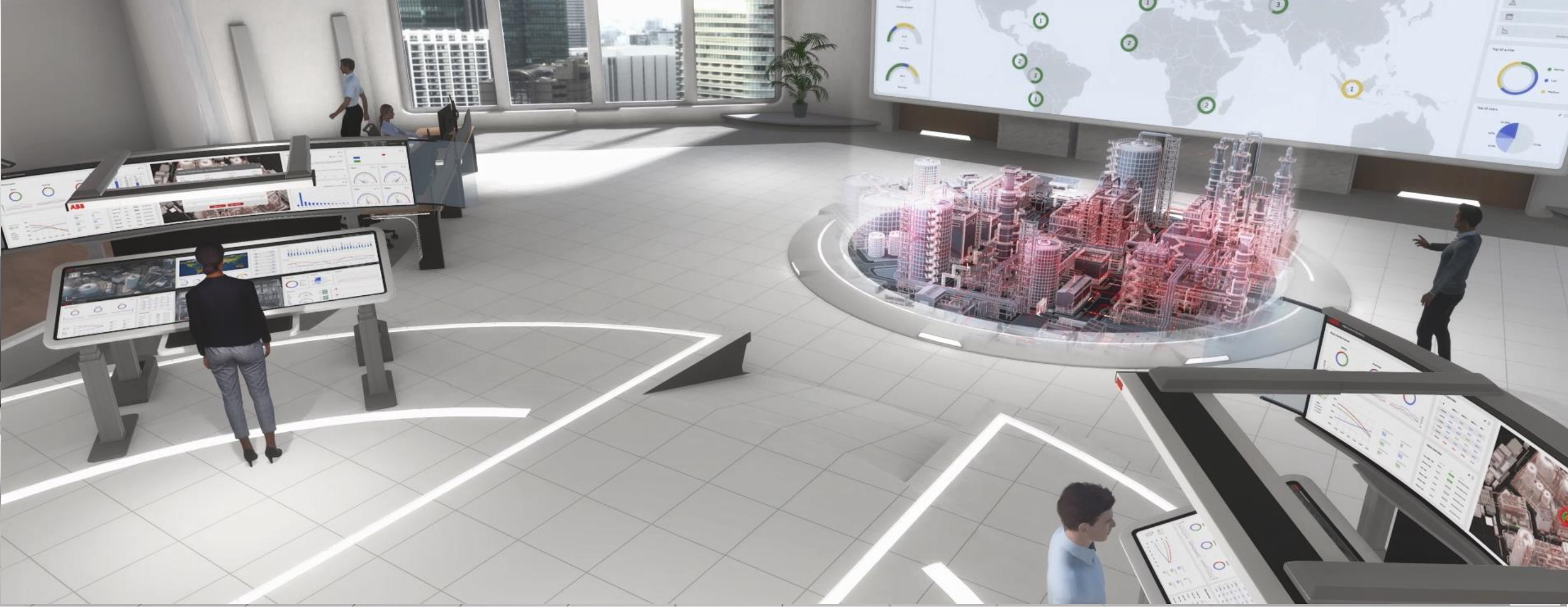


MARK BITTO | HEAD OF GLOBAL PRODUCT MARKETING, ABB | CIBO POLICIES & TECHNICAL ISSUES CONFERENCE | MAY 14-15, 2024

Envisioning the future of process automation for today and tomorrow’s energy and process operations

