IndustryWeek®

The Industrial Internet of Things: Boosting Asset Performance and Return

Joe Barkai, Author, *The Outcome Economy*
Jagannath Rao, SVP, Siemens Cloud Application Services

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KEY TAKEAWAYS

- The IIoT is changing how organizations approach assets and operations.

- Humans are becoming sensors.

- The IIoT is changing mindsets, but organizational change isn't always easy.

- Platforms can help manage organizational change.

- Outcome-driven organizations think differently about product development.

- As manufacturing experiences digital transformation, the IIoT will enable value creation.

- Companies are leveraging the IIoT to improve productivity and profitability.

- Siemens' MindSphere platform offers an integrated dev/ops environment.

- The IIoT increases the power of "digital twins."

The Industrial Internet of Things: Boosting Asset Performance and Return

OVERVIEW

With the Industrial Internet of Things (IIoT), assets, resources, and people are connected like never before. Connected assets enable new business models and new customer engagement models that focus on user-defined outcomes. In addition, connected consumers are now sensors for products, operations, and quality. The IIoT will enable manufacturers to generate greater value by building intelligence into systems. This will improve transparency and support proactive maintenance. Platforms such as Siemens' MindSphere offer a powerful ecosystem that makes IIoT a reality for manufacturers.

CONTEXT

Joe Barkai discussed how the Industrial Internet of Things is changing the manufacturing sector and enabling outcome-driven organizations. Jagannath Rao explained how technology platforms like Siemens' MindSphere bring the power of the IIoT to manufacturers.

KEY TAKEAWAYS

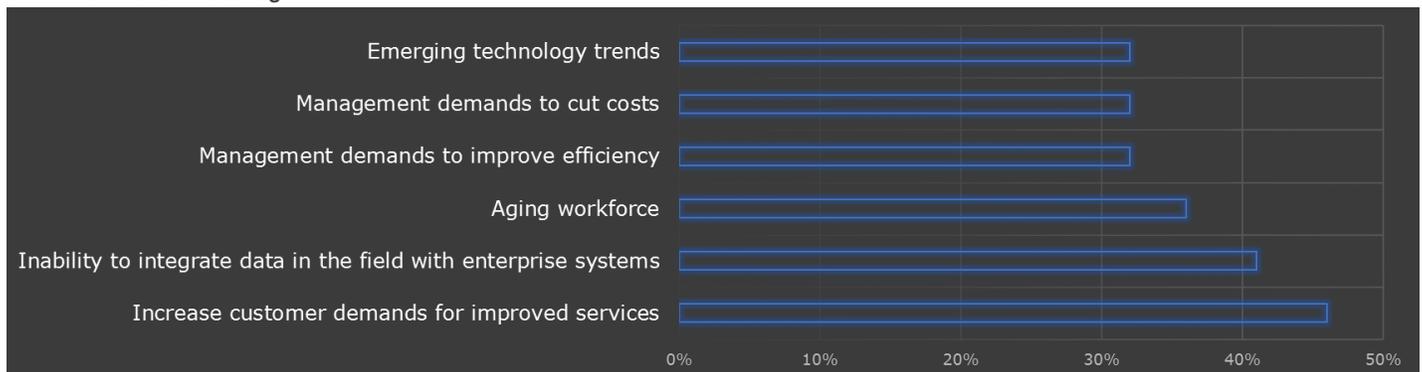**The Industrial Internet of Things is changing how organizations approach assets and operations.**
Field service challenges that have plagued organizations for years continue to be persistent problems. A recent study by the Service Council highlighted the top challenges facing service organizations, such as increased consumer demand for service, growing management demand for increased efficiencies and reduced costs, and the need for better data integration and visibility into operations.

With the Industrial Internet of Things, assets, resources, and people are connected like never before. This is changing how organizations view assets, asset operators, and asset consumers. The IIoT makes the outcome economy a reality. In the outcome economy, connected assets enable new business and customer engagement models that focus on user-defined outcomes that are delivered by an ecosystem.

