How Smart, Connected Products Are Transforming Manufacturing Operations

A manufacturing operations view of the new Harvard Business Review article, How Smart, Connected Products are Transforming Companies

THE DEFINITIVE ARTICLES ON THE IoT

PTC President and CEO, Jim Heppelmann, and Professor Michael Porter of the Harvard Business School, collaborated on a multi-year research project to understand the impact of smart, connected products, commonly referred to as the "Internet of Things," on competition and companies.

The findings of their research were published in two Harvard Business Review articles, How Smart, Connected Products Are Transforming Competition published in the November 2014 issue, and How Smart, Connected Products Are Transforming Companies published in the October 2015 issue.

Michael Porter
Harvard Business School

Jim Heppelmann
President and CEO, PTC

"Smart, connected products will give rise to the next era of IT-driven productivity growth at a time when the impact of earlier waves of IT has largely played itself out."

– November 2014

"Smart, connected products are transforming how companies design, manufacture, operate and service products, and ultimately, how they organize to create and capture value."

– October 2015

TRANSFORMING COMPANIES: EXECUTIVE SUMMARY

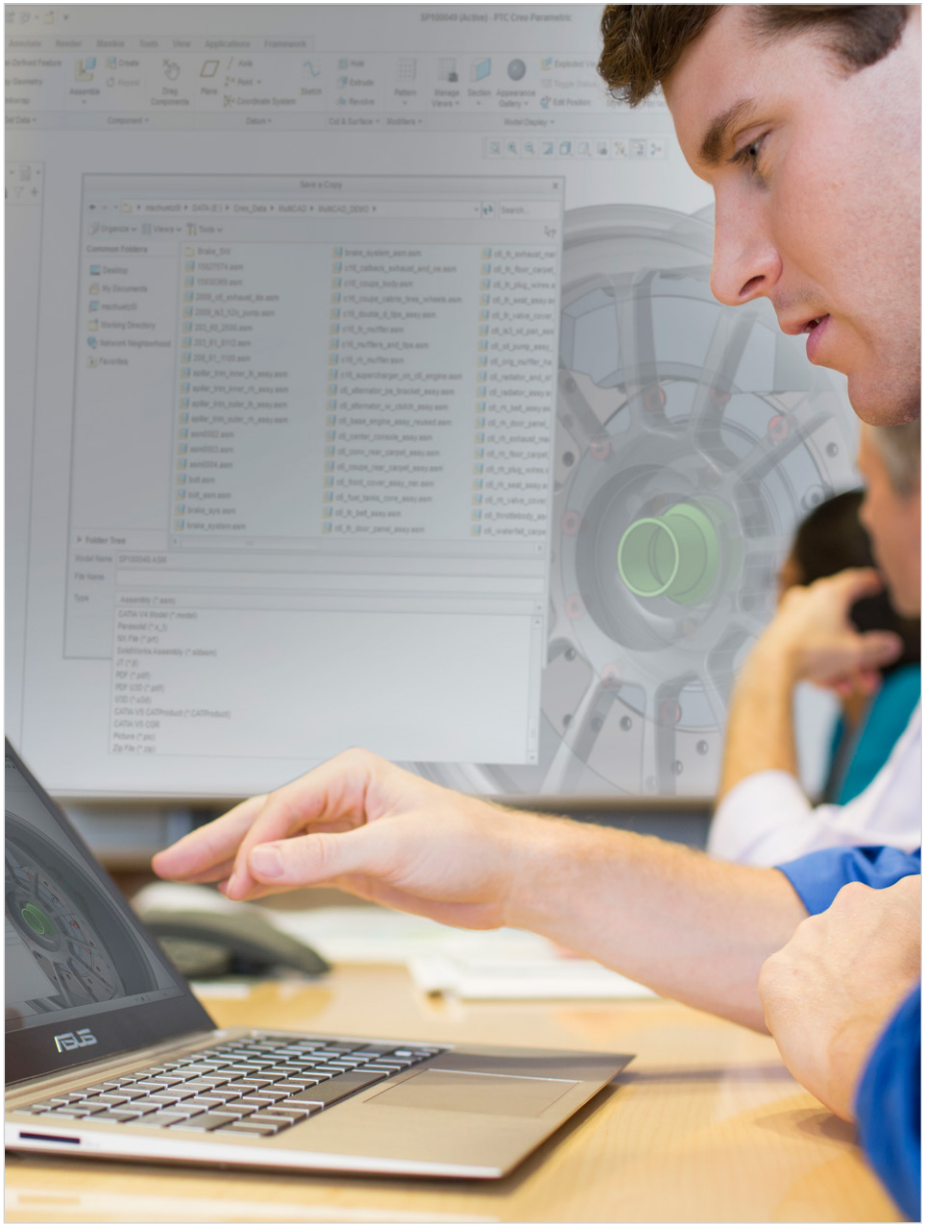
How Smart, Connected Products are Transforming Companies, the second in this two-part series, focuses on the impact of smart, connected products on companies' operations and organizational structure.

