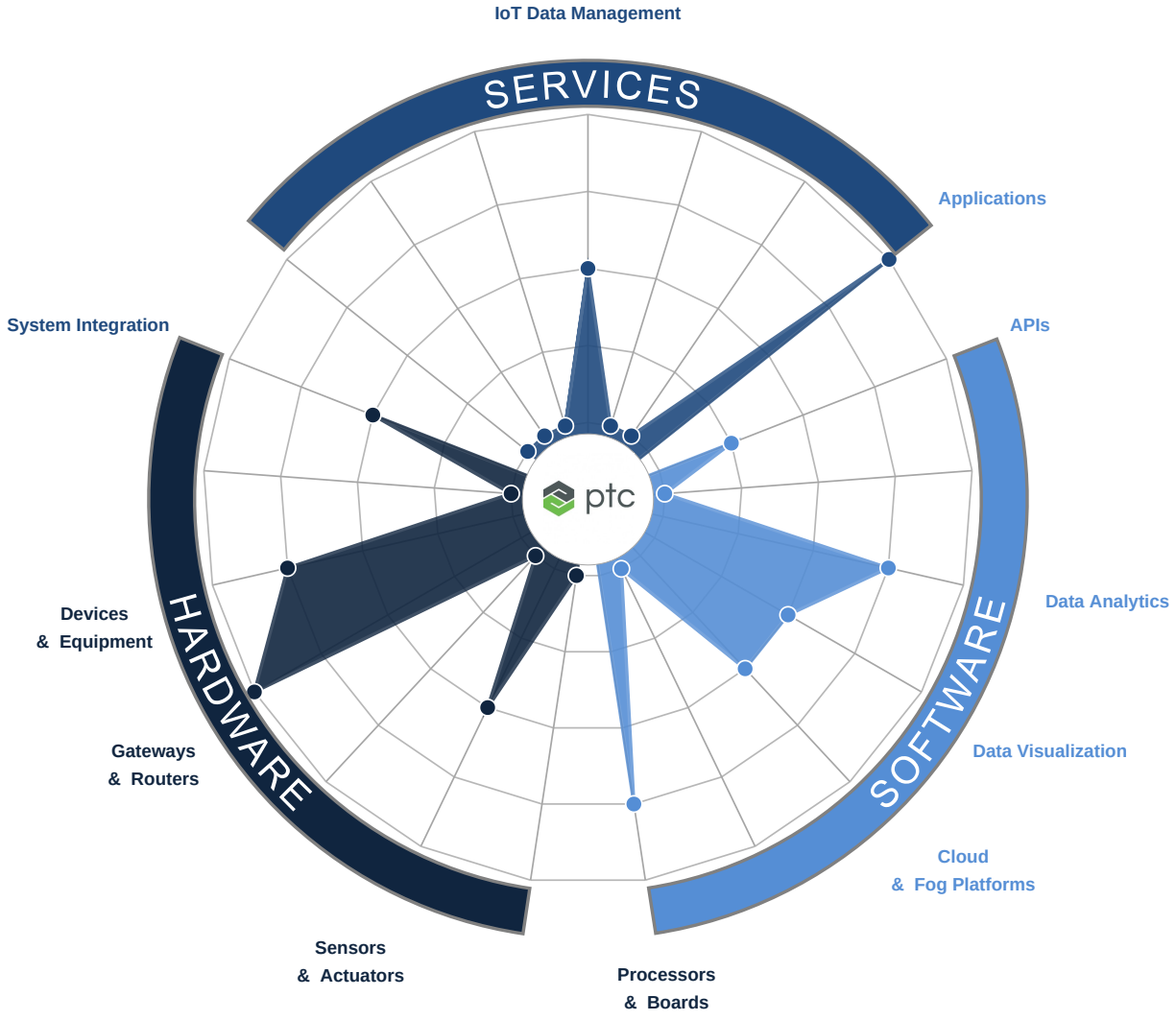
ptc + IoT ONE

Transformation for IoT Business Model in Connected Industrial Vehicles



Overview

Applicable Industries

Heavy Vehicle

Applicable Functions

Field Services

Logistics

Maintenance

Connectivity Protocols

Satellite

Challenge

CNH Industrial wanted to put IoT-enabled viechles onto the market. Whether monitoring a single machine or integrating an entire fleet, operators are able to track the status, speed, and movement of machines and their performance and also receive alerts on issues that may require service by a qualified technician to improve uptime and overall effectiveness of the vehicle.

Customer

CNH Industrial is one of the world's largest capital goods companies registered in the Netherlands with corporate offices in London, with more than 70,000 employees.

