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Connecting Manufacturing IoT to Complete the Enterprise Data Cycle

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Enterprise Data Cycle: The Concept

Enterprise data is becoming one of the most significant assets of large industrial companies, with the data itself potentially becoming more important than physical corporate assets. Management of this data has become perfected over the last generation and is now moving to the next generation of data capture and analytics. The current situation of data management within large enterprises can be characterized as unique areas of data inputs and analytics, which feed into Enterprise Resource Planning ("ERP") systems such as Oracle, Dynamics or SAP. This complex system of interconnected enterprise information is further optimized and integrated into a uniform platform as a cloud-based infrastructure supported by Internet-enabled devices such as process control systems and sensors.

Data that is generated throughout an organization can be viewed as having a "life cycle," beginning with a customer order and ending with a delivery. Data generated in this life cycle can deliver powerful insights and efficiencies if managed and monitored, yet enterprise information tends to gravitate toward individual cycles of interconnecting data sets and related analytics. These individual cycles, referred to as Operational Data Cycles ("ODCs"), feed into a larger Enterprise Data Cycle ("EDC"), where enterprise business analytics can occur, yielding true Business Intelligence. Enterprises around the globe have understood this interconnectivity for years, but now, with the introduction of cloud-based IoT implementation for industry, the impact and value of enterprise data can rise exponentially. Hidden costs, liabilities or efficiencies can be identified in real time across the enterprise as the life cycle of data revolves within the enterprise.

IMPACT

Using real-time data to predict and prevent breakdowns can reduce downtime by 50 percent.*

Implementing IoT across industrial worksites could yield $160 billion to $930 billion economic value by 2025.*

Better predictive maintenance using IoT in manufacturing could save $630 billion per year in 2025.*

* McKinsey Global Institute, June 2015 http://ow.ly/XGrTL

Operational Data Cycles

The Enterprise Data Cycle is comprised of four key underlying Operational Data Cycles:

1. Customer Experience Data Cycle
2. Supply Chain Data Cycle
3. Manufacturing Data Cycle
4. Distribution/Care Data Cycle

Each cycle may operate simultaneously and independently as data is collected, transmitted, analyzed and processed to create feedback loops of input and output, or response to the data.

If all four ODCs are functioning optimally, they work interdependently with the others. If they are connected with one another in real time through an IoT cloud infrastructure, then more complete, accurate and useful information results, completing the EDC and resulting in higher productivity.

Customer Experience Data Cycle

The EDC begins with customers' needs/wants, depicted by the Customer Experience Data Cycle. Customer input can be the life blood of any business. Analyzing that input, developing demographic profiles, and analyzing price elasticity, marketing impact, etc., all drive this ODC. CRM systems notably excel in managing this single ODC, but do so at the risk of limiting real value potential by not being fully integrated across an organization. Any intuitive business understands that the information that defines customer experience impacts research and development and fine-tunes supply chain needs. Through an IoT-optimized cloud solution, this data can be shared in real time with other parts of the Enterprise Data Cycle, improving efficiency and accuracy in supply, production and delivery.

Supply Chain Data Cycle

Adapting to meet customer demand through research and development and product customization, the supply chain generates data about the availability of products to sell. The Supply Chain ODC may monitor materials and costs, the skills and talents of individuals and groups involved, and any necessary re-design or sourcing that may be required by market demand. Product engineering teams cooperate with sourcing teams to determine these requirements, but if this information is integrated with other ODCs, it can yield an ever-increasing return on investment in a fully deployed IoT strategy.

IMPACT

Operations optimization through IoT can increase overall worksite productivity by 5 to 10 percent, in addition to cost savings from more efficient use of equipment, people, and materials.*

Worksite automation can yield cost savings of up to 40 percent.*

Activity monitoring to improve productivity across worksites could generate $15 billion to $30 billion of economic impact in 2025.*

* McKinsey Global Institute, June 2015 http://ow.ly/XGrTL

Data, when uploaded to the cloud and driven autonomously by IoT connections with other parts of the EDC, results in a just-in-time supply chain that reacts in real time to customer demand and needs, manufacturing adjustments and distribution requirements.

