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Industries Transformed by the
Industrial Internet of Things

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Executive Summary

Ever since the British technology pioneer, Kevin Ashton, introduced the term in 1998, the Internet of Things (IoT) has been attracting attention from technophiles around the world. By embedding data-emitting sensors in physical objects around us, we have created a complex but compelling network of human and machine connectivity.



6.4 Billion Connected "Things" Will Be in Use in 2016, Up 30 Percent From 2015

- Gartner



The latest wave of IoT technology, though, is in the industrial sector, where it is called the Industrial Internet of Things (IIoT) or Industrial Internet. Combining connectivity with the capability to virtually monitor and control factory equipment and machinery, paints a whole new picture of the industrial landscape—efficient machines, automated production processes, and reduced machine breakdowns and maintenance costs.

Proving its potential to optimize efficiency and transform business, the Industrial Internet has found successful application across various industries. However, many questions remain on the possible risks that come along with the opportunities. This white paper explores the Industrial Internet of Things and its application in three different industries.

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Oil and Gas

IIoT is enabling oil and gas companies to increase operational efficiency and decrease safety risks. Through predictive maintenance, pipeline monitoring, automated workflows, IIoT is not only creating value but addressing major challenges in the oil and gas sector.

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Automotive

What the automotive industry needs is a holistic solution to its most pressing challenges. The ever-increasing demand for product variety and shorter turnaround, among other challenges can be met effectively by leveraging IIoT.

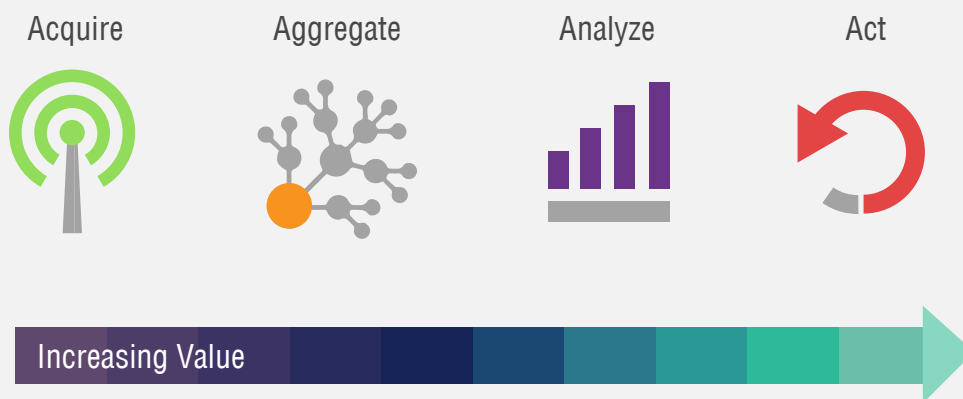
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Aviation

Aviation is one of those industries that have been hugely impacted by the Industrial Internet. As a highly competitive and customer-centric services industry, aviation stands to gain immensely from the transformative power of IIoT.

An Industrial Renaissance: Smart Factories

The Internet of Things (IoT) has led to a paradigm shift in the world of technology. The concept of IoT has been around for several years, but it did not cause much sensation until a few years ago. Embedding sensors in a wide variety of day-to-day gadgets and enabling communication among people and things, and among things themselves has radically transformed how information is exchanged. More than a bunch of devices, the IoT is about being able to embed connectivity and share data across multiple devices to generate new value out of them. Sophisticated sensors and chips embedded in physical things transmit valuable data. The data is brought together on a platform where it is interpreted and channelled to different applications that communicate with us.



A leap of innovation that is expected to show tremendous growth is the combination of Internet of Things with data analytics in various industrial environments, resulting in the Industrial Internet of Things or IIoT. Some of these industries include oil and gas, aviation, automotive manufacturing, food processing, healthcare, energy, and utilities. things transmit valuable data. The data is brought together on a platform where it is interpreted and channelled to different applications that communicate with us.



The Industrial Internet of Things is a fairly recent concept that involves interconnecting the different subsystems in an industrial environment. Sensors that continuously record performance are embedded in factory machinery. The massive amount of data produced by these sensors are subjected to advanced analytics and converted into meaningful insights. Machines operate based on these insights. In short, there exists a network of communication among machinery to read, interpret, and act upon data. What comes out of this new way of working, data sharing, and interaction is called machine intelligence. This is being actualized by a new generation of intelligent devices that are self-CHOP (self-configuring, self-healing, self-optimizing and self-protecting) systems. For manufacturers, this means that they can easily manage factory equipment to adapt to the rapidly changing business and technological requirements.

The brain of the entire ecosystem is the platform that powers Industrial Internet. The IIoT platform receives tremendous amount of data from sensors, performs intelligent data analytics, and provides timely and relevant insights. The platform brings together advanced sensor and communication technologies, cloud services, and data analytics.

Oil & Gas

Monitoring and maintaining expensive equipments, getting hold of timely status data to improve operational efficiency, and driving performance are some of the key challenges faced by the oil and gas industry. Industrial Internet can address most of these challenges through smart sensors and real-time data analytics.