The unprecedented data and capabilities that smart, connected products generate are driving this transformation. The impact is reshaping the work of virtually every function in the Value Chain, including product development, IT, manufacturing, logistics, marketing, sales, and after-sale service.

In addition, new forms of cross-functional collaboration and entirely new functions are emerging:

- **IT & R&D Collaboration:** Reflecting the new need for IT in product development
- **Unified Data Organization:** Handles enterprise-wide data management and analytics
- **Dev-Ops:** Oversees ongoing product updates and efforts to shorten product-release cycles
- **Customer Success Management:** Ensures customers gain ongoing value to reduce churn

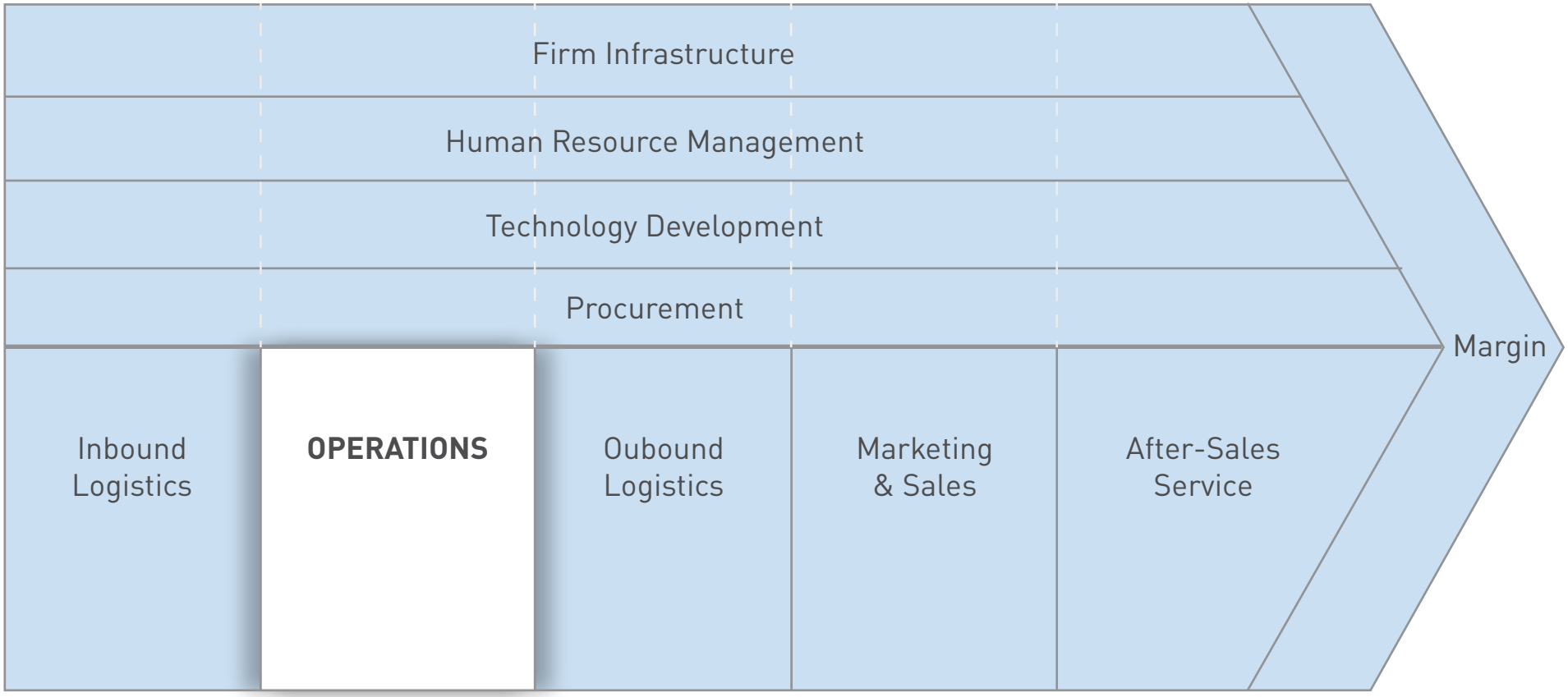
How will manufacturing operations need to transform in order to capitalize on the unprecedented data and capabilities that smart, connected products generate?



