Life Is On | Schneider Electric

FROST & SULLIVAN

Business Value through a Software-defined Automation approach using EcoStruxure Automation Expert

Enhancing System Agility, Streamlining Engineering, and Boosting Operational Efficiency

With open, hardware/vendor independent automation

A Frost & Sullivan Whitepaper

In Partnership with Schneider Electric

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Summary

Conventional industrial automation solutions – that have been defined by their robustness and reliability for over half a decade – are now struggling to adapt to the vastly different needs of today's dynamic business, production, and process environments.

The chronic shortage of automation engineers and programmers aggravates this problem.

In response, Schneider Electric's EcoStruxure Automation Expert takes an IT centric approach to enable the decoupling of software from hardware, for modeling of distributed data and control systems.

This event-driven approach, combined with asset-centric and object-oriented design, simplifies AI and edge computing integration and enables true IT-OT convergence, offering significant business benefits throughout a project's lifecycle.

These benefits can lift performance across all organisational metrics - revenues, costs, productivity, workforce attraction and retention, quality, sustainability, compliance, and innovation.

Source: Schneider Electric and Frost & Sullivan analysis

The Need for Change

Traditional industrial automation solutions - that have been the mainstay of the industrial automation landscape for over half a century - are reaching their limits due to their focus on closed, hardware-centric design.

Often continuous, hybrid or discrete process environments must contend with multiple proprietary devices and operating systems (tied to various vendors). This makes them complex and difficult to integrate, configure, reconfigure and maintain, thus reducing flexibility and adding risk to the plant lifecycle.

In the past, this challenge was addressed by using experienced automation engineers and programmers with a high degree of specialisation. However, the industrial automation sector faces a chronic talent shortage and can no longer rely on having enough skilled engineers and programmers due to changing workforce demographics and competition from other sectors.

This traditional paradigm of industrial automation is also found wanting in meeting the increased demand for cost efficiencies (by reducing implementation and downtime costs).

The Challenge with Traditional Hardware-centric Automation

Hardware-centric industrial automation systems hinder innovation, scalability, and adaptability in dynamic production and process environments. This is because they tend to be:

- *Static, embedded control logic,*
- *Closed systems,*
- *Not designed to natively support analytics-driven applications,*
- *Tied to proprietary hardware lead times,*
- *Preventing true IT/OT convergence.*

- Frost & Sullivan

A global survey undertaken on behalf of Schneider Electric found that talent acquisition and/or retention of plant personnel was a key challenge for over 75% of industrial companies.

- The Future of Work in Industry, Omdia, Schneider Electric, 2024

Source: Schneider Electric and Frost & Sullivan analysis

A New Approach to Industrial Automation

In response to these challenges, **Schneider Electric** is driving the transformational shift from hardware to **software-defined architecture**. With **EcoStruxure Automation Expert**, in alignment with Universal Automation.org (an independent, non-for-profit association managing the implementation of the shared source runtime execution engine that provides the basis for an ecosystem of portable, interoperable, "plug and produce" solutions), true harmonisation of information technology (IT) and operational technology (OT) is now a real possibility. It simplifies the design of industrial automation processes as control engineering is no longer limited by hardware constraints. Instead, control strategies are designed based on the actual plant layout, moving away from the traditional tag-based model. This asset-centric approach displays process assets rather than just tags. It allows for a more intuitive and visual approach, making it easier for new automation engineers to onboard and understand the system.

This asset-centric approach also simplifies troubleshooting for maintenance and automation engineers, as the control strategies visually resemble the plant itself, enhancing overall operational efficiency. Asset centric methodologies also make it easier to virtualise processes and validate with digital twins. In addition, the asset centric, event driven approach is understandable to IT staff, so they can better understand and work with the OT domain for enhanced business-process linkage.

Based on open standards for modeling distributed data and control, EcoStruxure Automation Expert delivers a range of compelling business benefits.