Oil flow through pipelines

Maintaining oil flow in a complex system of pipes is a daunting engineering challenge. If the oil flow through the pipeline drops, velocity decreases, increasing the time taken to reach the destination. During bitter temperatures, the pipelines are vulnerable to operational problems. Sensors embedded within pipelines help engineers keep close tabs on line pressure, rate of flow, temperature, and other critical variables. These help in the real-time monitoring of the equipment's performance.

Smooth functioning of the supply chain network

An ecosystem of smart sensors, interconnected machinery, and big data analytics contribute to an intelligent supply chain network. Business challenges like predicting and optimizing trip time, improving asset utilization, and formulating efficient pricing models can be addressed through a connected supply chain. Remotely captured raw data coupled with advanced analytics will empower engineers and other personnel to make more informed decisions concerning operations and asset management.

Efficient fuel delivery

Ensuring supply in accordance with the surging demand and factoring in fluctuating prices is a key challenge for the downstream sector of the oil and gas industry. This sector has to negotiate the logistics of transporting fuel across complex networks in order to ensure uninterrupted supply. By tracking this process closely with the help of sensors, the industry can gain significant cost savings and productivity. Pumps, for instance, can tap into data on their existing stock and consumption rates to predict refill requirements.

Automotive

Automotive manufacturers were one of the early adopters of the Industrial Internet. Connected systems and data capabilities have successfully enabled automotive businesses to enjoy a competitive advantage in the market. Through implementation of predictive maintenance, efficient service parts management, predictive assessment of demand and the like, IIoT has transformed the automotive industry.

Assembly and fabrication of machine parts

Automating the assembly and fabrication of parts with minimal human intervention is the key to improving process efficiency. In an IIoT-enabled unit, a network of devices track and manage parts assembly and material carriers across the factory floor. It also enables forklift truck operators to deliver raw materials and components to the correct station based on requirements, on time.

Asset condition and maintenance

Machines that are constantly in use are prone to wear and tear, resulting in breakdowns. Machine breakdowns and asset damages not only escalate costs but also bring the entire unit to a standstill. With the help of Industrial Internet, inbuilt sensors in machinery collect and convey data on performance and usage patterns. For instance, a plant manager is alerted well in advance of a weakness in a conveyor belt. This process of predictive maintenance generates enormous savings and enhances production efficiency.

Process efficiency and quality control

Manufacturers are constantly in a struggle to streamline their workflow without having to compromise on the quality of the product. Industrial Internet enables process optimization by extracting real-time performance data from machinery to minimize errors and wastage. The data is analyzed to identify productivity killers and drive efficiency. The platform can also facilitate quality control. For instance, when a defective part is identified by the platform, it notifies a quality personnel. The part can then be sent to a different section to determine whether it needs to be eliminated or fixed.

Aviation

The competitive and customer-centric industry that it is, aviation has quite a few hurdles to overcome, such as fuel wastage and high operating costs. Industrial Internet empowers aviation, optimizing operations and plugging revenue leakage.

Optimizing fuel usage

Billions of dollars can be saved on optimizing fuel usage. With the help of sensors, fuel usage can be monitored. The data extracted from the sensors provide the daily usage of fuel through automated reporting. Enabling Industrial Internet will help determine the exact fuel consumption of a plane, helping aircraft engineers to optimize usage and bring down costs.

Flight efficiency

Numerous sensors placed on the aircraft provide statistical data on the overall performance of the plane. This data when compared to the flight plan will show areas where the aircraft failed to achieve the expected efficiency. Engineers can address the responsible factors and optimize flight efficiency.

Ensuring safety for long flights

Real-time monitoring and data analysis will help detect any irregularity in the functioning of an aircraft. Unwanted mishaps can be avoided by notifying the concerned personnel regarding the detected anomaly. Notifying glitches in real time also helps in timely maintenance.

Choosing the Right Industrial IoT Platform: Challenges to Overcome

Any new technology that emerges as a result of innovation will have to surmount a number of obstacles before it is successfully adopted by an enterprise. The reasons could be many, from budget constraints to risk aversion. There are many challenges that businesses might want to consider before they go for an IIoT-enabled solution. Some of the most talked about challenges in adopting the Industrial Internet are discussed here.

Security

One of the most critical risks, as agreed by many, is security. One dreadful instance of security breach is the data hack at Sony back in 2014, which gave away classified and critical information to the attackers. Ideally, an Industrial Internet platform should meet the requirements of security, privacy, identity management, and access control. In an ecosystem where everything is connected over the Internet, such instances are bound to happen unless the platform is tightly guarded and continually upgraded with security features. It would also help to ensure that security features are integrated into the platform by the vendors themselves .

High Availability

Industrial Internet platforms need to work on an “always-on” mode as it is a vast ecosystem of interconnected devices that handle small to critical processes. An entire supply chain process, from design to delivery and beyond, is dependent on the platform. Even a slight power outage can cause failures and cost a lot of money. This makes availability one of the most critical issues to address. Platforms must be highly available and equipped with multiple failover and immediate recovery capabilities.