Solution

CNH Industrial created the Precision Solutions & Telematics business unit to provide performance-enhancing technologies for the company's product segments, which include agriculture, construction and commercial vehicles. The CNH Industrial system includes other components such as correction signals that provide sub-inch accuracy for drivers during crop seeding and harvesting.

Software Components
- Precision Solutions & Telematics business unit

Data Collected

Data for field attributes, in-field variability

Solution Type	IOT
Solution Maturity	Cutting Edge (technology has been on the market for < 2 years)

Operational Impact

Impact #1	Total Cost of Ownership - Total cost of ownership is lowered due to GPS controlled seed and fertilizer application which results in lower input costs and less waste.
Impact #2	Remote Device Diagnostics - Real-time status reports enable maintenance personnel to remotely diagnose the status of a device.
Impact #3	Predictive Maintenance - The solution allows CNH Industrial to enable predictive maintenance which helps reduce maintenance costs.

Quantitative Benefit

Benefit #1	The average time that combines, tractors, and harvesting machines are out of commission for maintenance has been reduced by approximately 50% due to the proactive service approach.
Benefit #2	The engineering data could reveal that when the water temperature on a particular model rose to certain level, 80% of the time the vehicle was experiencing a faulty radiator.

Case Study

PTC®

Internal Transformation for IoT Business Model Reshapes Connected Industrial Vehicles

With its Corporate Office in London and operations in 190 countries, CNH Industrial N.V. is a global leader in capital equipment products, with a portfolio of individual brands that produce more than 300 types of vehicles for agriculture, construction, and commercial use, including brands like New Holland Agriculture and New Holland Construction, Case IH and Case Construction, Iveco and FPT.

Building on its heritage of innovation, the company has embarked on a transformation to make smart and connected products an integral part of their portfolio of customer offerings.

For CNH Industrial, the Internet of Things represents a path for strategic differentiation in its relationships with customers. While the nature and depth of those relationships is evolving, the goal is to build customer loyalty through greater visibility into and management of the total cost of ownership that includes performance monitoring as well as integration with core enterprise business systems, such as ERP and CRM functionalities.

Whether monitoring a single machine or integrating an entire fleet, operators are able to track the status, speed, and movement of machines and their performance and also receive alerts on issues that may require service by a qualified technician to improve uptime and overall effectiveness of the vehicle. The CNH Industrial strategy is to enable their end users to derive greater performance and value from the data collected as the center of a larger ecosystem.

To bring the IoT enabled vehicles to market CNH Industrial created the Precision Solutions & Telematics business unit to provide performance-enhancing technologies for the company's product segments, which include agriculture, construction and commercial vehicles.

The company has invested in and aligned the organization to roll out vehicle telematics functionality to assure better performance and reliability, best-in-class parts availability to end customers, and increase customer loyalty. In 2014, CNH Industrial invested $1.1 billion on research & development, including its telematics systems.

> We have created an awareness on internet of things in all the business units of the company this was the first step toward the changes necessary for the future of precision agriculture"

Antonio Marzia,
Vice President Precision Solutions and Telematics

CNH Industrial – Smart, Connected Vehicle Product Strategies and Goals

In July 2013 CNH Industrial began offering the current generation of smart and connected vehicles in North America. Since then the company has accelerated adoption in other regions. In the current generation, connectivity capabilities are designed into the new vehicles.

The agricultural sector has the most potential for in-depth offerings due to influence of weather, seeds, harvesting and other aspects that are not part of commercial or industrial vehicle operations. CNH Industrial recognized the competitive pressures in the marketplace as customers come to value successful delivery of an integrated-connected agricultural eco system as a major driver for future equipment purchase decisions.

Currently CNH Industrial enables three categories of capabilities in its IoT offerings. The first category of capabilities, monitoring, enables the comprehensive monitoring of a product's condition, operation, and external environment through sensors and external data sources.

For example, for both agriculture and construction, the system can monitor machine working condition, thus enabling the customer and the repair workshop to effectively diagnose the root cause of the problem and increase speed in warranty claim management.

Another example in the area of agriculture is the monitoring of field attributes and yields to understand in-field variability. This data can contribute to analytics to select the proper seeds and fertilizers given the unique characteristics of any individual acreage.

The second category, control, uses software embedded in the product or the cloud that allows the customization of product performance and personalization of the user experience. The CNH Industrial system includes other components such as correction signals that provide sub-inch accuracy for drivers during crop seeding and harvesting. The operator can also control inputs such as seeds and fertilizer with the agricultural implements linked to the system. GPS controlled seed and fertilizer application results in lower input costs and less waste.

