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THE INDUSTRIAL INTERNET

SIX CRITICAL QUESTIONS FOR EQUIPMENT SUPPLIERS

By Massimo Russo, Richard Helm, and Grant McCabe

The Industrial Internet is here: smart, connected machines generating prodigious amounts of data that can be analyzed to improve operations. Inexpensive sensors, ubiquitous connectivity, the ever-declining cost of microprocessors and storage, and the emergence of cloud-based storage and software have made this shift possible. Traditional capital-equipment suppliers—which have historically focused on mechanical- and electrical-engineering disciplines—will need to rethink their business models and respond with new data- and software-enabled services. Implemented correctly, these new business models will allow suppliers to strengthen their ties to the customer and create new revenue sources.

There is tremendous value at stake. For downtime-sensitive applications—including, manufacturing and process industries—such technology can provide predictive-maintenance services that increase equipment reliability. For example, Trane, a wholly owned subsidiary of Ingersoll Rand, makes HVAC systems embedded with digital sensors that allow the company to resolve nearly a third of customer problems remotely.[1] Similarly, equipment providers can analyze customers' equipment data and provide services to improve performance: the potential increase in productivity through optimized, data-driven operations for customers can drive productivity increases of up to 30 percent.

Yet while the promise of the Industrial Internet is significant, incumbent suppliers will need to take specific measures in order to capture that promise. Intermediaries such as system integrators and software companies are marketing "smart" everything and positioning themselves to capture the data and software layers within existing processes. New start-ups are also forming to provide data-hosting and analytics services to equipment customers. For example, there are hundreds of start-ups providing fleet management software for truck operators, potentially disrupting truck OEM and fleet operator relationships.

Given these shifts, equipment suppliers need to rapidly define their strategy to cap-

ture the potential of the Industrial Internet. Specifically, they must shift from a business model built around engineering, product development, and manufacturing to an information-based model that leverages data, analytics, software, and services to unlock value. In navigating this change, suppliers need to address six fundamental questions.

How Is Data Creating New Value?

Designing smart, connected equipment that collects operational data is merely table stakes. Suppliers need to understand how to unlock value through the collection and analysis of data and cultivate the ability to change the operational performance of their machines remotely. For example, aircraft engine manufacturers can make in-flight adjustments to optimize fuel efficiency. (The worldwide market for aircraft-performance-monitoring systems, which is now worth more than $2.2 billion, is projected to grow at a compound annual rate of 6.8 percent through 2020, to more than $3.3 billion.)

Suppliers can begin by optimizing their own machines—for example, by providing predictive-maintenance services—but they also need to understand what data to capture and at what resolution and frequency, as well as how to analyze that data to deliver insights that customers can act on. It is critically important that this information be linked to value—such as the potential savings for customers in downtime prevention and improvements in operational performance.

Suppliers generally understand that data-driven analytics could be valuable, but they struggle to determine where they should start. They need to define specific use cases, clear value propositions that address specific customer needs. For example, a service provider in the trucking industry might collect data on operators' driving patterns and how to improve them to save fuel. In a more advanced version, a GPS-linked algorithm could anticipate elevation changes in the road and recommend an optimal speed to minimize braking and acceleration on declines and inclines.

How Fast Will New Business Models Emerge?

Historically, equipment suppliers have been limited in their ability to exploit technologies for competitive advantage, primarily because the technologies themselves were expensive. (Noteworthy exceptions are companies that develop highly advanced reliability-critical products, such as jet engines, with a large aftermarket to protect. These companies can justify correspondingly high R&D budgets.) Yet the cost barrier is falling fast. Today, the capital investment required to innovate through technology has dropped significantly, even as the sophistication of potential solutions has improved.

For example, the cost of embedding 3,000 smart sensors in a new power-plant boiler has fallen to less than 1 percent of the total manufacturing cost. Adding 100 to 200 sensors to a large mining truck adds just 0.5 percent in incremental manufacturing costs. The potential value of the information those sensors generate is significant for individual equipment components. But it is magnified once a critical mass of equipment is connected and smart. Also, once an entire fleet is connected, a transportation provider can optimize operations by dynamically rerouting trucks to improve service levels, utilize capacity more efficiently, and reduce travel time.

That said, if equipment lives are long and there is no retrofit opportunity, adoption rates will be slow. Additionally, suppliers should not underestimate potential disruptions—such as a simple smartphone app that replaces expensive onboard telematics equipment. Is there a disrupter (like, say, Uber in the limousine and taxi industry) that leverages smartphones for connectivity and dramatically changes an industry? Could a simple, low-cost temperature and acceleration sensor with a processor and mesh network create an easy retrofit opportunity and capture enough data to address valuable customers' pain points? An assessment of adoption rates will have to take these factors into consideration.

There are other factors at play as well. The race to set global industrial standards is

heating up, with the recently formed, U.S.-led Industrial Internet Consortium and the Germany-led Industry 4.0 initiative as examples. Equipment suppliers as well as countries (in this case Germany) want to establish a leading position by setting standards early.

Venture capital firms are directing their attention—and investments—to Industrial Internet companies, making more than $1.1 billion in Internet of Things investments in 2013 alone.[2] Evrythng, a start-up that designs software that helps manufacturers connect with clients and partners through their own products, recently received $7 million in funding from a range of venture capital investors and technology players, including Cisco. Such innovation is accelerating as Silicon Valley increasingly focuses on creating platforms for connected smart machines.

