

SCADA and the cloud: a perfect partnership?

Suzanne Gill reports on the changing role of SCADA systems as we enter the era of smart manufacturing and IIoT.

In the last decade the most usual solution to an operational bottleneck has involved the introduction of yet another isolated information system. This has resulted in mind boggling quantities of process data being available today. However, according to figures supplied by Yokogawa, only 5% of this raw data is converted into workable information; only 10% of data is relational structured; and more than 50% of data is considered poor.

The emergence of a combined

SCADA/MES (Enterprise Automation Systems) layer was a big step forward for the process industry, helping simplify data management. However, just connecting databases is not sufficient to turn data into knowledge. "To really capitalise on the massive amounts of data, in other words, to become analytically competitive, companies need to be thinking about their overall information strategy," said Frank Horden, global business development and marketing manager for Yokogawa Electric Corporation.

Of course, SCADA users are accustomed to collecting enormous amounts of data from machines and processes and due to an increasing need for transparency and to meet increasing regulatory compliance, they also understand the need to store this data. "What is new are the tools that can extract and capture actionable information and meaningful insights from the data. The explosion of data has resulted in the need for modern enterprise SCADA solutions – which have already evolved from mere PLC and device integration tools – to become an environment where a more holistic information-model approach is applied," continued Horden.

The greatest benefits that

engineers gain from all this data, in technically complex environments is the information needed for the early and precise detection of defects and to help increase product quality and consistency. In addition, by obtaining information from data it is possible for planning to be improved throughout the production chain.

"Taking full advantage of the data in the hybrid data ecosystem has the potential to transform the operational and industrial landscape in the same way that the media, communication and technology industries has changed the consumer landscape over the past decade," said Horden.

Horden believes that SCADA/MES will continue to play an important role in the real-time operational management of smart factories and processes of the future by collecting, storing and managing the data utilising the latest IT-technologies.

"Edge computing will also grow

as organisations attempt to collect, analyse and process data from assets more efficiently than traditional cloud architectures," said Horden. "This will lead to a reduction in the amount of data being sent to the cloud, decreasing network latency which, ultimately, will improve system response times in mission critical applications." Horden predicts that the adoption of Edge computing will also lead to the use of newer technologies such as LTE and LoRA which makes data available everywhere, quickly.

Another strategic driver is the growing need for collaboration between IT and OT. As the systems merge and integrate within SCADA/MES it is important to define and segregate responsibilities to avoid tension between IT and process engineers to ensure efficient operation. "Users of SCADA/MES will need to create a shared understanding of the 'real-time' and 'near-real-time'

requirements of each system so that the need of the production process for real-time information is not compromised by using shared public infrastructure which is critical to the IIoT philosophy," concludes Horden.

A bright future

Martyn Williams, managing director of COPA-DATA UK believes that the future for SCADA is bright, quoting the findings of a report from global market research company, Technavio, which says that the manufacturing industry is set to experience a significant growth in the adoption of analytical software through SCADA.

"The integration of predictive analytics into modern SCADA software has made it easy for manufacturers to collect and archive production data and make future predictions based on this intelligence," said Williams. However, he believes that SCADA systems can

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provide much more than an insight into the lifespan of machinery. "The integration of cloud computing with SCADA systems has enabled operators to control production from any location, further improving the flexibility of the plant," he said. "As with any cloud migration, there are security concerns. However, as cloud security features become more sophisticated and SCADA providers increasingly adopt a security by design approach to their software, this concern is unlikely to deter manufacturers from embracing – and benefitting from – cloud-based SCADA."

Williams predicts that we will soon be experiencing an influx of supervisory control technologies designed to improve the flexibility, accuracy and security of production.

Coming together

In an era of Industry 4.0 and the IIoT, we are starting to see IT and OT environments fusing together more and more, according to Katrin Kunz, head of marketing for Industrial PCs and SCADA, Siemens Division Digital Factory. She believes that cloud infrastructures and SCADA systems have the ability to

enrich each other in modern industrial environments. SCADA systems have, for many years, been an essential tool in production-critical processes, wherever it is important to display data in real-time and log it with a time stamp in order to make and document strategic business decisions quickly. It can also be used for teleservice and remote maintenance.

Cloud systems thrive on having access to the largest and most comprehensive data pool possible as the basis for analysis apps and services. Assured data availability and data display in real-time play a subordinate role here.

"The question that needs to be considered is which analysis and deductions are reasonable in the cloud and which ones are better done in the SCADA system? And how can they complement one another?"