ABB Today

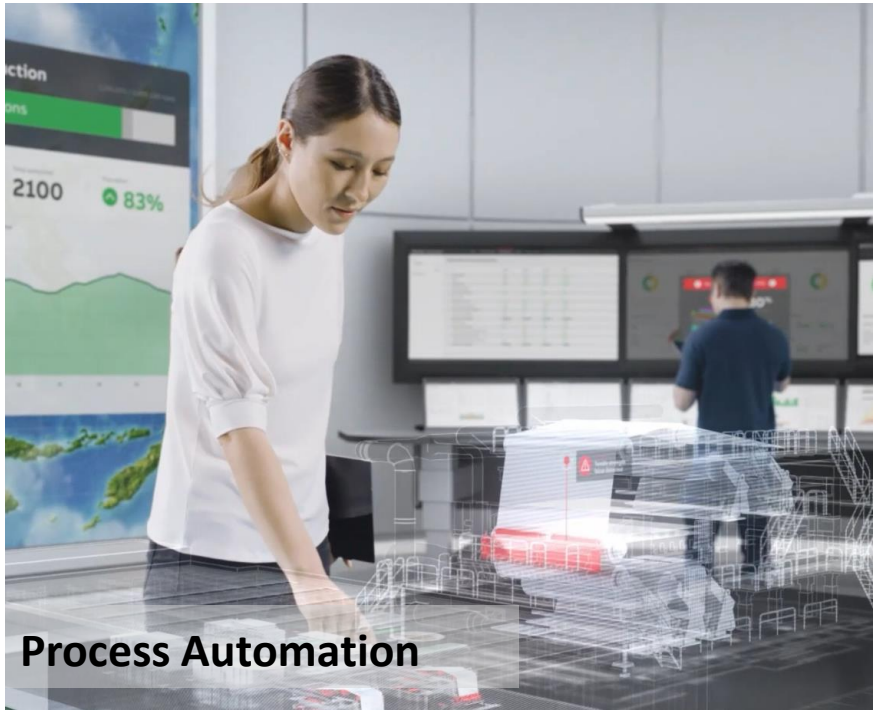
105,000 employees

In >100 countries

30 BUSD revenues

HQ in Zurich

We enable a more sustainable and resource-efficient future with our technology leadership in electrification and automation



Envisioning the future of process automation

Industry challenges

Although safety, efficiency, and reliability remain foundational automation requirements, users require agile innovation to adapt to the rapidly changing landscape of process industries.

Future automation developments will help industry to:

- **Address increasing unpredictability**
- **Enable energy transition**
- **Evolve production needs**
- **Adapt to next generation workforce**
- **Drive digital transformation**

Users push for change….

…Voice of the Customer

What users are saying are the top issues with traditional DCS solutions…

"Complexity of replacing or upgrading a DCS is significantly higher than for other computer-based systems."

"Current DCS cyber-security models will be difficult to adapt to future cloud-based or managed cyber security services."

"DCS compatibility and interoperability is poor, even between generations of system from the same supplier."

"Many DCSs require replacement due to system obsolescence and limitations to integrate with newer equipment or systems."

"It's evolution as well as revolution."

PETER TERWIESCH, PRESIDENT, PROCESS AUTOMATION,
AND MEMBER OF THE GROUP EXECUTIVE COMMITTEE, ABB

End-user initiatives / Market trends

From Control to Network Centric

Traditional Automation Pyramid

Enterprise Apps

Plant Network

MES Applications

Plant Network

HMI Level

System Network

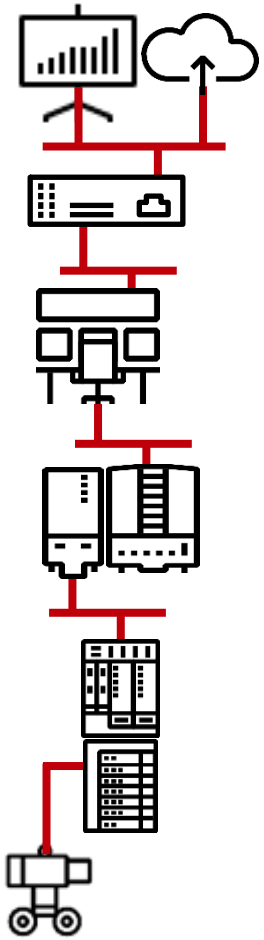
Control Level

Fieldbus

IO Level / Complex Device

mA

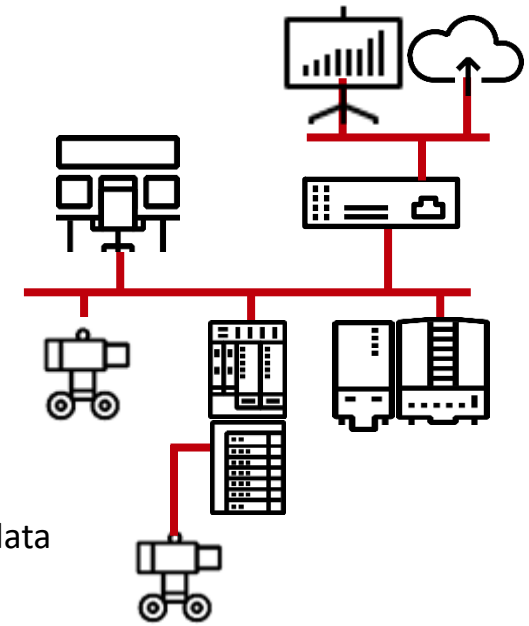
Instruments



- Different network/bus layer
- Layer based security zones
- Controller centric approach
- Engineered data flow
- Pre-defined and constrained data throughput

