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Industrial IoT Demands 'Platforms' and Intelligence at 'the Edge'

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Industrial IoT will increase production and inspire new business models with intelligence-driven innovation, but operators must first invest in IoT "platforms" and in moving intelligence to the edge of the network so they can fully monetize the performance and latency advantages of smart industrial applications.

The Industrial Internet refers to the combination of Big Data analytics with the IoT. Industrial IoT will affect nearly two-thirds of GDP, and revolutionize how humans, machines, sensors, actuators, devices, objects and "things" interact. Already, 8.4 billion things are connected worldwide, 3.1 billion of which are being used by business and industry, according to Cisco estimates.

The total potential economic impact for IoT will amount to $3.9 trillion to $11.1 trillion a year by 2025, representing about 11 percent of the world economy, according to research by the McKinsey Global Institute (see Figure 1).

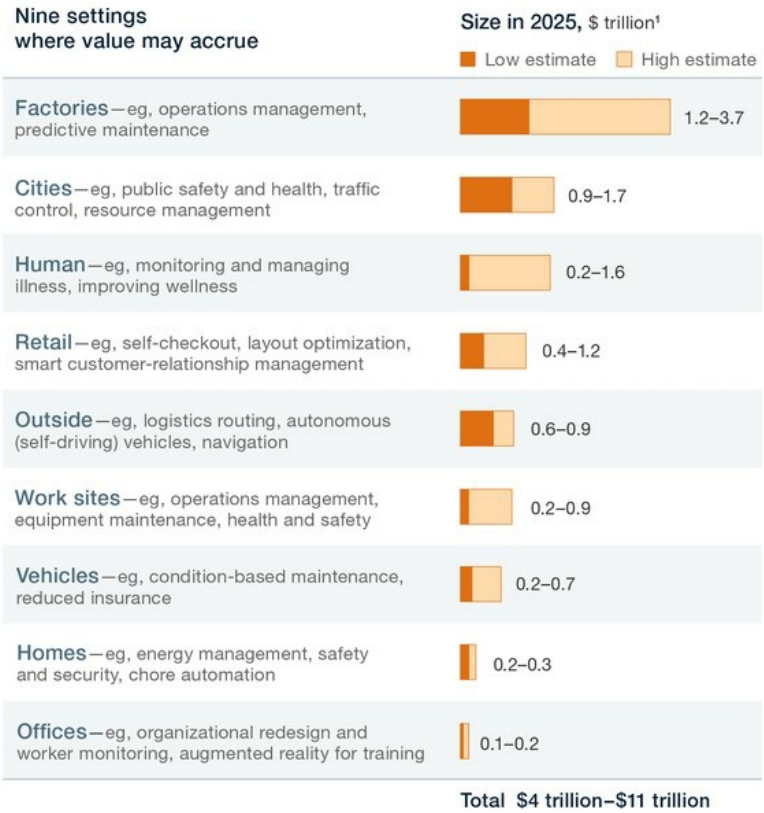

Figure 1: The IoT offers potential economic impact of $4 trillion to $11 trillion/year.
Source and courtesy of McKinsey

The beauty of industrial IoT is that it is vast and expansive enough that no one company can dominate; innovation comes from the collaboration and complementary expertise shared among many stakeholders. First movers in key industries are working rigorously to build IoT ecosystems in which value chain partners can bring to the table once-competitive capabilities that now must become complementary. In interconnecting "all" everyday and industrial "things" in a programmable and intelligent way, the IoT becomes an accelerating agent of digital transformation for many companies across all verticals.

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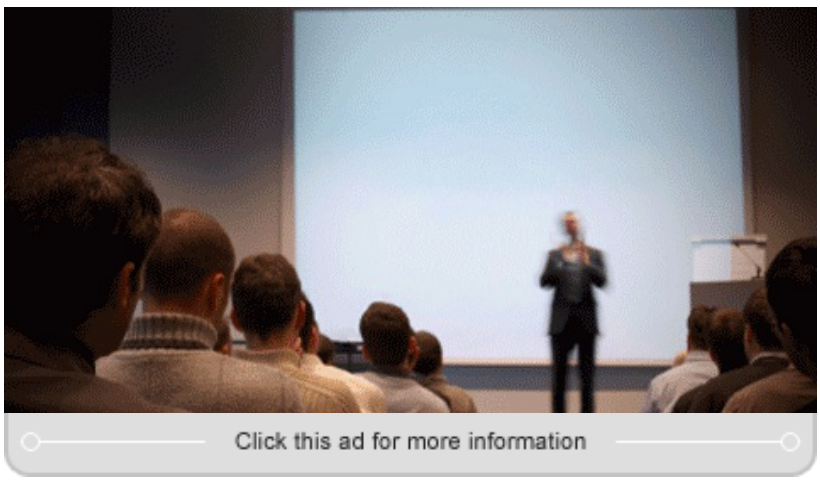
For example, in connected agriculture, interconnections are being forged among farm equipment, fertilizer and seed companies, weather services, as well as the suppliers of IT, telecom, sensors, analytics and other products and services. Connected agriculture will grow to $3.06 billion (USD) by 2021, at a CAGR of 17.9 percent, according to MarketsandMarkets research. That market spans network management, smart water management, device management, application enablement for farm planning and management, and agricultural finance. It is a lot to cover, and John Deere, Monsanto and other giants are evaluating how these elements of precision agriculture can accommodate the 70 percent increase in food production needed by 2050 to accommodate population growth.

