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THE SECRET FORMULA FOR A WINNING INDUSTRIAL IOT PROJECT

Current State of Industrial IoT Market

The Industrial Internet of Things (IIoT) market is at a key inflection point. From smart grids and water management to manufacturing processes and smart cities, there seems to be a consensus on both the inevitability and benefits of IIoT-driven transformation.

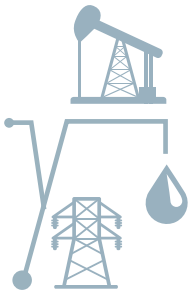
However, despite the huge strategic investments in IIoT projects, successful deployments are few and far between. The current state of IIoT deployments is reflected in a number of recently published industry surveys:

- 70% of organizations are still in the "consideration" or "planning" phases, while 30% are in pilot or implementation phases (IDG Research 2016)
- 81% of organizations believe successful adoption of IIoT is critical to future success, however only 25% have a clear IIoT strategy and only 24% (on average) among those are happy with IIoT project execution (Genpact Research 2016)
- 27% of manufacturing executives report unclear financial benefits and difficulty calculating ROI with respect to IIoT adoption (Dell)

Due to these "growing pains," vendor revenues from IIoT deployments have been substantially lower than their levels of investment in research and development.

This white paper discusses the reasons why Industrial IoT, in general, has not gained traction as quickly as expected. It describes the main obstacles hindering the progress of IIoT deployments, as well as providing guidance with respect to the key solution attributes required to overcome these challenges.

Defining an IIoT Project



Before we delve into the challenges facing organizations that wish to deploy IIoT solutions, let's set a few baseline definitions. The Industrial Internet Consortium defines the Industrial IoT as "machines, computers and people enabling intelligent industrial operations using advanced data analytics for transformational business outcomes."

Unlike consumer-oriented IoT, industrial IoT is typically associated with critical utilities and infrastructure services, such as oil and gas, power generation, water and healthcare. Regardless of the market segment, there are three fundamental components common to any IIoT project: sensors, a communication network, and a smart analytics-driven management system.

Sensors

Sensors are electronic devices or software that generates information about a physical condition or event. Sensors can be thought of as the nervous system collecting continuous streams of data to be processed by advanced software in the smart management system. Different sensors capture different types of information such as motion, velocity, temperature, humidity, light, etc.

In IIoT projects, sensors are being installed anywhere and everywhere - from industrial machines and power grids to water pipes, HVAC systems and parking meters. A typical IIoT project may include thousands and sometimes up to millions of sensors. In power utility projects, for example, sensors are being used to sample DGA data in transformers, as well as for monitoring voltage and current levels in solar energy systems.

Communication Network

Information captured by sensors rarely reaches maximum value at the time and place of creation. To leverage data collected by sensors in the field, their signals often must be communicated to other locations for aggregation and analysis. Following data analysis, smart management applications send commands over the communication network to controllable devices in response to conditions in the field.

Sensors are connected to the networks using various networking devices such as hubs, gateways, routers, network bridges, and switches, depending on the application. Networks use both proprietary and open (e.g., IP) protocols to enable connected devices on a network to identify and communicate with one another. People can connect to the network through mobile devices and computers using wireline (e.g., Ethernet) or wireless (e.g., Bluetooth, WiFi) technologies.

Smart Analytics-Driven Management System

The smart management system is the "brain" of the IIoT deployment. It is responsible for integrating, monitoring and managing the sensors and network elements, as well as other smart devices and applications. This system aggregates data from various sources, including sensors, external systems (e.g., weather forecast systems), and internal IT systems (e.g., ERP, CRM, OSS).

The smart management system analyzes the data, generates insights and displays its findings on a single comprehensive dashboard. All routine operations are managed automatically. Non-routine events can be handled by the operator with the assistance of the smart management system according to pre-defined SOP (Standard Operations Procedures). SOP may be simple or complex and may involve analytics, human intervention, sending commands to controllable elements, communication with external teams and stakeholders, etc.