Manufacturing Data Cycle

Various data can be collected and analyzed about the manufacture of the product, including production management and the efficiency of processes. Information about maintenance systems, HSE considerations and

quality control ideally provide on-the-spot insight into the efficiency and efficacy of the manufacturing process. When various IoT tools operate in coordination, the collective data generated can reveal issues surrounding synchronization and process flow. In any refined process or ecosystem such as manufacturing systems integrated with the entire enterprise, the real, opportunity or inefficiency costs of dealing with exceptions are disproportionately expensive or impactful. Timeliness and accuracy of such manufacturing/production data can have greater significance to the organization than do the impacts of any of the other ODCs.

In an industrial manufacturing facility, data hosted in a cloud infrastructure enables process control systems, early warning detection devices and a myriad of other digital tools. These tools deliver a broad range of actionable information directly from hazardous locations, where a company's largest investment is typically located and where its risk is highest.

Delivery and Customer Care Data Cycle

The shipping and delivery of product to the customer is the final piece of the data cycle, with distribution information being collected and analyzed to increase efficiency, and customer engagement data being used to improve performance and service. Ongoing support and customer reengagement completes the data loop, providing feedback for continued progress in customer care.

IMPACT

Equipment manufacturers could gain $10 billion per year by 2025 from IoT data-derived improvements in the design of their equipment.*

IoT technologies can inform additional health and safety programs that reduce accidents and injuries and the cost of insurance by 10 to 20 percent.*

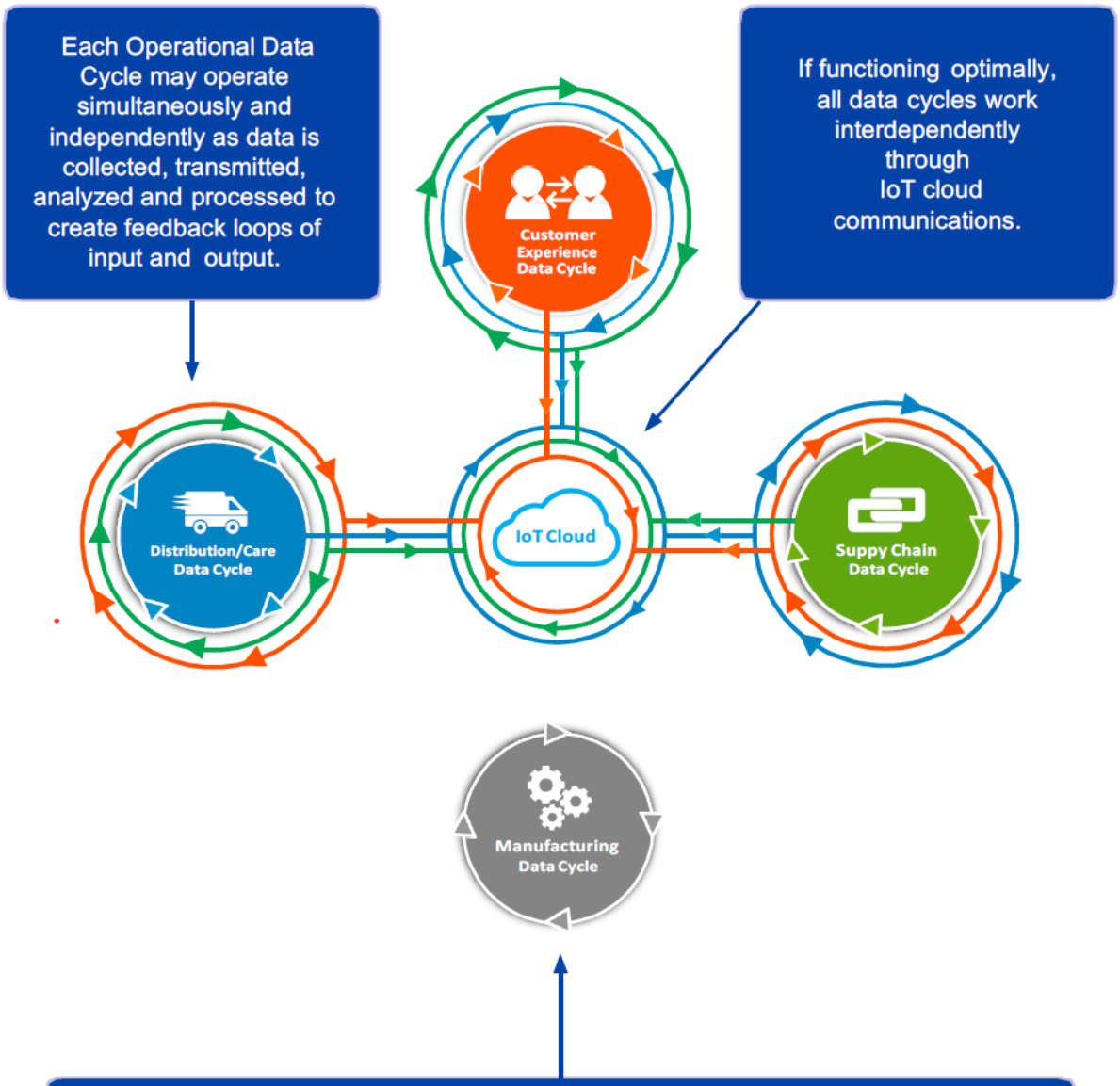
* McKinsey Global Institute, June 2015 http://ow.ly/XGrTL