Connected vehicles can also predict failures and reduce downtime via remote services and help farmers monitor their fields and equipment to improve efficiency.

The CNH Industrial systems provide customers with the data necessary to optimize their operations, whether that's delivering the most yield from a field of crops or make sure that truck delivery is on schedule, by connecting the vehicles to an ecosystem built around the availability of the data.

Optimization capabilities build on monitoring and control capabilities, enabled by algorithms that optimize product operation and use in order to enhance product performance, and allow predictive diagnostics service, and repair.

Using these solutions, agricultural vehicle customers value the precision farming system for optimization of the entire farming cycle: planting, growing, harvesting and planning. Precision farming has moved from the optimization of one single machine to an ecosystem of interconnected vehicles.

Providing data to equipment owners has been a priority for CNH Industrial, and the company has committed to data standards that enhance operability and participates in research groups.

To derive value from the data collected by the telematics solutions, CNH Industrial is changing its internal working paradigm from reactive to proactive to anticipate customers' needs for service and maintenance to reduce operational downtime, for example.

In early analysis, the average time that combines, tractors, and harvesting machines are out of commission for maintenance has been reduced by approximately 50 percent due to the proactive service approach. A pilot program with 1,000 commercial vehicles will yield additional insights as well.

Future data-driven offerings could include proactive service alerts and parts supplies, based on aggregated performance data from individual vehicle types and models. For instance, the engineering data could reveal that when the water temperature on a particular model rose to certain level, 80 percent of the time the vehicle was experiencing a faulty radiator. The proactive part supply chain polls the nearest dealer's inventory for parts availability and ships the required parts when necessary.

The customer receives an alert to deliver the vehicle to the dealer for service, and telematics at the dealer recognize the vehicle when it enters the geofenced location, negating the need to fill out forms manually for every service visit. The proactive approach will also reduce the cost of repairs for CNH Industrial as the OEM and its dealer network.

CNH Industrial System Priorities

- Simple user interface & user experience
- Data-sharing platform
- Open Standard data systems
- Integrated into machines

Key Strategic Choices

One of the key infrastructure choices was to utilize outside resources to design and build the technology stack, including the connectivity platform, as it was not "our core competency," said Antonio Marzia vice president, Precision Solutions & Telematics.

The Connectivity Platform is the core of CNH Industrial's telematics business. The company made the strategic choice to use an open data architecture so that the data can be shared with the greatest number of partners and is not limited by proprietary formats. Data from vehicles is sent via telecommunication services to the platform, which distributes the data to the customer, dealer, third parties and internal analytics in accordance with data privacy regulations and customer approval. For the agriculture sector, key third party data users include seed providers, insurance companies, technology providers, agronomists, and fertilizer providers.

Two of the company's agricultural brands, Case IH and New Holland offer uniquely branded offerings – Case Advanced Farming Systems and New Holland Precision Land Management – that are customer-facing identities of common CNH Industrial Precision Solutions and Telematics components. The telematics system offers a secure but open single point of access connecting machines to multiple participants in the Ag ecosystem. The company's strategy is to create alliances with best-in-class technology providers and integrate those components into their core products, to create the most competitive offering on the market.

To maintain the data privacy and security that is at the core of all CNH Industrial systems the company faced another strategic choice around data management. All the performance data is owned by the customers who has a data access right management dashboard and can decide to share it with third parties specialists. CNH Industrial cannot access customer data unless the customer gives permission. The company retains ownership only of engineering data. The company has no plans to sell customer data.

"The data is owned by the customer and we at CNH Industrial, also provide the tools to transfer the data to service providers," said Antonio Marzia, Vice President Precision Solutions and Telematics.

Using the open data architecture selected as a strategic choice, the data sharing platform permits access to data from third-party providers.

Also, the company is developing opportunities to monetize premium-level capabilities. For instance, the company offers its new satellite connectivity product as an upgrade package to the Case Construction SiteWatch and New Holland Construction FleetForce telematics services.

With the strategic choice to use the open data exchange architecture and as precision technology costs continue to fall, some legacy players in the agricultural ecosystem are experiencing disintermediation from companies such as CNH Industrial that are developing their own connectivity strategy.

"The question is, how do we create additional value and opportunities for our customers based on authorized access to the data?" said Marco Franza, EMEA Product Marketing and Business Intelligence Director. "And what will be supply chain implications with this new approach? The set-up of the business model will be crucial for a turnaround in the industry."

Large customers will likely have their own in-house ability to utilize data, so the company is also targeting small and mid-size customers to provide easy to use analytical services. This service will allow CNH Industrial to provide services directly to end users, improving its position relative to competitors working together with its dealer network.

