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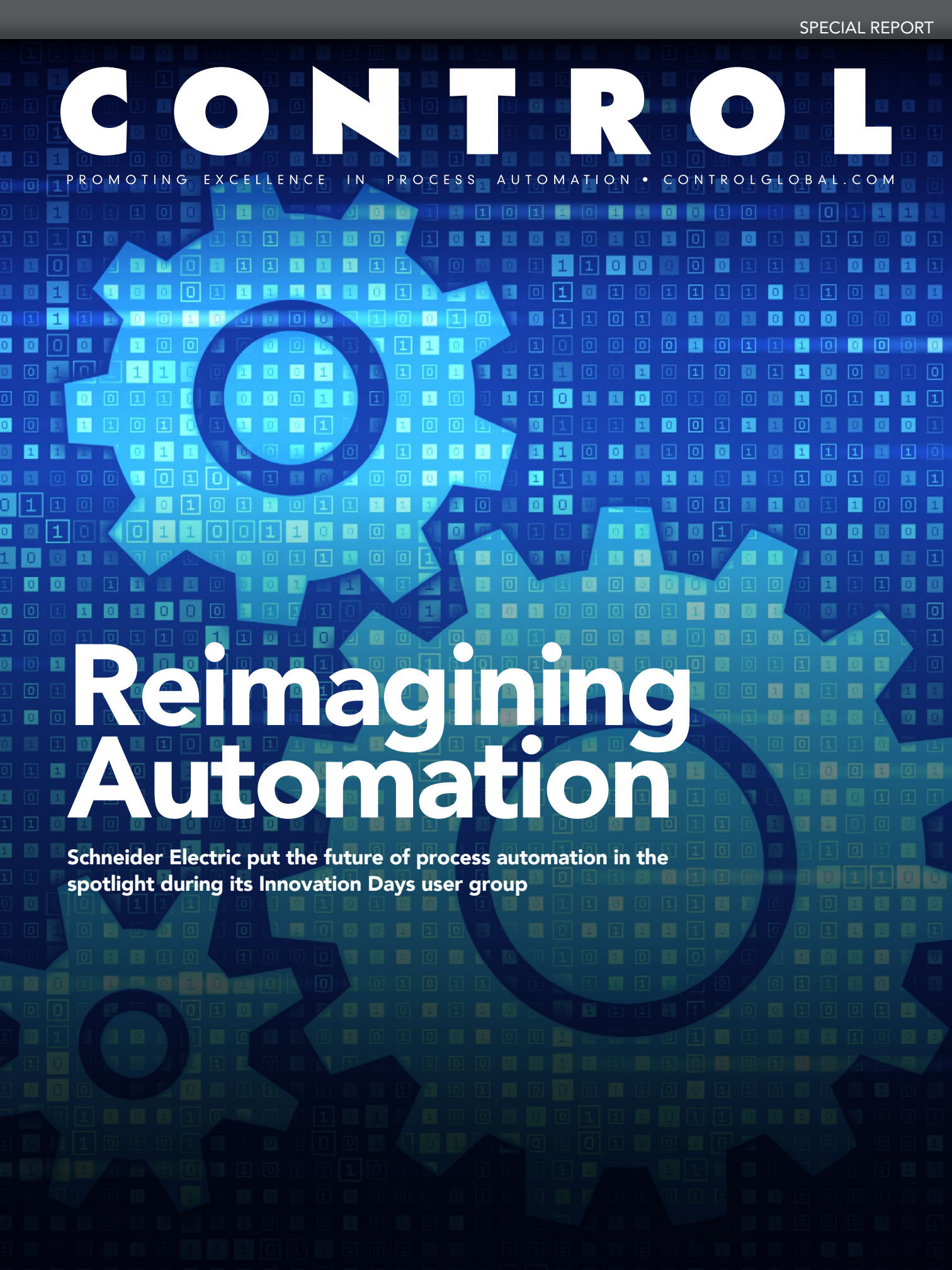


Reimagining Automation

Schneider Electric put the future of process automation in the spotlight during its Innovation Days user group

The value of reimagining process automation

Open systems, empowered collaboration and democratized technology are keys to a new way of thinking about control

By Len Vermillion

Michael Martinez, EcoStruxure Foxboro DCS Global Leader at Schneider Electric, understands why the conversations surrounding process automation need to change. Global trends and recent events, such as the pandemic and supply chain challenges, have left end users demanding more value from their legacy industrial operations. These days, dynamic markets worldwide require industries to be more agile and adaptable.