In manufacturing, GE is fueling a “Brilliant Factory” initiative with the concept of “generativity” — where companies large and small from Cisco to PTC, to startups like Bit Stew and Maana, work together to harness the power of manufacturing data and to create rich application enablement environments through enhanced product lifecycle management (PLM) and data mashups. Each IoT partner becomes part of role-based manufacturing dashboard, contributing to and accessing powerful analytics and actionable data. GE predicts investment in the IoT will top $60 trillion during the next 15 years.

In healthcare, the push for value-based care is connecting medical practitioners, patients, telehealth systems, OEMs, healthcare system integrators, pharmaceuticals, hardware and software companies. With cross-device connectivity and implementation of smart features into medical devices and related software systems, a medical ecosystem can improve continuous care and remote management of patients.

Giants like Merck, Philips (Healthsuite) and Qualcomm (QualcommLife) are evaluating how IoT healthcare ecosystems can improve patient care, operational efficiencies, manufacturing of drugs, and other capabilities.

The healthcare sector’s IoT solutions are expected to reach a staggering $1 trillion by 2025, in large part due to the sheer complexity of the market, which includes an ever-expanding universe of objects and things, including: wearable sensors, eHealth IoT applications, machine learning for signal processing, quantified self devices and technologies and data processing, predictive eHealth algorithms, smart homes and smart caring environments, data mining of health data, wireless sensor and actuator networks, among other variables.



As in these industries, momentum is sweeping the energy, transportation and logistics, security, connected car, government surveillance, and retail inventory and warehousing sectors as well. The common thread among all industries is the hope that the IoT can increase production and engender new business models with intelligence-driven innovation. It can foster operational, strategic and competitive gains in the near term, and perhaps economic growth and enhanced competitiveness worldwide in the long term.

The Evolution Toward IoT 'Platforms'

Just how CSPs will capitalize on the IoT remains to be seen. Many are evaluating which industrial

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IoT use cases are relevant to their enterprise customers, and how big a role they want to play in facilitating or participating in the IoT ecosystem.Those who enter the fray compete long term with big operational vendors like GE, Siemens, Bausch, or IT players like SAP, Microsoft and Oracle, or even systems integrators and outsources like Fujitsu and Accenture. These companies curry favor with enterprises by boasting integrations to ERPs and manufacturing apps through what they tout as “end-to-end” solutions.

“As a result, CSPs have to become more platform centric and unite what are currently islands of IoT apps and innovation,” says Gartner’s Eric Goodness, research vice president, IoT Group. “It's the SIs that eat, breathe and sleep enterprise integration, so CSPs will either pull them into partnerships through connectivity, or perhaps build out their own integrations.”

He notes that some network operators are selling connections and reselling hardware on the IoT edge, “but then they take a leap over to fleet management and other vertical applications with everything living in silos,” adds Goodness. “Throwing SIM cards at everything is fogging the mirror and doesn’t really make IoT frictionless for enterprises.”

For those that don’t yet have organic IoT platforms, significant work is underway to structure relationships around third-party app and service providers for capabilities like device management and managed services, which will ultimately help CSP enterprise customers work through PoCs, field trials and production systems with less risk.

In other words, CSPs are attempting to integrate into enterprise applications through platforms at least tangentially related to IoT. The goal is to scale and foster reuse of common components among different use cases and verticals by eliminating the multiple IoT silos that force case-by-case integration, higher operational costs and inhibit growth.

While the concept of “platform” is being debated and conceptualized among CSPs, there is momentum worth noting. For example, AT&T’s Control Center (powered by Cisco Jasper cloud-based IoT platform) orchestrates SIM management, connectivity, and change management. It complements AT&T’s M2M Data Storage Services (M2X), which are built to move enterprises toward sophisticated connectivity, device management, data orchestration, and data visualization. “Our industrial applications are focused on automation, SIM activation rules and comprehensive diagnostics,” says AT&T’s Lisa Park, assistant vice president, connectivity product management and channel enablement. “We help enterprise customers do more than just collect or harvest data off interconnected devices, as they want to derive meaningful insight and make better real-time decisions about how to run their businesses better.”