TRANSFORMING THE VALUE CHAIN

The Value Chain, a concept defined by Michael Porter in his 1985 best-seller Competitive Advantage, are the many discrete activities a firm performs in designing, producing, marketing, delivering and supporting its product. Each of these activities contributes to a firm's cost and creates a basis for differentiation, which enables competitive advantage. Using Porter's Value Chain framework, the impact of smart, connected products on each activity is analyzed.

The "Operations" activities include the production process, development activities, testing, packaging, equipment maintenance, product operations and all other activities that transform the inputs into the finished product or service.



TRANSFORMING MANUFACTURING OPERATIONS

Smart, connected products create new production requirements and opportunities. They may even shift final assembly to the customer site, where the last step is loading and configuring software. But more radical still, manufacturing now goes beyond the production of the physical object, because a functioning smart, connected product requires a cloud-based system for operating it throughout its life.

These new manufacturing operations principles are becoming foundational for competing in a smart, connected world:

- **SMART FACTORIES:** The new capabilities of smart, connected machines are reshaping the operations of manufacturing plants themselves, where machines increasingly can be linked together in systems. Industrie 4.0 and Smart Manufacturing initiatives analyze machine data for insights on cutting downtime and improving efficiency.
- **SIMPLIFIED PHYSICAL COMPONENTS:** The physical complexity of products and production processes often diminishes as functionality moves from mechanical parts to software. As the physical complexity of products decreases however, the quantity of sensors and software rises, introducing new parts and complexity.
- **RECONFIGURED ASSEMBLY PROCESSES:** Software in the product or in the cloud can be loaded or configured well after the product leaves the factory, so that product configuration or design changes and enhancements can be incorporated later in the process, or even remotely and after delivery. For example, new apps can be added or touchscreen keyboards set up for different languages.
- **CONTINUOUS PRODUCT OPERATIONS:** Until now, manufacturing has been a discrete process that ended once the product was shipped. While the physical product may be complete, manufacturing goes beyond physical production via a cloud-based system that the manufacturer must operate and improve throughout the product's life.

INDUSTRY ANALYST PERSPECTIVE

Enabling Manufacturing: Transformation with the IoT

— By **Matthew Littlefield**, *President and Principal Analyst,* LNS Research

Last month Michael Porter and Jim Heppelmann published a follow-up to their seminal November 2014 Harvard Business Review article on How Smart Connected Products are Transforming Competition. In this newest installment, Porter and Heppelmann, focused on How Smart Connected Products are Transforming Companies.

LNS Research agrees with the duo in that Smart, Connected Products and the Industrial Internet of Things (IoT) will transform the internal operations of companies and how companies interact with the rest of the value chain. In a recent LNS Research blog post, I highlighted the IIoT Platform, Big Data Analytics, Business Model Transformation, and Manufacturing Systems Transformation, and Organizational Structure Transformation as the top areas that will be impacted. In this article I will drill down into one of the most important areas highlighted by Porter and Heppelmann: How manufacturing will transform and the emergence of Smart Factories.

Read the full article on PTC.com.

LNS research

SUMMARY

The capabilities and data generated by smart, connected products dramatically increase the opportunities for value creation and higher productivity, but require companies to build and support a new technology stack and face 10 new strategic choices.

This innovation is going to transform the nature of work across all business functions, starting with product development, which require new skills such as software development, data science, UI design, IoT security, and systems integration, that are in short supply.

We are still early in the transformation and the organizational transition will be evolutionary, with old and new structures operating in parallel for many years.

To get started however, it is critical for companies to align on these concepts across business functions and define a comprehensive strategy. Defining and prioritizing IoT use cases, like Connected Operations Intelligence, to pilot is the clearest path to creating value. If you're ready to go from thinking about IoT to winning in the new competitive environment of smart, connected products, request an Innovation Workshop.

J6334–How-Smart-Connected-Products-Transform-MAnufacturing-Operations –EN–1115