This ODC is typically cloud-hosted due to the likelihood of a distributed organization supporting delivery and customer care. Actions taken in this area impact all other aspects of the business and, therefore, data collected here not only informs delivery and customer care processes but can also be used to improve the overall EDC.

The Broken EDC: A Hazardous Manufacturing Disconnect

The power of modern business intelligence can be realized in a basic model of four ODCs generating data that is analyzed internally while driving a larger cloud-based EDC. A complication occurs for organizations that operate hazardous manufacturing environments. These businesses are often prohibited from using electronic devices such as tablets and computers because such devices normally carry the risk of spark that could ignite a fire or explosion in regulated hazardous locations. Thus, data cannot be collected, transmitted nor analyzed on a real-time basis, creating a gap in the efficiency of the EDC because the Manufacturing ODC is disconnected from the overall system.

The lack of cloud communications and real-time data in hazardous location operations causes the EDC to break down and essentially isolates the MDC, delaying analysis and response time for a variety of potential issues in the manufacturing process. (*See diagram page 5.)*

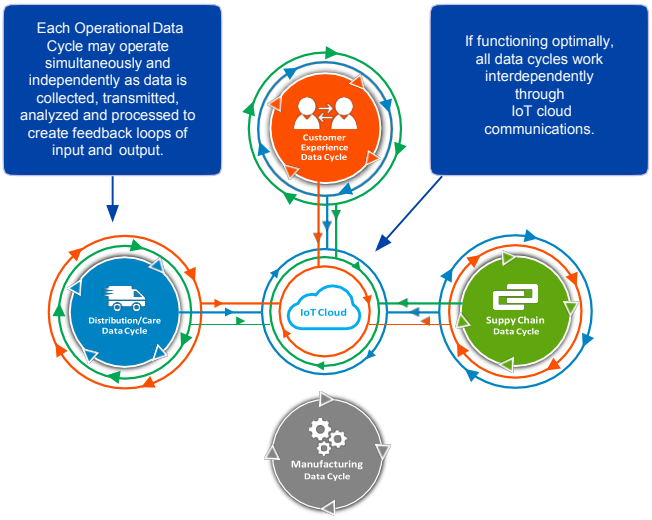


The Broken EDC: A Hazardous Manufacturing Disconnect (*continued*)

Compounding this disconnect problem is the fact that the bulk of assets, valuation and risk lies in the manufacturing process for economically critical industries such as Oil & Gas, Petrochemicals, Pharmaceuticals, Dry Goods, Mining and more than a dozen others with hazardous locations. When problems arise in these industries, they can often be considered catastrophic. Catastrophic problems in volatile manufacturing facilities, potentially caused or exacerbated by delays in information, could have a significant impact on brand and shareholder value for companies in these critical industries. Unlike other industries, critical industries with hazardous environments carry enormous risk and enormous liability, where mistakes in manufacturing can have a significant impact. Accurate and timely data becomes even more crucial when managing and mitigating this type of high-stakes risk.