The GSMA’s Mobile IoT Initiative also is yielding impressive results, with collaborations emerging among CSPs to build IoT platforms: China Telecom and Telenor Connexion, for example, launched a common IoT/M2M platform to serve each other’s multinational enterprise customers on their collective networks in Europe and Asia, with integration of their cross-border eUICC (eSIM) platforms. China Telecom also forged a similar multinational IoT/M2M eUICC agreement with Orange Business Services covering Asian, European and African markets.

When global CSPs work together in this manner, they can do make tremendous strides in advancing emerging technologies, In this case, AT&T, Verizon, Vodafone, China Mobile, China Unicom, China Telecom, and Deutsche Telekom (DT) are working on low power wide area (LPWA) networks — considered one of the more important wireless connectivity technologies for enabling industrial IoT to take off.

How ‘Edgy’ Will CSPs Get in Industrial IoT?

In an increasingly crowded IoT market place, running networks is going to be the obvious competitive advantage for many CSPs, as will be their expertise in deploying IoT and end user services focused on vertical needs (i.e., fleet management, smart home, eHealth, lean manufacturing). Through managed services and “as a service” business models, they will more readily monetize industrial IoT.

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Many operators are starting to position themselves around IoT edge-centric offerings from which they can connect assets, processes and people, as well as provide insight into data through analytics. Moving away from centralized data centers is smart, since the edge of the network is the logical point for the IoT-supporting pillar of 5G, where the agility of NFV and programmability of SDN can come together.

The challenge — as millions of IoT devices come onto mobile networks, streaming information to Internet cloud applications — will be achieving ultra-responsiveness and higher degrees of intelligence in industrial IoT applications. To succeed, CSPs will have to process content at the very edge of mobile networks, giving them the ability to monetize the performance and latency advantages that come from putting their IT resources near base stations. For example, delivering video via a local cloud at the network edge, close to the subscriber, will greatly reduce latency compared with a video appliance in the cloud.

By opening up edge computing infrastructure to third parties like Web-native companies and application developers, operators will be able to generate new revenue streams through as-a-service offerings they make available in the cloud.

As this happens, “there will be a need for intelligent communication between the edge and the cloud to balance the forces of memory and processing in relation to time for decision making, according to John Crupi, vice president and engineering system architect at Greenwave Systems. “When a manufacturer, for example, wants real-time pattern recognition to reveal when industrial parts are exhibiting potential failures, there is a great advantage to having analytics at the edge.” He notes this is particularly true when doing AI learning or training deep-learning networks. “In those instances, you might have thousands of images coming in from cameras and sensors for pattern matches that you have to do in real time. By doing this at the edge, you enable a progression of raw data to analytics processing to pattern processing to AI processing. The cloud then becomes a support infrastructure rather than the source of where all the analytics is done, which makes things much faster and efficient.”

This is the ideal for use cases that require high service uptime and low-latency communications, regardless of where the end user is located, such as fast augmented reality (AR) and virtual reality (VR) tactile Internet applications, vehicle-to-vehicle communications, and mobile HD video.

Formal specifications for edge technology are emerging from theEuropean Telecommunications Standards Institute (ETSI), and proofs-of concepts are starting, as with the HPE and Intel collaboration for service agility with 5G-ready telco edge.

In these standards and POCs, multi-access edge computing (MEC) is becoming a focal point for putting intelligence at the edge of the network through virtualized core systems, network access control, virtualization of the customer edge, and data center optimization, among other capabilities.

By bringing content and applications to data centers in the RAN, MEC is expected to help operators branch into services not ideal for cloud-hosted environments, as with those requiring intelligence in remote and less-than-optimal environments. After all, achieving true IoT means “everything” connects “everywhere,” not just in densely populated areas replete with all the technologies necessary to make things work.

Other enabling technologies important to industrial IoT will be macro and small cell base stations — ideal for places where operators need to improve network efficiency, and management and monitoring capabilities — and ubiquitous fixed wireless access (FWA) in 5G and other generations of wireless and mobile technologies coming our way.

As IoT is increasingly distributed across edge and cloud, the technological advances in MEC, small cells and fixed wireless communications will come together with advances in AI and machine learning, containers, microservices, and blockchains to bring decision making capabilities to the network’s edge.

These advances will open a world of use cases and opportunities for CSPs in many areas affecting industrial IoT, such as autonomous driving, connected homes, smart cities, VR and AR, and drones. Facilities-based service providers that own the access network will be particularly well

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positioned, as they will leverage their network infrastructures to provide what others cannot: carrier-grade performance, scale, and rich stores of customer data. These are coveted capabilities for enterprises seeking managed services, wide-area IoT solutions and applications at low cost and with fast time to market.

It will be incumbent on CSPs to work toward platform-centric approaches either alone or with partners to help integrate the edge and platforms into the enterprise, and to automate IoT operations in order to monetize what enterprise customers need in terms of IoT-specific analytics, app development and deployment, IoT management and anything that helps them digitize the industrial space and drive supply-chain optimization.