An example is Spain's Renfe high-speed rail system between Madrid, Malaga, and Barcelona. Customers get their money back if the train arrives more than 15 minutes late. Renfe has contracted with Siemens, which manufactures the train and maintains the rails and cars, to provide system uptime that will meet customer obligations. Before the program 80% of passenger traffic between Madrid and Barcelona was by air. Now, more than 60% of passengers take the train.

Persistent Service Challenges

Challenge	Value
Emerging technology trends	~32%
Management demands to cut costs	~32%
Management demands to improve efficiency	~32%
Aging workforce	~36%
Inability to integrate data in the field with enterprise systems	~41%
Increase customer demands for improved services	~46%

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> With IIoT, pervasive connectivity provides better uptime for assets. Thanks to remote connectivity to assets, organizations enjoy monitoring services, diagnostics, and better remote problem resolutions. In the future, failure prediction will be possible.
>
> *Joe Barkai*

Humans are becoming sensors.

In today's world, customers are also always connected. Product users go to the Internet for advice, rather than calling the manufacturer's hotline. People in chat groups are often more knowledgeable than manufacturer tech support teams. As customers participate in these online forums, they offer opinions about product reliability and service quality. Connected consumers have become sensors for products, operations, and quality in the Internet of Things. They offer insights into brand perceptions and consumer sentiment.

The Industrial Internet of Things is changing mindsets, but organizational change isn't always easy.

The connected enterprise is about timely and accurate information. Insights come from an amalgamation of information sources, ranging from instrument data from assets to social media interactions from customers. This enriched context allows organizations to make better decisions.

The IIoT is changing how organizations think about information, as well as how they use information to improve products, services, and customer interactions. Mindsets are shifting from an operations focus to customer-centric models, from reactionary operation to evidence-based decisions, and from functional silos to product life cycle optimization.

Making these changes is easier said than done. Organizational cultures and human resistance to change can create obstacles even for the best technology and the best strategy.

Platforms can help manage organizational change.

Platforms are more than software. They provide a framework that supports flexibility and agility. Platforms help organizations change business models, service offerings, and contract terms. They offer data governance in terms of data security and privacy, as well as operational governance in terms of onboarding and offboarding ecosystem partners.

Outcome-driven organizations think differently about product development.

Outcome-driven organizations are customer-centric. They offer new engagement models to increase market share and adopt new mindsets about product development processes. Traditionally, manufacturers have been myopic. Once a product is sold and deployed, the organization loses sight of it and field service is the only channel for feedback.

The Internet of Things helps organizations think differently. They can use data to improve product design. In addition, manufacturers can incorporate asset performance and maintenance into the product life cycle. Operations are no longer siloed and service moves to the forefront of product development.

As manufacturing experiences digital transformation, the IIoT will enable value creation.

Common problems facing manufacturing companies include quality problems, rework, and waste. Most companies don't have complete transparency into their operations due to legacy equipment and unintegrated data sources.

The Industrial Internet of Things:
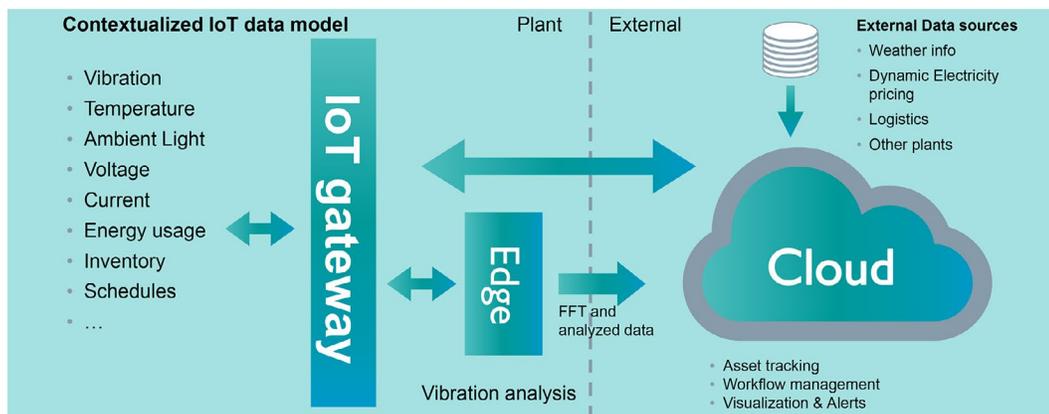# Boosting Asset Performance and Return

Looking ahead, manufacturing will undergo digital transformation. As customers demand more customized products, flexible design is growing in importance. In addition, product life cycles are decreasing and time to market is a top priority. These factors are pushing manufacturers to implement smarter, more integrated systems.