Scalability and Flexibility

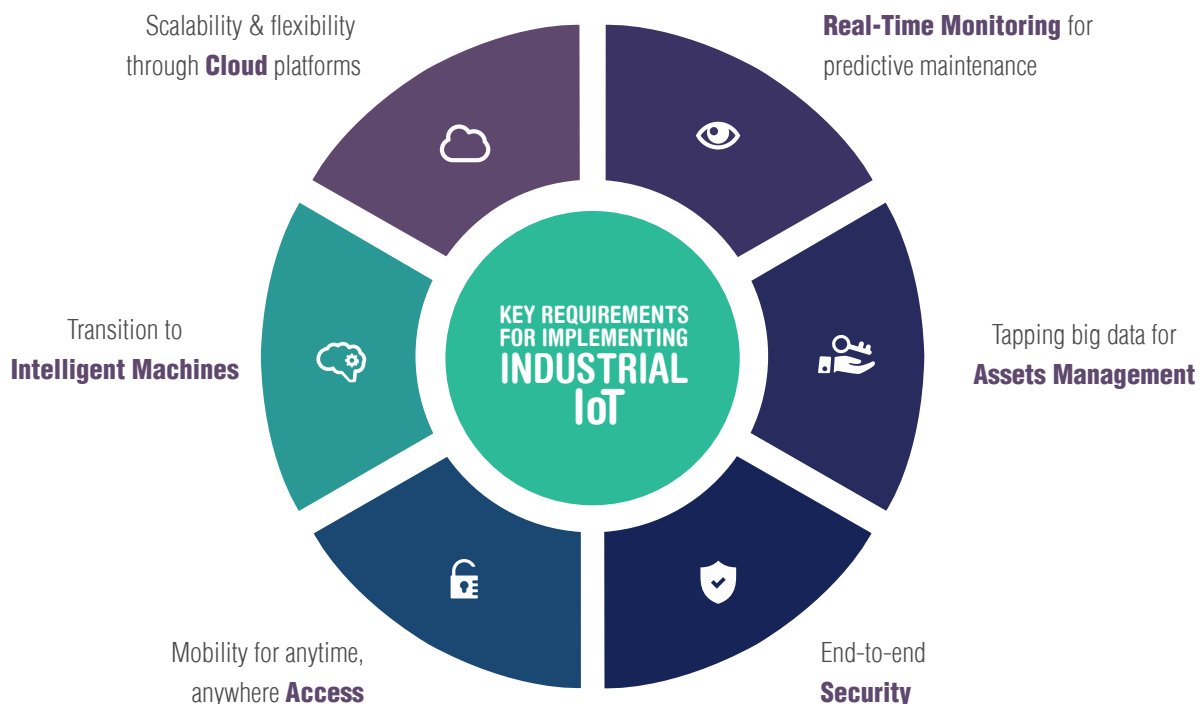
Industrial IoT is a technology that is relatively new and hence is undergoing constant evolution. The uncertainty element in this can make it difficult for businesses to invest in an IIoT platform. The safest and the most logical option would be to invest in a flexible and scalable platform. The IIoT platform needs to be continually modified to adapt to the changing requirements over time. The platform should also be horizontally and vertically scalable to ensure that the performance of the platform does not go down as new applications are integrated.

Data Volume and Diversity

Data is one of the most fundamental aspects of the Industrial Internet. Data is received in massive volumes by the Industrial Internet platform in multiple formats and at different intervals. A common format is needed to facilitate analytics. To interpret and create value from this data, the platform needs to adopt standards or a string of algorithms that can manage the diversity and volume of incoming data.

Orchestration

There would be instances after deployment when the Industrial Internet platform is extended to orchestrate multiple applications to work intelligently together with the goal of optimizing the entire operational environment. Applying analytics on a set of data from one application will trigger a series of corresponding actions, which will bring in more data that has to be analyzed further. This will again trigger more consequential actions. The platform should be able to support this kind of environment. It should also support users to create new operational models and define workflows.



The Industrial Internet of Things, still being on the path of evolution, has to contend with many implementation challenges like any other emerging technology. Many of these challenges have been addressed, and solutions are underway for others. Although these factors seem daunting, it does not compare to the transformation IoT brings to the industrial sector.

Are You Ready to Take the Plunge?

New businesses will open up as the industrial IoT technology evolves on one side. On the other side, this would be an opportunity for technology players to bring out solutions to tackle many of its challenges. Either way, IIoT has proved to be a boon for a number of industries that have implemented it successfully. So far, businesses have realized benefits from IIoT in terms of boosting productivity, enhancing performance, and cutting down costs. It is only logical for them to focus on the growth and value that can be derived from an [Industrial IoT implementation](#).

If you want to learn more about the Industrial Internet of Things or want to implement Industrial Internet in your business, feel free to [get in touch](#) with us or [visit our website](#). We can answer all your questions, ease the bottlenecks in implementation, and speed up value realization.

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