The degree of competition is understandable: large system integrators, software vendors, and technology providers see the Industrial Internet as a lucrative opportunity to help manufacturing companies capture the value. For example, Taleris, a joint venture of General Electric and Accenture, focuses on airline fleet optimization; SAP has developed a predictive-maintenance offer that leverages its software and analytics tools; and GE has announced that it is opening its Industrial Internet platform for others to use. Given this spate of activity, however, equipment suppliers must understand the dynamics in their industry, including how fast new services will emerge in their industry, what trigger points may accelerate adoption, and who the potential disruptors are.

How Will Industry Structures Change?

Capital-equipment suppliers have long benefited from a relatively stable value chain, which, in some sectors, dates back to the industrial revolution. In comparison, the high-tech industry has much shorter product life cycles and more frequent disruptive innovations that are driven by software as well as hardware. As a result, industrial-equipment suppliers now face accelerated innovation cycles, as new entrants with strong capabilities in software, data, and analytics join the market and either replace high-margin services or invent whole new markets.

For example, Nest Labs' introduction of the connected intelligent thermostat (and Google's subsequent acquisition of Nest) has been a wake-up call for suppliers of building-control devices. A division of Google is seeking to provide energy management services that are enabled purely by data, encroaching on the market and customer interface historically occupied by equipment providers and utilities.

Similarly, a start-up called FirstFuel Software can provide energy efficiency services to commercial real-estate clients through data analytics. In this environment, industries are moving away from traditional, linear value chains to much more complex ecosystems. Pure hardware providers that do not adapt run the risk of becoming commodity businesses or worse—obsolete.

As the industry structure evolves, certain assets will become more relevant sources of innovation and growth. These include the right to monitor and control installed equipment and devices, more comprehensive industrial-software platforms that enable ecosystems (either open or proprietary), and new software- and data-enabled services that provide more than the traditional suite of basic repair, support, and maintenance.

How Do We Play in This Space?

Determining how to play requires a deep understanding of the value creation potential of data across the production chain; knowledge of where the hardware, data, analytics, and software control points are; an assessment of potential business models and their economics; and an overall view of how the ecosystem of players may evolve. Because there is such a high degree of uncertainty, we advocate using several tools to explore the various positions industry players might take and to determine where profit pools could migrate. These include scenario planning (a disciplined

method of constructing alternate futures within the company's external environment), engaging in war games (assessing decisions in the context of the competitive environment), and stress-testing (exploring key assumptions and critical levers that support specific strategies).

However, as digital technology becomes more pervasive, equipment suppliers have one key advantage: because they are in the best positions to harness the information asymmetry from their installed bases, they have a greater ability to detect trends across fleets and can, thus, provide clearer insights to their customers.

What Capabilities Do We Require to Win?

Once it defines a clear strategy for playing, an equipment provider needs to conduct an honest assessment of internal capabilities. The addition of sensors, actuators, and more advanced control systems into equipment greatly increases the software-engineering and integration skills required. The data stream needs to be captured, stored, and analyzed, and this will require new capabilities in cloud-based storage, big-data analytics, and software solutions. These capabilities traditionally fall within the IT function, which is generally ill suited to deliver customer-facing applications.

Accordingly, companies need to consider several critical questions. Does the organization have the agile software-development and user experience capabilities to launch high-quality customer-facing applications? What are the capabilities of the engineering team for developing embedded software? Is corporate IT the right function to support new customer-facing data services? What software product-management capabilities are needed?

It is essential that companies decide which capabilities to develop internally and which to fill through external partners, vendors, or acquisitions. In many industries, an ecosystem of solution providers is already emerging, allowing suppliers to close any internal gaps quickly.

How Do We Get Started?

Manufacturers need to develop compelling use cases—based on real customer needs—for an integrated hardware, data, software, and services offering that leverages not only internal capabilities but also the full power of an ecosystem. There is a basic path manufactures can follow to capture the promise of the Industrial Internet.

First, they need to gain a clear understanding of the customer value proposition—that is, the specific need that a solution will address. That accomplished, they should determine what data could be collected from the installed base (either of new equipment or through a retrofit program) and capture the most granular data available from customers. Next they have to clearly articulate the "minimum viable product" that should be released to a customer. The value proposition can be built around optimizing equipment performance, preventing downtime, or providing decision support to customers (for example, optimizing a machine's performance or planning a particular operation). At this point, the manufacturer should conduct a pilot, testing an initiative and getting early feedback that can be applied to building out the product and service portfolio. The goal must be to manage the software like a product.

According to GE, the pace of change is about to accelerate, and the twenty-first century's Industrial Internet revolution will be on the scale of the nineteenth century's Industrial Revolution, with correspondingly large opportunities for equipment manufacturers that seize the initiative. In this environment, manufacturers must ask themselves a tough question: Do we have a clear strategy and plan in place to capture the emerging profit pools?

Notes

1. Nancy Pardo, "How Smart, Connected Products are Reshaping Manufacturing," *PTC,* September 1, 2013, http://blogs.ptc.com/2013/09/01/how-connected-products-are-reshaping-manufacturing/.
2. "Internet of Things Companies Haul in More than $1 Billion in Venture Capital in 2013," *CB Insights,* March 18, 2014, http://www.cbinsights.com/blog/internet-of-things-investing-snapshot/.

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