The catalyst for fulfilling those demands is a reimagination of process automation, Martinez told an audience of Schneider Electric customers at its user forum in May in Foxboro, Mass. "Reimagining automation" was the theme of the multiday event, with several breakout sessions addressing just how the company is reimagining process automation as it innovates and updates its product lines for open systems and interoperability. After all, much of control, like just about everything else, finds efficiency by operating via cloud-computing.

"One thing I and probably all of you have recognized over the last couple of decades is we've always put hardware first," Martinez said.

He admits this was the basis of a lot of investment in the Foxboro distributed control system over the last 35 years. However, given the way the world has changed, particularly as everything from planning meetings to plant operations continues to adapt to the cloud, the primary focus on hardware has become "a little bit backward." Rather, he says, it's time to reimagine process automation for open systems.

End users agree. In a recent survey commissioned by Schneider Electric, more than 80% of industries consider open systems and interoperability as important capabilities when selecting vendors for their control system. In addition, 95% of participants reported that, when selecting new controls systems, interoperability is very important or important.

With those kinds of expectations, there's no doubt conversations in innovation labs are taking on a different tone these days.

OPEN SYSTEMS

Thinking differently about process automation revolves around three important avenues: open systems, empowering collaboration and democratizing technology.

There are three different ways to think about open systems, according to Martinez. The first model of open systems in today's process industries is one that says everything can talk to everything else. It creates a common language, such as OPC Unified Architecture (OPC UA). "If everything speaks OPC UA and we have OPC UA databases, then regardless of all of the systems that we have underneath, the challenges of configuring those systems, maintaining the licenses, and getting the proprietary hardware, is open," Martinez said.

Another definition implies that, when you buy anything from a vendor, it will work with everything from that vendor. "That's another definition of open, but it's not the definition of open that Schneider Electric uses," Martinez adds.

Schneider Electric opts for a definition of open systems in which software and hardware are separated. The goal is to decouple them, so end users can experience automation in a new way that's portable, much like how listening to music has decoupled from any one physical sound system.

Using this approach, solutions aren't hardware dependent; they don't require users to change out hardware because of a scheduled hardware lifecycle. Users won't be compelled to reconfigure or rebuild their entire applications.

EMPOWERING COLLABORATION

Another aspect of reimagining process automation is empow-

ering collaboration. This is where engineering gets back to process first, according to Martinez. "Today, when we think about automation systems or even when we walk into a customer's site, what's the first thing I want to see? It's the control room—where the controllers are," he says. "That's because we're so hardware focused. But as we move into the future, we need to change that conversation."

Changing this discussion will take effort from both instrumentation providers and end users. Nowadays, their talks often start with specification sheets. But Martinez points out it's really all about making good products that give customers what they need. This means starting the conversation with the process and what the end user is trying to accomplish.

"Whether it's production, sustainability or ESG goals, you name it," he says. "All of them are achievable when we work together and don't just transact."

DEMOCRATIZING PROCESS AUTOMATION

Democratizing technology is about accessibility and easily incorporating new ideas. It lets applications and configuration interfaces be based on industry standards that are accessible to everyone.

"It's a language that we speak, that we must speak, to get our systems to do what we want," said Martinez.

He adds that locked and proprietary systems limit the ability of experts in innovation labs to add value to processes and contribute as soon as they arrive. Instead, they must be trained in "ancient ways" before they can add value to the organization.

At a time when many industries are struggling to bring in the next generation of automation professionals, how can process automation companies attract new talent if they can't or won't open the full toolbox for them to use?

Martinez points to partnerships with Universal-Automation.org, a group of member companies working to enable vendors, end users and academics to share a common automation software layer regardless of brand. He adds the industry can extend a hand to educational institutions, so it will educate the next generation of automation professionals about this open way of thinking. It's a vital step in the future of process automation because it ensures the skills that new process automation professional gain can be immediately applied to their area of expertise and industry processes.

"It makes it very easy for them to add value immediately," Martinez says.

While industry has historically focused on profit and financial performance, open systems, empowering collaboration among vendors and end users and embracing next generation ideas ties a company directly to purpose-driven goals. ■

Embarking on the digital transformation journey

Digitalization isn't just about replacing technology; it's a new way of thinking about people and processes

By Len Vermillion

As the idea of digital transformation moves industry toward a more efficient and responsible future, it's important to remember that the process is a journey companies make over many years. It's not something that happens one day, and an entire production line is digitalized the next, according to Schneider Electric executives, who spoke during the company's Innovation Days for process control in May at one of its global Hubs in Foxboro, Mass.