"The SCADA system of the future could transfer non production-critical data to the cloud in order to enrich its data pool for higher-level apps and services. In the other direction, SCADA systems could have the potential to utilise domain knowledge from the cloud, such as weather data, in order to facilitate further conclusions which would not be possible without this

synergism," concludes Kunz.

Practical developments

"Putting aside the obvious and inevitable strides forward in functionality and networking communication, I think the major factor driving the development of SCADA for the factories of the future is a practical one – the user demand for increased versatility," said Paul Hurst, director at Products4Automation, which is the UK distributor for Progea products which include Movicon SCADA and NEXt.

Hurst believes that SCADA monitoring systems should offer ease of integration for existing and new technologies; and should also display the scalability and transparency required to allow plant managers to create a truly custom monitoring system with ease.

Hurst goes on to explain that such characteristics can be achieved by actively designing a SCADA system for the latest software platform technologies – future-proofing – which can be achieved by utilising the latest network protocols, modular process structures, graphical capabilities and communication technologies as part of SCADA software architecture.



"A next generation SCADA platform should use specific hardware and OPC UA protocols for ease of integration across the plant; Windows Presentation Foundation (WPF) graphics for modular process modelling would be a good idea and connectivity to the Cloud via a range of options is pretty much essential," he said. "All of these technologies are likely to form the basis of the Internet of Things (IoT) and compatibility with future expansion towards Industry 4.0 compatible monitoring systems. It makes sense that SCADA platforms evolve and adapt seamlessly with these trends."

Breaking free

Traditionally, SCADA has been confined within the plant. However, smart phone SCADA apps for iOS and Android operating systems mean that plant managers can now monitor and analyse data from anywhere, 24-hours a day on a personal wireless device. This results in improved responsiveness to alarms, helping to increase production uptime.

Hurst believes that monitoring will be further revolutionised by breakthroughs in Augmented Reality (AR) and Virtual Reality (VR) technologies. "In the not too distant future, I believe we will see engineers utilising virtual headsets to navigate a 3D plant which offers real-time data and models representing the physical plant off-site. Increases in graphical capabilities will achieve accurate environments which will enable engineers to gain even more insight into processes, and maybe even amend applicable parameters virtually via the AR or VR environment."

Alternative views

Taking an alternative view about the future role of SCADA, Nicholas Temple, marketing manager at B&R Industrial Automation, questions whether there will actually be a need for SCADA solutions in many applications in the future, as HMI solutions grow in capability and MES and ERP solutions become more cost competitive with

Business Intelligence Solutions. He said: "SCADA systems usually carry an additional engineer resource so the integrity of an automation platform for a plant can be at risk. If a PLC programmer can use a single engineering environment to completely cover the needs of both SCADA and PLC, why complicate matters further with another engineering environment?"

He argues that typical SCADA systems come out with a new solution annually with support offered for a

Unitronics Industrial Automation Solution targets the smart factory of the future. "This is one of the reasons our all-in-one PLC/HMI controllers include a built-in webserver. We enable our users to click-to-convert HMI screens to webpages. The application can then be viewed and edited – depending on the security levels assigned — by users on any browser, whether that be a on PC or mobile device," said Magrafta.

Support for protocols such as Microsoft SQL, FTP, email, SNMP is

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limited period after launch. This means that hardware and software lifecycles can also come unhinged, creating unnecessary costs for the user with software updates that may not be compatible with the potentially legacy hardware installed base.

B&R offers a simple, modular way of programming with its mapp solution and a visualisation solution called mapp View. mapp View integrates web technology right into the software development environment. While it is built on HTML5, CSS3 and JavaScript, automation programmers never need to deal with these languages and can continue to focus on their own areas of expertise.

Benny Magrafta, head of software research & development at Unitronics, also questions the need for SCADA software in many applications. He said: "Why go to the trouble of setting up a SCADA system, when the front of your PLC can easily become an elegant HMI touch screen, and all of the data in the control system is immediately accessible?" He is referring to the integrated PLC and HMI offerings available from his company.

also important, and according to Magrafta, this results in the PLC side communicating machine/application data and the HMI/webserver side enabling direct communication with the application and the facilities backend systems, while protocols such as SQL, FTP, email, SNMP communicate data to/from the management layer. "The all-in-one controller becomes the nexus of the system," he concludes.

Conclusion

There can be no doubt the SCADA system has changed over the years, evolving from the role of providing a plant-wide monitoring and control solution for often geographically wide spread systems, and delivering data to the control room. Today, there is ever more data to collect and SCADA data management capabilities have been extended and its role as an HMI has reduced. It looks likely that the concept of a SCADA system, in some form, will continue to dominate as a tool for harvesting information and insight from the plant, albeit the system might be unrecognisable when compared to SCADA systems of the past.