←→ network based and network centric

- Ethernet based networks
- Security build in
- Network Centric
- Direct access to data
- Unconstrained and unprioritized data throughput



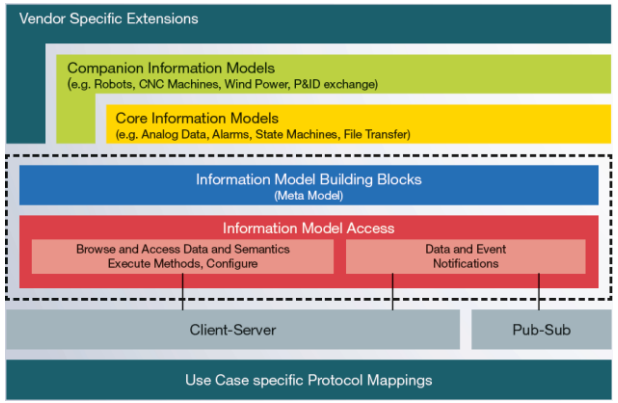
End-user initiatives / Market trends

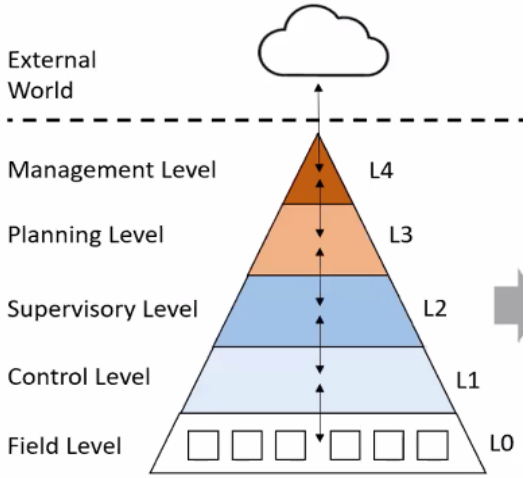
What is OPC UA?

Role in Industrial Automation

OPC UA plays a crucial role in the transition from traditional automation architectures to Industry 4.0 and the Industrial Internet of Things (IIoT).

It facilitates data exchange at various levels of the automation pyramid, from sensors and actuators to enterprise systems.





Key features and benefits

Interoperability: OPC UA enables seamless communication between devices from various manufacturers.

Security: It offers robust security mechanisms, including encryption, authentication, and access control.

Platform Independence: OPC UA works across different operating systems and hardware platforms.

Extensible: The multi-layered architecture of OPC UA provides a “future proof” framework. OPC UA products built today will work with the products of tomorrow.

Comprehensive Information Modeling: It supports complex data structures and allows for semantic modeling of information.

End-user initiatives / Market trends

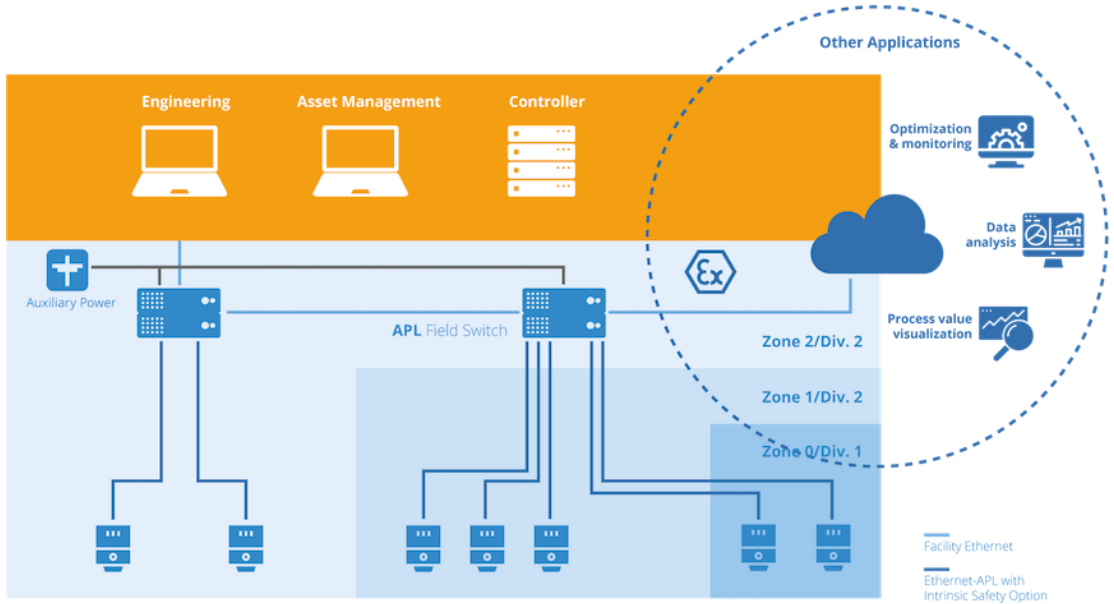
What is Ethernet – APL?

