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NO IOT WITHOUT IT/OT

The Internet of Things (IoT) promises a tomorrow enriched by unprecedented connectivity; an unfathomable number of devices and sensors delivering real-time inputs and data-driven functionality for optimized decision-making and performance. It has the potential to take the smart grid to another level, enabling a new generation of smarter buildings, transport and citizens.

For utilities, it's a lofty ideal. And for most, it currently still feels a good distance away.

That's not to say that the potential benefits that IoT promises cannot be realized by utilities, but there is groundwork to be laid. Because, like it or not, getting to an IoT nirvana requires a good deal of effort to integrate the underlying information and operations technologies (IT and OT).

While most transmission and distribution system operators (TSOs and DSOs) are actively engaging in IT/OT integration, the effort invested and the progress achieved to date, varies. According to IDC Energy Insights research on the topic, across Europe for example, while more than 90% of utilities surveyed say they have initiated IT/OT integration initiatives, only 46% say basic initiatives (e.g., meter and analytics projects, field force apps, IoT pilots, GIS network modelling) have been completed. OMNETRIC, a Siemens company, went live in 2014 precisely to help organizations weave together the worlds of IT and OT for greater business value, while helping to manage the inherent risks. Today, in the face of industry transformation, and a need to operate with greater operational and business intelligence, how can utilities accelerate IT/OT integration?

Business value – secured

Fact: Opening up grid operations to IT systems potentially exposes the grid to global cyber-attack. In a context where there is a growing number of cyber breaches resulting in performance degradation and business losses, grid operators clearly need to evaluate the risks of such integration.

Security concerns arise even where greater IT/OT integration might seem an obvious route to take. For example, utilities think twice before attempting to integrate a distribution management system with their GIS systems, or before using smart meter data to improve outage management. Concerns deepen further when we catch a glimpse of the future, where energy systems may be integrated into smart city hubs and the grid is extended with, and to, all kinds of components.

Given the opportunities to be realized, utilities need to overcome this deep seated fear of exposing OT systems to the IT world.

Without a doubt, security experts will tell you that it is essential to bake security into the core of the solution, rather than layering it on top at the end. All too often, security measures are forgotten once the project is in-flight. Additionally, rather than resisting the inevitable path to greater integration, utilities should evaluate IT/OT convergence, not purely on the basis of the security risk, but firstly on the basis of how critical the systems concerned are. With this in mind, secondly, they should determine whether the business value that can be derived from greater integration outweighs the risk.

Open data exchange

IT/OT integration is primarily about making the data in network control (OT) and enterprise (IT) systems available to each other to optimize performance and fine-tune control of an increasingly complex grid.

On top of their worries over security, another challenge faced by utilities is that older, supervisory control and data acquisition (SCADA) systems were not conceived or built for integration. While centralized management systems used by DSOs and TSOs do enable integration, they are generally used in isolated environments, with little integration to enterprise IT systems. Where integration does exist, it is old-fashioned point-to-point integration that has limited interoperability, is costly and complex to manage, and is not secure. The new generation of devices, equipment and solutions, such as microgrids, advanced smart metering systems and virtual power plants that need to be integrated into the grid are raising the stakes further.

To lessen complexity and ease integration, we believe promoting open standards, such as the common information model (CIM), and deploying Enterprise Service Bus (ESB) integration capabilities can simplify the exchange of information for applications and systems. Open systems and greater interoperability present a tremendous opportunity to go beyond the capabilities of the present installed base, boosting performance, lowering integration costs and improving risk mitigation. This offers a technical and economic advantage to the industry. OMNETRIC Group's work in the development of an open field message bus architecture for microgrid management – an NREL INTEGRATE project in collaboration with a number of partners that explores the capacity of the grid to host renewables – illustrates the value that can result.

Cultural boundaries redrawn

There are two cultural influences at play that contribute to the resistance of operators to integrate IT/OT systems.

