input costs. There is a direct relationship between the animal's nutrition and the volume, quality and composition of the milk or meat it produces. Our system helps farmers get a predictable

yield from each animal, while minimizing waste, reducing nitrogen and methane pollution, and enhancing animal health."

Connected cows and data analysis

The evolution of the Keenan system has been matched by an evolution in technology tools deployed to deliver it. John McCurdy, business innovation director explains: "While our scientists were looking for the best ways to feed cattle, our technologists were looking at the best way to share data between our nutritionists and our farmers. Before we adopted an IoT solution, we were still dependent on farmers loading data from memory sticks and sending it to us. By developing an IoT-enabled solution, we have added a whole new layer of automation which makes it much easier for farmers to use."

Keenan's IoT-enabled system is known as InTouch*. A gateway is attached to the feeder, which guides the farmer through the mixing process to ensure an optimal feed mix. Data from the unit is collected in a gateway, along with information from dairy production and processing side.

The data is then sent via the cloud for analysis where proprietary algorithms decide which issues need to be addressed, raise a ticket, and alert the nutritionists who interpret and discuss with the farmer. They then send an updated program back to the gateway on the feeder, so the new information is there when the farmer next switches on the machine. As McCurdy says: "We've always provided farmers with data. But now it's about delivering actionable information in real time. It's all about being proactive."

A global ambition

InTouch is now installed on 3,000 farms in total. Its database currently holds information on 23 million ingredients along with feed efficiency information on 1.1 million cows. However, Keenan is now working with Intel to take it to the next level and extend the benefits to a much wider customer base.

Gerard Keenan explains: "The current system has provided our farmers with great results. But we now want to extend the benefits into the wider supply chain. Food outlets, processors and supermarkets all want consistent output from farmers. If they can assure the specification of milk or beef before it arrives at the processing plant, they can reduce their own costs and inefficiencies in the supply chain. Our tailored nutrition programs can enable more farmers to deliver that consistency."

Keenan also wants to extend the system to more farmers in the developed and developing world. Its scientific advisors have shown that diet alone can enhance milk yields by as much as 25 percent without additional feed, which as Gerard Keenan points out, creates societal, economical and environmental benefits. "Simply put, it helps keep the costs of food production down without compromising quality, health or safety of people or animals. The potential for this system in countries like China and India is huge. To make it work, the system has to be easy for every farmer to use to get the recipe right every day."

Scaling InTouch with Intel® technology

Keenan wanted to improve the processing capability on the device and the gateway as well as enhance the analytics at the edge of the network so that even more relevant data could be included in the monitoring devices on feeders. McCurdy and his team also wanted a complete end-to-end solution from device to cloud.

"We're stepping up the InTouch service and extending its reach and Intel offered us the complete package we needed to deliver that vision," he explains. "Scalability, security, performance, and manageability are all there. It is the end-to-end solution that we were looking for. Working with Intel will give us the ability to get all the complicated functionality right, without the farmer realizing it's complicated."

Intel and Keenan are developing an infrastructure based on the Intel IoT Gateway powered by the Intel Atom processor, with a private cloud run on Intel technologies.

Keenan is also working closely with teams at the Intel IoT Ignition Lab in Leixlip in Ireland to develop additional use cases for the system. This includes developing an Open API Architecture, which will enable collaboration within the supply chain and provide additional real-time data. When combined with the Keenan database it will add more value throughout the supply chain.

Smarter sustainable supply chains

For Keenan, the IoT-based system creates the opportunity to change their own business model, with less emphasis on a single capital sale and more focus on an outcome-based model with recurring income. This enables a more affordable service for its customers and maintain a relationship on an ongoing basis. As McCurdy points out: "Our relationship with Intel is key not just to remaining at the forefront of technologies, but more importantly as an enabler of the global roll-out of this new business model." Within three years, the company expects to have 20,000 farms using the new InTouch system in Northern Europe alone.

Significantly it also gives Keenan the capacity to extend its geographic reach still further and work with far greater number of farmers, food processors, retailers and others. The company is already carrying out research on the feasibility of the system in India, and is

collaborating with the Chinese Academy of Agriculture to deliver the system to Chinese farmers.

It is here that the company believes the real impact will be seen. "There are massive stresses in the food supply chain," concludes Gerard Keenan. "There's a real challenge because of global volatility in prices. People are willing to change the way they do things. But they don't want to take risks. Big name companies like Intel with high levels of credibility are going to be the enablers."

Lessons Learned

Keep it simple. Do not get carried away by introducing a multitude of features which may only be used by a small proportion of your users, while switching off the rest. There is also great benefit in networking with other companies from different industries. Having a narrow focus on your own industry can deny you other potential opportunities which may fit into your product in the future.

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