Main Challenges to Successful IIoT Projects

When taking a closer look at the reasons behind the disappointing success rate of IIoT projects, we identify four major obstacles.

1. Most applications, sensors and IIoT management systems focus on a single or only a few domains

While digital management systems have become commonplace in large industrial organizations, their main drawback from an IoT perspective is that each system was usually developed to handle a specific domain or discipline. In a smart city scenario, for example, the city may operate multiple separate systems for lighting, traffic management, waste management, parking and the like. Each of these comprises a complete ecosystem of sensors and software for its respective domain.

But the true essence of a smart city is being able to see the big picture. To do this, IIoT management systems require the ability to correlate real-time data collected from sensors and devices in each domain in order to extract meaningful business and operational insights. By analyzing all of this data holistically in one central "system of systems" application, organizations can maximize:

- Real-time visibility - get situational awareness in real time for improved decision-making
- Operational efficiency - processes can be optimized to increase productivity and cut costs
- Predictive maintenance - problems can be predicted and prevented before they actually happen

Sample Power Utility Scenarios

Smart grid applications illustrate the benefits of dynamic data correlation among multiple disciplines and applications. Using solar panels and batteries, households can create energy during daylight and discharge the batteries at night rather than drawing electricity from the grid. To support this model, a smart management system should connect to the solar systems and other assets in the power grid and dynamically adjust the power grid capacity to regional demand, in accordance with forecasted and real-time weather and usage patterns. For example, real-time monitoring and management of power batteries will control their charging and discharging in specific areas according to these grid conditions. On a more complex level, utilities need to correlate battery charging with load, power and price forecasts in order to minimize their cost of energy.

This type of multi-domain data correlation allows service providers to perform load shaping, minimize voltage fluctuations, protect transformers from sudden spikes, avoid construction of new power plants, and reduce costs and carbon footprint. At the same time, it enables utilities to offer innovative, consumer-oriented business models such as peer-to-peer energy trading.

2. Industrial IoT projects typically require significant investments, time and risk

In a survey conducted by Dell, 48% of manufacturing executives who deployed Industrial Internet of Things applications ranked budgetary constraints as the number one challenge to IIoT adoption.

By nature, IIoT projects may be complex and expensive, requiring strategic investments of millions of dollars depending on the project scope, number of sensors and subsystems, level of infrastructure changes required, geographical distribution, etc. Thus, finding ways to reduce these cost factors can help organizations meet budgetary constraints and reach a successful outcome.

Moreover, most industrial and municipal organizations interested in deploying an IIoT solution already have a certain number of sensors and digital systems in place that they wish to enhance through smart management capabilities. The extent to which these components can be utilized by the new system also has a major impact on the project cost, duration and risk.

Some vendors offer a comprehensive solution covering all of the IIoT components described above. They can provide sensors and data aggregation, analytics and control across multiple systems; however, their management system integrates easily only to their own sensors and communication network, or a limited set of such components. This approach might require a forklift replacement of existing sensors, IT subsystems and communication networks, which significantly increases project costs, risk and duration.

Thus, in order to preserve existing investments and drive down project costs, organizations need a vendor-agnostic smart management system that easily integrates and communicates with existing and new assets. In addition, IIoT management systems should integrate smoothly with legacy IT/OT systems (e.g., SCADA, GIS, BI and ERP).

3. Over-reliance on generic, horizontal IIoT platforms

As noted earlier, a smart analytics-driven management system is a fundamental component of any IIoT application (e.g., smart water management, smart grid management, etc.). One common way of building an IIoT management application is to start with a generic IIoT platform as a basic technological infrastructure, and to develop the specific application on top of this platform.

The main advantage of this platform-centric approach is flexibility, as the same generic "horizontal" IIoT platform can be used for multiple vertical applications. There is no need to "reinvent the wheel" for each application as these platforms know how to connect to multiple sensors and subsystems, as well as providing rule engines, analytics tools, databases and security controls. Many excellent horizontal IIoT platforms exist on the market.