The journey, according to Nathalie Marcotte, SVP and president of process and automation at Schneider Electric, is about much more than simply replacing technology. In fact, she said, people are the core of digital transformation and technology, and should be supported despite the often-invoked conventional wisdom that technology is at its center.

"In any digital transformation, we need to put the people in the middle and we're seeing it in many cases," she said, while speaking on a digital transformation panel with two of her colleagues, Marc Fromager, SVP of industrial automation services, and Elias Panasuik, executive director of EcoStruxure Power and Process.

"When we talk people and digital transformation, a lot of people feel threatened," she continued. "But what we've learned, what we've seen, is you need both [people and technology]."

At the same time, the digital journey requires a specific end goal, usually tied to efficiency and sustainability. Without domain expertise, digital transformation can simply become cool things without a purpose. "Then it's not going to be helpful, and you're going to be in this proof of concept forever," Marcotte added.

Fromager agreed and said the first step in the journey is to define the roadmap for ultimate end results. He added one of the most important steps is defining return-on-investment (ROI) guidance for customers. "We can implement a lot of systems, but if that doesn't generate value, then it doesn't make sense," he said. "So, what is the level of digitization you actually need?"

Schneider Electric's goal is to help customers establish the value they need from digitalization. As suppliers of technology solutions, Schneider Electric's executives said they start with their own supply chain. "This is where we learned it really is a journey," added Fromager.

The company started the process of transforming its supply chain six years ago. From the start, it found that digitalizing the link between IT and OT is a challenge because IT departments tend to be conservative, primarily for security reasons.

To manage the process, Schneider Electric looked at its opportunity to digitize OT across its approximately 200 sites worldwide. In the end, it came up with a five-step process for its own digital transformation journey, and the executives on the panel said this experience strengthened their ability to help end users with digital transformation.

KNOW WHERE YOU WANT TO GO

Fromager advised end users to first identify their own expectations for operational efficiency. Factors often involve how many sites need to be covered, as well as which sites make sense to get a digital solution and which don't.

"As soon as you know where you want to go, [the supplier] needs to know the situation: what's

the data model, how is data acquired, and what's the status of their OT and IT infrastructure?" Fromager said. "We dive deep into the process with a customer, identify the pain points, and come up with cases that will identify productivity or energy efficiency."

The next step is implementation, and Fromager said it's usually done in phases because putting people first in the transformation means change management becomes a very important step. Not to be overlooked is continuous maintenance of solutions implemented, including how revenue is maximized, and the value of the ROI of the digital transformation solutions implemented.

A BIGGER PURPOSE

The goal of any digital transformation should never be about adding technology just for the sake of adding technology. The implementation of technology must not only answer a business purpose, but also, increasingly, an environmental or social purpose.

Schneider Electric launched EcoStruxure, its open and interoperable architecture and platform, in 2016, with the idea to expand use of the company's software and hardware technologies to better drive sustainability, automation efficiencies, and energy management. The architecture remains to be the foundation from which Schneider develops its open, data-driven, software-centric portfolio – evolving through different use cases that address customer objectives, such as with capital and operational efficiencies by bringing power and process data together.

"Whether we're looking at the design side and integrating overall design packages in simulation packages to understand interactions between process and electrification, we need to think about how we can link electrical data into the process control network to give the insights that people require, rather than looking at these systems as totally isolated," said Panasuik.

In many instances, electrical systems and processes are separated, but these days, those interactions have really started to matter in terms of looking at sequencing of events, tracking and disruptions. Panasuik added that Schneider Electric has seen a tremendous push for processes driven by decarbonization an existing process, electrifying a process, carbon capture, or decarbonizing supply chains.

Michael Martinez, Foxboro DCS global leader at Schneider Electric, said there are several projects happening right now concerning electrification of processes. "I know from the process side, specifically, we have to extend the boundaries of what we think of traditionally as a distributed control system to include what will be a very important raw material in the future," he said. Adding that one of the challenges now is to manage electrification like any other vessel or material that might be brought into a plant.