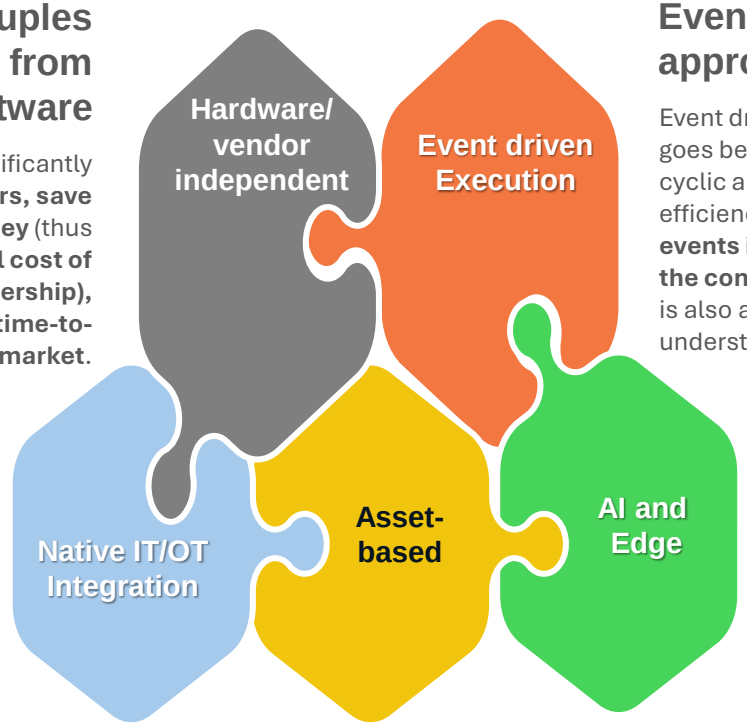
Business Benefits of Leveraging EcoStruxure Automation Expert

Decouples hardware from software

Can significantly **reduce errors, save time and money** (thus **reducing total cost of ownership), accelerating time-to-market**.

Cloud based IT/OT Convergence

Addresses the growing need for **IT/OT convergence** in industrial environments - supports the development of a more skilled and engaged workforce familiar with software-centric tools and environments.



Event driven approach

Event driven approach (that goes beyond the standard cyclic approach) improves efficiency by **responding to events in real time when the conditions require it**. It is also an approach that is understood well by IT staff.

AI and Edge

Easy deployment to the hardware that makes the most sense, whether it's a controller, an **edge computer** or incorporating **AI**.

Asset-based

Asset centric and object-oriented design methodologies and programming - Drag and drop as many times and wherever needed, rather than designing from scratch. The layout of the control system follows the layout of the process.

Source: Schneider Electric and Frost & Sullivan analysis

Value through the Project Lifecycle

Digital Continuity – design, engineering, integration; through to visualisation

Project Pre Planning

EcoStruxure Automation Expert allows for the design of distributed control applications independent of vendor or hardware solution.

Automated engineering with advanced AVEVA integration leverages technical input documents such as engineering and instrumentation diagrams to automatically create automation assets and HMI logic. This enables early process simulation and testing before hardware becomes available.

Design & Build

Project wide asset standardisation reduces engineering errors, commissioning time and costs.

Easier to utilise digital twin models with design optimisation, testing and validation of machine solutions in a virtual environment before commissioning and scaling.

Operation & Maintenance

The ability to virtually test and simulate enables changes to operations and production assets with minimal impact to production. It also reduces downtime and costs.

Virtual controllers can run on existing computing resources, reducing hardware costs and energy consumption.

Continuous Improvement

Hardware independence allows operations to be future ready. When control hardware components become obsolete, it is easy to redeploy the control application on the more up to date hardware.

With OPC Unified Architecture, (OPC UA), MQTT and other open protocols, seamless data modeling and cloud integration enhances operational flexibility supporting data driven decisions.

End of Life

The existing control strategies and intellectual property can be leveraged and re-used for future process and automation needs without significant re-engineering.

Source: Schneider Electric and Frost & Sullivan analysis

EcoStruxure Automation Expert Business Value vs the Traditional Automation Approach

Project Lifecycle Phase	Traditional Automation Approach	Business Benefits* with a software defined approach using EcoStruxure Automation Expert
Project Pre Planning	Tied to specific hardware platforms. Lack of predictability and control of project scope and costs	**Accelerates pre-planning** through automation design that starts earlier (enabling greater predictability of project requirements, improved design, and simplified architecture) by decoupling automation from specific hardware or vendors.
Design & Build	Hardware dependent, linear deployment	Automated engineering and digital twin allows **creation of assets, plantwide simulation, visibility, and pre-testing even before the hardware is on site**
	Commissioning automation infrastructure can range from 1 to 6 months based on the scale of site operation	**30% to 60% savings in commissioning time and cost** as pre-qualified assets in the corporate library eliminate human input errors and time taken for manual configuration and validation for all assets
Operation & Maintenance	Standard cyclic controller scan time of tens of milliseconds (ms)	Event driven approach provides automation data on demand with **no dependency on hardware cycle times**
	Troubleshooting and system diagnostics problematic with diverse systems	**Faster troubleshooting and system diagnostics**
	Modification of production equipment performance in days	**Modification of production equipment performance in minutes**