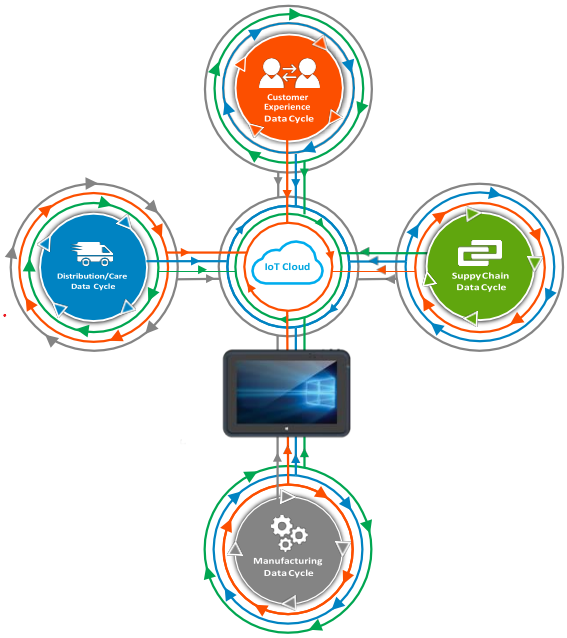
Further, not having a fully synchronized, automated manufacturing cycle impedes the efficiency of the overall Enterprise Data Cycle, as lack of complete real-time manufacturing data creates a lag in the analysis of and response to data in all other Operational Data Cycles.

Lack of cloud connectivity and real-time data
in hazardous locations



Lack of cloud connectivity and real-time data in hazardous locations
The disconnect between manufacturing and other data cycles results in delayed analysis and response time and causes a breakdown in the overall Enterprise Data Cycle.

Intrinsically safe devices
in hazardous locations



Intrinsically safe devices in hazardous locations
IS devices can connect the Manufacturing Data Cycle in real time to other data cycles. When all data cycles are connected through the IoT cloud, they complete the Enterprise Data Cycle, generating more thorough information and yielding higher productivity.

The Resolution: Achieving Real-Time Data in Hazardous Locations

The lack of cloud communications and real-time data in hazardous location operations causes the EDC to break down and essentially isolates the MDC, delaying analysis and response time for a variety of potential issues in the manufacturing process.

If enterprises can bring cloud connectivity to hazardous locations, those manufacturing locations can communicate with the rest of the organization, providing real-time data that not only makes the Manufacturing Data Cycle more efficient, but which also allows each of the other three ODCs to operate seamlessly, contributing to an optimized overall Enterprise Data Cycle. As a result, the most valuable assets can be better protected and risk can be lowered.

With a globally certified tablet PC such as the **Aegex10 Intrinsically Safe Tablet**, enterprises can manage the four primary ODCs with cloud-based connectivity in real time. Running Windows 10 on an Intel architecture, the tablets empower organizations to synchronize data transfer, analysis and processing for real-time, enterprise-wide collaboration. Each ODC can be completed simultaneously and work interdependently via cloud connectivity when using Aegex tablets that bring each process directly into the site of data collection and execution, even within explosive atmospheres in manufacturing environments. The tablets can also be customized for each particular role in an organization, yielding highly specific, real-time data that can then be utilized in conjunction with all other data from the ODCs, resulting in improved efficiency and productivity for the entire EDC. (*See diagram page 7.*)

RESULTS

Intrinsically safe devices give hazardous locations access to real-time data via cloud connectivity.

Access to real-time data in hazardous locations optimizes manufacturing processes.

Optimized manufacturing data informs and improves other data cycles and optimizes the entire enterprise data cycle.

Intrinsically safe devices
in hazardous locations

Intrinsically safe devices in hazardous locations
IS devices can connect the Manufacturing Data Cycle in real time to other data cycles. When all data cycles are connected through the IoT cloud, they complete the Enterprise Data Cycle, generating more thorough information and yielding higher productivity.

Results

The first step in an IoT strategy of connecting everything begins with connecting the people and the cloud. **With intrinsically safe tablets that can collect, analyze and transmit data from within hazardous locations, critical industries can optimize their Enterprise Data Cycles.** Utilizing more complete, real-time data at each stage of the business cycle and sharing it among all parts of the operation via cloud connectivity can result in a better overall picture of operation-wide performance. This allows for improved safety, efficiency and productivity, as well as greater protection of assets and reduction of risk, at the enterprise level.

RESULTS

An optimized enterprise data cycle yields a better view of operation-wide performance.

Clearer information about enterprise performance can improve safety, efficiency, and productivity.

Improved processes result in greater protection of assets and reduction of risk throughout a critical industries enterprise.