One thing is certain, digital transformation is not only a journey, but also a new way of thinking about entire processes. ■

Creating the right environment for 'responsible profitability'

Process automation leads the way for companies looking meet new business expectations

By Len Vermillion

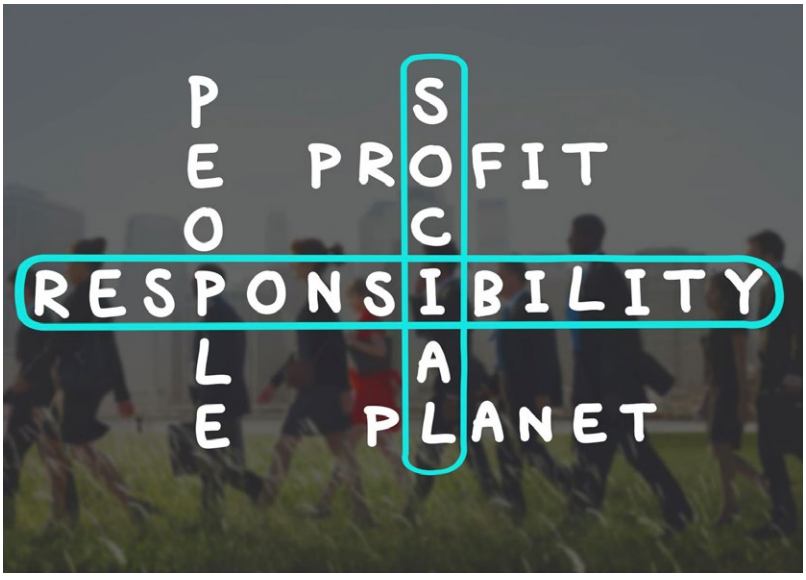
What is the future of process automation? One concept put forth during the recent Schneider Electric user group forum in Foxboro, Mass., is called "responsible profitability." In an age of environmental, social, and corporate governance (ESG) mandates, companies are not only looking to be profitable, but also responsible.

There's no doubt technology, particularly automation, plays a vital role in the march toward responsible business. While artificial intelligence and machine learning garner headlines these days—and they are certainly valuable to responsible plant operations—they are just part of the solution. More broadly, the pursuit of open systems, interoperability and democratized solutions are central to reimagining process automation and steering new control concepts toward the new business expectations.

As Michael Martinez, EcoStruxure Foxboro DCS global leader at Schneider Electric, asked at the user forum, "How do we start to leverage technology to enable us to achieve those outcomes beyond profitability? How do we think differently about our expectations?"

Reimagining process automation means diving deeper into the why and how of each step of operations. For example, Martinez said it's not just about moving a valve anymore, but why the valve is moved and how it is moved. Engineers will need to consider the force of the valve and the energy that is used to move the valve, among other metrics.

"[Responsible profitability] is about getting away from using things that might not be good for the environment," Martinez added.



Schneider Electric's ExoStruxure Automation Expert software has been around since 2020. The company bills it as a single, integrated development environment, and Martinez said it makes the company's EcoStruxure platform a more effective solution. The platform is an IoT-enabled, plug-and-play, open, interoperable architecture and platform. It is also the heart of Schneider Electric's efforts to help end users think differently about process automation and to engage in more responsible operations.

"When we originally talked about [EcoStruxure], customers would ask me, does that mean that I can buy any of these products and any of these software applications from Schneider Electric and they all work together? That was the vision," he said. "That vision is becoming a reality today with EcoStruxure Automation. One single, integrated development environment that allows us to create applications that can run on all these devices."

With EcoStruxure a reality, the company went even further. UniversalAutomation.org is a third-party nonprofit organization with several member companies, including Schneider Electric and additional vendors, end users and educational institutions. "This is what we believe is creating that platform of the future, that runtime of the future, that's going to allow us to create products that can all be incorporated," he said of the organization.

Collaboration is vital to reimagining automation for responsible profitability. "It's going to be a challenge, but I honestly believe that in order for us to meet the expectations that industry and people have of us moving into the future, we can't scale what we have today," Martinez continued. "We can't do more of what we do today. This is where we run into these boundaries as we start to talk about sustainability and availability of resources. We must think differently. We must reimagine automation." ■

Operational flexibility drives new process power generation

Fully integrated electrical controls push the boundaries of traditional process control

CHRIS SMITH
Director, EcoStruxure
Power and Process
Industrial Automation Group
Schneider Electric

Power systems for plant-level process control continue to evolve, particularly as the quest to create efficient and sustainable operations garners increased importance for industry. Technology is already addressing operators' need for high-powered, flexible and fast-distributed control. Chris Smith, Director of EcoStruxure Power and Process, Industrial Automation Business, Schneider Electric, talked with Control's editor-in-chief, Len Vermillion, about the emerging landscape of power and process control systems.