- *Potential business benefits – where quantified – are based on Frost & Sullivan's analysis of likely benefits through leveraging a software defined approach, along with inputs from Schneider Electric (based on Schneider Electric use cases, inhouse analysis, and adhoc customer feedback).*
- *Business benefits vary significantly based on the industry, the type and scale of operation, and location. Ranges provided are indicative only.*
- *Stated benefits may not be realised in the build-out of the first project as project teams will have to rethink libraries.*

Source: Schneider Electric and Frost & Sullivan analysis

EcoStruxure Automation Expert Business Value vs the Traditional Automation Approach

Project Lifecycle Phase	Traditional Automation Approach	Business Benefits* with a software defined approach using EcoStruxure Automation Expert
Continuous Improvement	Quick controller logic updates in minutes per controller	**Quick controller logic updates in minutes for all controllers**
	Optimisation of complex processes	Asset-centric approach with virtual test and validation (instead of reprogramming) **improves agility and makes it easy to resolve problems and increase throughput**
	Programming for a new line on a plant added in weeks	Asset based agility enables **copy and paste of a new line on a plant in a couple of hours**

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- *Business benefits vary significantly based on the industry, the type and scale of operation, and location. Ranges provided are indicative only.*
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Source: Schneider Electric and Frost & Sullivan analysis

Beyond Incremental Improvements

While the potential business benefits outlined relate to specific stages in the project lifecycle, some attributes of the software-defined approach apply to multiple stages and can have a **cumulative positive impact** that is bigger than the "sum of its parts".

More importantly, the use of computing power in virtual machines as a substitute for control via hardware allows EcoStruxure Automation Expert to do what traditional automation cannot. Therefore, as the potential business benefits in the previous pages suggest, the aspiration is to not only make incremental improvements, but to open up a whole new range of opportunities.

However, to leverage software-defined automation effectively calls for a **mindset shift** amongst plant managers, automation and IT engineers, as well as asset maintenance teams. For example,

- An asset-based approach allows teams to think process or manufacturing systems first and "begin with the end in mind", instead of designing control systems based on hardware architecture limitations.
- The ability to use digital twin solutions means that virtual simulation offline enables changes to be made before they are implemented in the production environment.
- Using IT programing methodologies (rather than traditional cyclic control) aligns more closely with IT systems and increases cultural compatibility with IT teams.
- Unlike closed/proprietary systems, data modelling and cloud integration reduces configuration effort. Reusability ensures that the delivery of future upgrades is seamless.

Schneider Electric's commitment to open and interoperable systems brings this shift to software-defined automation within reach.

As a result, innovation is possible through a system that makes it easy to optimise and that proactively leverages advanced tools such as digital twins, AI, and edge computing.

This way, speed to market can be achieved at lower cost and with optimised resources. Business continuity needed to navigate volatility in market or operating conditions can be delivered through a software-defined approach. Adaptability and resiliency can help organisations thrive in the midst of change.

Source: Schneider Electric and Frost & Sullivan analysis

About Frost & Sullivan

For over six decades, Frost & Sullivan has helped build sustainable growth strategies for Fortune 1000 companies, governments, and investors. We apply actionable insights to navigate economic changes, identify disruptive technologies, and formulate new business models to create a stream of innovative growth opportunities that drive future success. www.frost.com

About Schneider Electric

Schneider's purpose is to empower all to make the most of our energy and resources, bridging progress and sustainability for all. We call this Life Is On. Our mission is to be your digital partner for Sustainability and Efficiency. We drive digital transformation by integrating world-leading process and energy technologies, endpoint to cloud connecting products, controls, software, and services, across the entire lifecycle, enabling integrated company management, for homes, buildings, data centres, infrastructure, and industries. We are the most local of global companies. We are advocates of open standards and partnership ecosystems that are passionate about our shared Meaningful Purpose, Inclusive and Empowered values. www.se.com

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