"We are building a model that will provide tools in order to also support small and mid-sized customers in managing more professionally their business thanks to a better control of their costs structure and giving them advice on how to improve their operations," Franza said.

Internal Business Transformation & Disruption

The Internet of Things strategy has led to internal organizational transformation to optimize resources and outcomes for customers.

To provide a consistent customer interface and technology development and support infrastructure CNH Industrial established the Precision Solutions & Telematics business unit to provide performance-enhancing technologies for the company's different product segments, which include agriculture, construction and commercial vehicles. An agricultural concern may operate tractors, farm equipment and trucks from various CNH Industrial brands and would expect the interfaces and operations to be consistent among all vehicles.

The Precision Solutions & Telematics business unit cuts across existing brand and departmental silos to provide services and integration for the company as a whole.

The central information technology organization manages the analytics, and each business unit also has cross-functional teams comprised of data scientists, information technology and technical experts for internal uses of the data.

From an internal point of view, CNH Industrial's IoT strategy involves using vehicle-engineering data to refine product design and manufacturing to optimize performance and reliability as well as drive manufacturing process improvements. The data will be used in the engineering organization to understand failure rates, mission profiling and real world organization to make changes to design which could improve product quality and customer perception.

Second, the company is shifting toward a proactive model for vehicle service. When the vehicle communicates a particular situation or condition – say overheating – the system will translate that to a specific part number for a radiator, based on aggregate service and repair history and algorithms to pinpoint the most likely cause.

The company can anticipate the service process and optimize local parts availability and place an order if necessary. The company will have to develop and analyze the historical data in order to predict failures and translate that to specific maintenance procedures and parts numbers and overlay that with the supply chain. Service technicians will have to be as familiar with a tablet and data analysis as they are with a wrench.

"Up-time on commercial vehicles is very important so customers will appreciate knowing that parts required to repair their vehicles will be on the shelf where and when needed," said Franza.

Internally, the company is coming to terms with how to utilize the product data for service as well as manufacturing improvements.

The company could monitor vehicle performance and push notices to vehicles for service. For instance, currently the company has the capability to alert the operator and the customer to have the vehicle serviced and display the nearest service location. Or technicians could be dispatched to the site if necessary.

The company must re-think and optimize its supply chain to support such a proactive service culture. A reactive response to a vehicle failure could mean using more expensive carriers to ship the necessary parts for the repair. With a longer lead-time, less expensive shipping methods could be used.

Product usage and performance data is shared internally to improve quality, understand failure rates, and enable design changes to reduce the complexity or placement of parts that are prone to failure. These opportunities can change the value chain substantially, with maintenance being scheduled rather than handled on a failure bases, less waiting time for parts, and improved vehicle uptime from pro-active maintenance and repair strategies. For CNH Industrial, the engineering data can be used to optimize production design and processes, resulting in lower engineering and production costs and lower warranty costs due to improved reliability.

Internet of Things Business Maturity

With proven results already, CNH Industrial continues to transform its business to optimize its IoT strategy.

The company is exploring options for business models for the telematics services that it offers and plans to offer in the future. For parts and service, the model must incorporate the dealer network as well. The company is also exploring additional revenue opportunities driven by connectivity.

In the future, customers could allow the company to transmit vehicle performance data to insurance companies for safe driving discounts, for example. This information exchange would have to be covered under appropriate privacy agreements among all the parties.

Ultimately the CNH Industrial vision is to ensure that its customers view the vehicles as an important part of an ecosystem, interacting with logistics, fleet management, field optimization systems and third party providers.

"The goal of the data services is to provide the end customer the answer to the big question: how much is the cost of the vehicle, how much is the cost per acre, per hour, or per kilometer of my system," Marzia said. And the customer wants to know what is the best decision to make to improve the costs per unit."

As the telematics strategy evolves, CNH Industrial will examine more transformative business models based on performance guarantees and product-as-a-service enabled by the robust data. Given the capital-intensive nature and long life cycles of the company's products, is under consideration as part of the company's transformative vision for the future.

J6081-CNH-Industrial-CS-EN-1015

IoT ONE Featured Case Study

Accelerating the Industrial Internet of Things

IoT ONE is widely recognized as a leading Industrial IoT research firm, opinion influencer, and go-to-market channel.

1. Create a **free account** to view and download hundreds of IoT case studies and supplier profiles.

2. Already have an account? **Feature** your case studies, and your hardware and software solutions.

3. You can connect with us via email at **team@iotone.com**.

www.iotone.com