The Industrial Internet of Things will enable manufacturers to generate more value by building intelligence into systems. This will improve transparency and support proactive maintenance. With transparency and reliability, manufacturers can improve their assets' yields. Thanks to the IIoT, suppliers will enjoy greater service efficiency, while operators and end users will see improved asset uptime and availability.

Observations about the IIoT include:

- **The IIoT is different from the consumer Internet of Things.** The volume of data generated by industrial machines is much greater than data created by consumers' smartphones and tablets.

- **Cloud computing and analytics enable cost-effective scaling of IIoT implementations.** The cloud offers unlimited compute power and storage capacity. This supports complex app development with advanced analytics.

- **Edge computing is useful in manufacturing.** Edge computing is a good solution when network latency is an issue, if data pre-processing is needed, or if sensitive data needs to be kept onsite.

- **Machine learning and deep learning support efficient data analysis.** These technologies can handle massive amounts of both structured and unstructured data.

- **APIs simplify application development.** Application programming interfaces (APIs) make it easy for developers to create apps with minimal effort. Siemens' MindSphere platform includes APIs for a range of functions, like advanced and visual analytics as well as fleet management.

IIoT Implementation in Manufacturing

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Companies are leveraging the IIoT to improve productivity and profitability.

Two manufacturing case studies illustrate use of the IIoT to improve business operation and efficiency:

- **Consumer packaged goods bottlers.** Bottling plants have many small conveyor lines powered by hundreds of small, inexpensive motors. Historically, monitoring systems have been more expensive than the motors. As a result, plant operators would just let motors fail and then replace them. This resulted in unplanned downtime and lost productivity, but was more cost effective than expensive reliability solutions.

  With IIoT, bottlers can attach inexpensive sensors to motors and monitor vibration and temperature. Vibration analysis is done at the edge and analyzed data is sent to the cloud. In the cloud, it is possible to correlate vibration and temperature data and set thresholds. This enables bottlers to detect signs of failure early, increasing productivity and uptime. It is also possible to compare plants to determine why one is more efficient than another, and to harmonize supply chain management. All of these initiatives can improve productivity and profitability.

- **Original equipment manufacturers.** Heller Maschinenfabrik is a leading CNC machine tool manufacturer. The company built connectivity into their machines and connected them to performance-based condition monitoring using the Siemens MindSphere platform. Now Heller can gather data from machines worldwide. The company has developed a new service offering called Heller4Service which creates graphic representations of machine data. Customers use these to maximize yield of their machines. The IIoT has enabled Heller to differentiate itself, develop a new revenue stream, and improve its product designs.

> The IIoT helps manufacturers generate transformational results. Machine data collection becomes easy. Information can be correlated with maintenance history to optimize asset operation, uptime, inventory, and the supply chain.
>
> *Jagannath Rao, Siemens Cloud Application Services*

Siemens' MindSphere platform offers a robust ecosystem with an integrated dev/ops environment.

In addressing the challenges facing manufacturers, no single company has the necessary breadth of knowledge and domain expertise. As a result, Siemens recognized that its MindSphere platform needed to be an ecosystem of partners.

MindSphere makes it easy for partners to use the platform and develop applications. There is a dedicated tenant where partners can build and test applications, reusable modules, APIs, a robust support system, a knowledge sharing community, and an industrial app store for customers. Siemens has ensured that tools are available as APIs which support complex analytics on structured and unstructured data.