Q: Plants often used medium-voltage systems, particularly for powering large motors. How have these networks and their information systems changed?

A: The key point is networking. In the past, they were often medium-voltage systems, which weren't digitalized and not networked. The latest medium-voltage controls are based on the new IEC 61850 standard, which was released in mid-January and is highly networked with high-powered, fast Ethernet networks. It helps eliminate hardwiring that previously connected different relays and motors.

By moving to a network, the overall configuration of the substation is simplified. This happened over the past 20 years. The fact is we've got all this added information from the intelligent relays at the station level, and having all that extra data lets us integrate it directly to the process control system, where business decisions are made. It enables much better situational awareness and business decision-making because it's networked.

Q: What plant interaction do operators generally have with electric power systems other than connecting with a motor?

A: I think you could say their only traditional connection was with other motors or generators. The classic distributed control system (DCS) consists of a hardwired control, start and stop status with a few interlocks going directly to all the motors. So, the situational awareness around large motors has been somewhat minimal, and occasionally inflexible with respect to the application. Instead of being hardwired, wouldn't it be great if that control was softwired by the network directly into the DCS, particularly for medium voltage?

Schneider Electric EcoStruxture™ Electrodynamic Controller

This is starting to become important. It provides a degree of business flexibility. Information can be derived, exchanged or modified depending on changing business conditions. For the next few years, those conditions will likely be dominated by the desire to improve electric power management for climate change and for initiatives, such as green hydrogen, green diesel and biofuels. Many of these initiatives can impact the plant, and directly influence how we should integrate with electric power systems beyond what we used to do by just connecting with the load.

Q: How are fully integrated electrical controls becoming part of the new landscape of power and process control systems?

A: If we look at a power control system, we could say that a plant has an internal power distribution network. In the past, this was either a secondary SCADA system or a secondary energy management system with few connections to the DCS. These days, that integration must be much tighter because we're exchanging a lot more controls at the micro-generation level or the internal plant power exchange level, and this impacts how we operate the plant. Instead of infinite availability, power is much more rationed. It needs to be calculated. It needs to be accumulated. It needs to be managed differently when it's green power compared to when it's not green power.

This information exchange is pushing the boundaries of what we used to do for control. Now, the modulation and changes in the electric power constraints will impact the actual process setpoints far more than they did before.

Another impact comes from electrifying plants. With green energy and net-zero carbon initiatives, heating different parts of the process is transitioning from fossil fuels to direct electric power.

We can now use green energy that's externally or internally provided to heat processes, rather than burning fuel, and that gives plants a more carbon-neutral stance. Electrifying the process requires some aspects to be controlled using power control instead of valve control or speed control. We now have a combination of speed valve positioning and power control mixed in plant controls. That's probably the biggest change in the next few years.

Q: How fast are load-shedding control sequences, and how did they change as IEC 61850 enable information systems?

A: One might think that electrically connected or hardwired systems would be the fastest at load shedding. At present, we have record-breaking load-shedding sequences down around 29 milliseconds, which is faster than a series of relays. The 61850 Generic Object-Oriented Substation Events (GOOSE) messaging system is certainly fast enough to do very high-speed load-shedding.

Where we need fast load-shedding is debatable. If we have large motors compared to small generators that may be islanded from a grid, then load-shedding needs to be very fast to preserve the network. This typically happens in upstream oil and gas, on offshore platforms, and in liquid natural gas (LNG) plants. However, for systems with significant generating capacity, load shedding possibly doesn't need to be that fast, and we can install more basic load-shedding schemes.

However, 61850 enables developments in load shedding, complexity of load-shedding, and implementing schemes to shed loads. An interesting question is: how do you recover a plant after load shedding? What's the best way to get it back on its feet? We've implemented in our controllers an arrangement which enables operators to confidently restart motors only when sufficient power is available. This lets operators restart or restore the plant with confidence. In the future, there may be some artificial intelligence that can restart plants automatically, but we're not there yet.

Q: What's the latest automation intelligence associated with plant restoration following a load-shedding event?

A: I've polled customers and technology providers and found that people are very keen to say how fast and how fantastic their automated load-shedding system is. However, load restoration is a different ballgame. I think the market, or at least the operational market, hasn't taken to the idea of restoring plants automatically. There are probably too many variables or things that might go wrong. If a plant sheds its load rapidly, its operators and engineers would have to perform fault finding. They may have to do workarounds, so an automated sequence would be difficult. At present, we allow manual restoration and automated load-shedding for optimal control and efficiency of a plant. ■