Firstly, the most significant cultural challenge is not technological, but human and is about IT and OT practitioners speaking the same language. IDC research¹ confirmed that more than half of utilities still operate along the traditional command lines of COO/OT and CIO/IT. Bridging the two requires cooperation across the culturally diverse domains of engineering, data, IT consulting and security. With our roots in OT, we approach integration from a different angle to the majority of systems integrators who come from the IT world: we understand how to generate and interrogate the data, but we have the operations expertise to interpret what the data means and how to feed that back into the solution.

Secondly, utilities operate in a regulated culture where price has been a guiding principle for decades. Over the last ten years regulators have gradually shifted their attention away from price towards quality. This has compelled operators to invest more in managing outage, improving customer service and “greening” supply. Despite this shift, a conservative attitude to software investments remains. And yet, IT has the potential to empower grid operations. Take the example of how IT/OT integration changes what happens when an outage occurs. In the control room, OT would traditionally isolate the fault and send a team out to deal with it. In the IT/OT world, the operator can draw on internal and external data sources in order to better understand the outage. They can provide information to customer-facing systems, and activate the allocation of resources through field-force solutions. Far from relinquishing control, the operations team is better equipped to manage the event as it unfolds.

Recommendations

There is no going back. IT and OT must learn to co-exist and use their respective strengths to drive tomorrow's distributed and digital energy system. These are our recommendations for success:

- Evaluate systems and software capabilities and work towards the definition of an integration stack that fosters interoperability (for example using CIM), and ensures long term value from integration investments.
- Start small and scale fast, but begin with an enterprise-wide IT/OT roadmap. In the early phases of rollout, the roadmap will evolve as best practices and conclusions are drawn from multiple discrete pilots.
- Gather a team of OT experts that understands IT imperatives to guide the journey.
- Don't let security fears hold back progress. Evaluate security risk on the basis of system criticality and business reward.
- Bake 360-degree security measures into the technology solution as well as related processes and practitioner training.
- Drive a shared understanding of impacts and priorities to inform a clearer definition of roles and responsibilities as well as an IT/OT governance model.

An IoT future

The reality right now is that utilities are strategizing or just getting started with major integration projects. Progress entails some risk but it is not unmanageable if OT and IT priorities are balanced – and there are more projects to learn from every day.

IT/OT helps TSO respond to changing market and environmental conditions

A North Western European TSO is currently working to implement a new grid control system that will enable it to transition to managing a new energy mix including renewable energy sources. Working to implement Siemens' Spectrum Power 7, OMNETRIC Group's role is to deliver complex middleware to facilitate the integration of the client's control system with more than 20 third-party external systems, such as the European Power Exchange for power trading, weather forecasts, market partners, and asset and network data. This helps prepare the TSO for the future by enabling the integration of internal and external data sources. Armed with better intelligence, the TSO can better refine controls to meet grid requirements and other business imperatives.

UK DCC gateway enables greater data security and future business value

In the UK, OMNETRIC is implementing Siemens' Energy/IP smart meter application platform and the OMNETRIC DCC Application and Security Gateway Solution for four major UK operators serving over half of the UK market. The solution will allow these operators to meet the requirements of the UK's Smart Metering Implementation Programme (SMIP), which compels operators to roll out a smart meter platform that meets the data security standards of Great Britain's Data Communications Company (DCC). In addition to secure communications, the solution will, for the first time, give operators insight into what is happening in the low voltage distribution network. This project illustrates how governments are driving IT/OT integration through the development of security and interoperability standards.

It has taken operators 30 or 40 years to build their current networks. A technology breakthrough now – be it in storage or DER generation – could compel operators to build a next-generation network in a fraction of that time to cater to a new energy landscape. IT/OT integration and the uptake of IoT-driven solutions will help ensure that energy networks and systems are better prepared for such transformation.

Getting the fundamentals right – the standards, the security, and the integration layers – as well as addressing cultural differences, will lay a robust foundation for a smarter grid and gear TSOs and DSO for the future opportunities that IoT-driven solutions may offer. ■■

ABOUT THE COMPANY

OMNETRIC is an industry-focused, solution and services company, drawing on the recognised strengths of Siemens to solve technology challenges untried by others. Its global team of operations and information technology data specialists are dedicated to providing integrated software solutions for energy providers.

¹ IDC Energy Insights IT and OT Integration 2016 Survey