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MindSphere's Prescriptive and Predictive Analytics
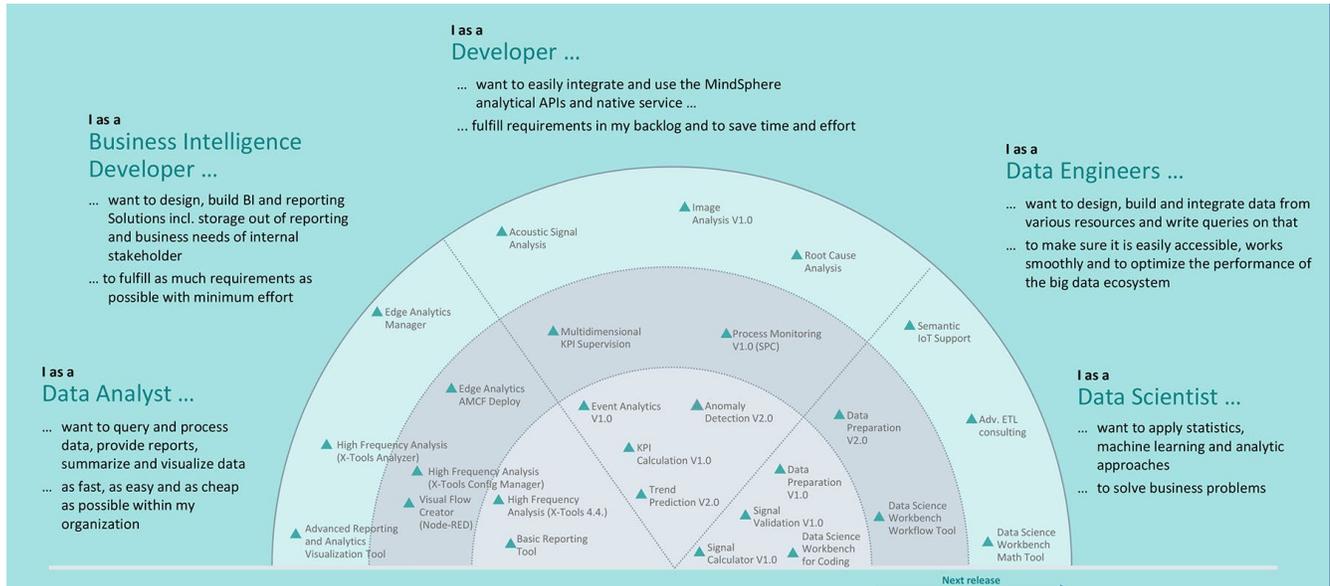
The IIoT increases the power of "digital twins" across the manufacturing value chain.

In today's world, it is possible to create complete product prototypes in a software environment. By iterating on these virtual prototypes, companies can generate a final "digital twin" of a product. In addition, manufacturing processes can be simulated in a virtual world, resulting in a digital twin of production.

Once a product is sold and is operating in the real world, it can be connected to the IIoT using the MindSphere platform. Performance data can then be gathered to create a digital twin of performance. Manufacturers can create a closed loop system in which the digital twin of performance feeds information back to the digital twins of product and production. This generates actionable intelligence for manufacturers that is applicable to the real world.

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BIOGRAPHIES

Joe Barkai
Author, *The Outcome Economy*

Today a consultant, speaker, author, and blogger, Joe Barkai was once vice president of research at IDC, one of the world's top market research firms. He specializes in charting market strategies for a connected world: the Internet of Things; connected cars; innovation; and product lifecycles. He has more than 30 years of experience in helping organizations map out their product and market strategies. He's been at the nexus of business and technology, consulting with hundreds of organizations across diverse industries, giving him a unique ability to "connect the dots" and clearly articulate the always-evolving business value of technology.

Jagannath Rao
SVP, Siemens Cloud Application Services

Jagannath Rao is responsible for the data-driven services business of the Industrial Internet of Things (IIoT), which includes MindSphere, the secure, cloud-based, open IoT operating system built for industry. His portfolio of responsibilities includes the widespread application of "Big Data" technologies in the realm of manufacturing, covering topics such as plant analytics, asset analytics, artificial intelligence, machine learning, and other digital services. He advises companies around the world how to best employ IIoT strategies and technologies.

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