The second step in this approach is to develop the specific functionality required to support the particular vertical application, such as smart city or smart grid management. As most horizontal IIoT platform vendors do not develop vertical applications, responsibility for this component falls onto the customer – and this is often where the problems begin.

Development of the vertical application requires technical knowledge of the IIoT platform and software development resources that many organizations (e.g., municipalities, water utilities) simply don't have. As a result, organizations deploying IIoT applications have to turn to third parties (such as software houses and system integrators) with the requisite knowledge of the IIoT platform. Usually, the third party must also invest time and resources in understanding the organization's business needs. The result is that projects take too long, are too expensive and deliver less than satisfactory results.

To avoid these issues, organizations need to choose a vendor with expertise both in the delivery of horizontal IIoT platforms and development of applications for the relevant vertical market. There is no substitute for real-world experience in developing and implementing IIoT applications. Vendors that offer a platform-based product, based on domain expertise and a proven track record, can provide the best of both worlds. Such an approach enables organizations to maximize flexibility, shorten time to market, reduce costs and mitigate project risk.

4. Adapting IIoT solution to the rapidly changing landscape

IIoT is all about digitizing and managing the world around us. As reality changes, IIoT systems need to adapt at the same pace in order to stay relevant.

An IIoT system may be built to spec and deployed in the field, but that spec is likely to be obsolete within two years. Unfortunately, many IIoT system deployments today are designed without the flexibility required to avoid time-consuming and expensive system upgrades.

Thus, today's organizations need agile, future-proof systems that empower users and control room operators to address changing business needs with little or no vendor involvement. Such an approach maximizes flexibility and responsiveness in a dynamic market, while saving time and money related to the development of new features and system upgrades.

Utilities, for example, have come to realize that their responsibilities should in many cases extend beyond their operators manning the control room. They understand the need to integrate with new sensors and subsystems, while business operations managers want the flexibility to create new business models in a timely manner. Typical examples include:

- Integrating with new sensors and subsystems. More and more power utilities have begun to support electronic vehicles (EV) both as an energy consumer and as an energy source and integrate both aspects as part of the smart grid optimization. When new EV charger vendors enter the utility market, utilities need the ability to cost-effectively and easily integrate with the new charger subsystem.
- Offering new business models. One value proposition of the new smart power grid is the consumer's ability to generate and even trade energy. As market dynamics change, utilities should be able to easily adjust these trading models and plans, e.g., offer a special peer-to-peer trading scheme for the holiday season.

Using flexible IIoT management applications, organizations can create their own business rules and continuously tweak system functionality in a cost-effective manner to keep pace with a volatile market.

Conclusion

To deliver on the promise of industrial IoT, organizations require smart monitoring, analytics and control applications that enable them to address formidable technological, financial and design challenges. To maximize the value and reduce overall costs, these systems must be able to collect and correlate data across multiple disciplines, while integrating seamlessly with existing and new sensors and subsystems.

Industrial IoT is still in its early stages, and the only sure thing is that change is inevitable. When choosing a solution, it's important to adopt a long term strategy and prepare for whatever the future may bring. In this context, innovation, agility, user empowerment and fast time-to-market are key criteria for a successful IIoT deployment.

The good news is that smart monitoring, analytics and control applications that meet these needs are available. Forward-looking organizations in multiple verticals are already using these advanced systems to power business transformation, improve operational efficiencies and reduce costs.

About mPrest

mPrest is a global provider of mission-critical monitoring, control and big data analytics software. Leveraging the power of the Industrial IoT, mPrest's integrative "system of systems" is a proven catalyst for digital business transformation. Our management solution has been deployed in next-gen IoE (Internet of Energy) applications for power utilities, as well as innovative management applications for water utilities, smart cities, defense and HLS.

By connecting the dots across multiple disciplines, mPrest delivers unified situational awareness, sophisticated analytics, end-to-end IT/OT integration and process management. Featuring unprecedented interoperability and real-time data optimization, mPrest allows organizations to accelerate time-to-market, improve system performance and reduce operational costs.

For more information, visit us at www.mprest.com

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