Ethernet – APL provides a secure, high speed, two wire,
powered ethernet networking solution for process automation instrumen

- 2 wire with power;
- 1000m cable (trunk) length; 200m spur length
- Designed for intrinsically safe applications
- Overcomes current bandwidth limitations
- Provides access to more data from the field for less

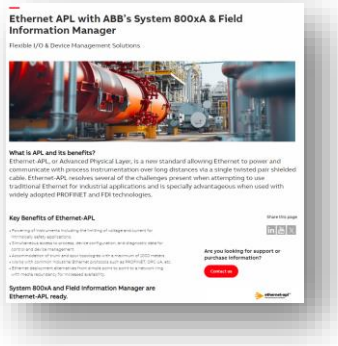
ethernet-apl™
advanced physical layer

Modernize your plant with high speed ethernet to the field technology



Links to find out more…

[Advanced Physical Layer (APL) - ABB 800xA DCS distributed control system (ABB System 800xA - process, electrical, safety, telecoms in one system)]



Ethernet – APL case example

Customer challenge

- Grass root facility with the need provide field device management through the entire instrument life cycle and utilize health as well as auxiliary data for digital optimization applications.
- Up to 500 devices per controller in addition to conventional IO via Select I/O and PROFINET.

ABB solution

- System 800xA with PROFINET over APL
- Combining Select I/O with single channel granularity and APL into a standardize cabinet layout,
- APL switches allowing to connect PROFIBUS PA devices in case APL device type does not exist
- Up to 252 field devices per Ethernet ring

ethernet-apl™
advanced physical layer

Learn more: BASF Applies Ethernet-APL | Automation World

Scope

- Chemical facility with multiple plants at site
- System size between 2 000 and 10 000 I/O per plant
- APL Switches supporting on PROFINET-APL devices or PROFIBUS PA
- Conventional Instrumentation via Select I/O

Outcome

- Single controller supporting 3 or 4 Ethernet rings
- 252 field instruments per Ethernet ring
- Standard cabinet for flexible deployment including Select I/O for conventional and APL switches for digital instruments

Benefits

- Flexible project execution with reduced risk.
- Robust and automation system with single channel granularity providing a high degree of flexibility and availability

End-user initiatives / Market trends

Automation users push for change…

Open Process Automation Forum (OPAF)

Open Process Automation Forum (OPAF) is a consortium of end-user companies primarily in the oil & gas and chemical sectors, together with automation providers such as ABB, that is working to define a standards-based, open, secure and interoperable architecture for tomorrow's Process Automation Systems.

- Aligning with OPA-S standard
- Open yet secure to reduce TCO
- Based on OPC UA as network backbone

Learn more: http://www.opengroup.org/

NAMUR Open Architecture (NOA)

NAMUR is an international user association of automation technology and digitalization in process industries. NAMUR represents interests of more than 150 member companies with roots in Germany's chemical industry.

- Embrace Industrie 4.0 and IIoT
- Enable integration of OT and IT with built-in digital platform for M&O applications
- Secure separation between Core Process Control and digital M&O environment

Learn more: https://www.namur.net/en/index.html
NAMUR Open Architecture

NAMUR Modular Automation

Modular Automation is an industry- wide effort to move from the engineering of monolithic total plant automation systems to flexible, service-oriented modules designed to "plug and produce" assembly.

- Plug and Produce Modular Approach
- Standardization of processing modules increasing reuse and speed
- Bringing agility and flexibility to production

Learn more: https://www.namur.net/en/index.html
Automation Modular Plants (namur.net)

"The call from users for greater openness and flexibility requires suppliers to respond by fundamentally renewing the technology underpinning their offering."

BERNHARD ESCHERMANN
CHIEF TECHNOLOGY OFFICER, PROCESS AUTOMATION, ABB

End-user initiatives / Market trends

NAMUR NOA Architecture

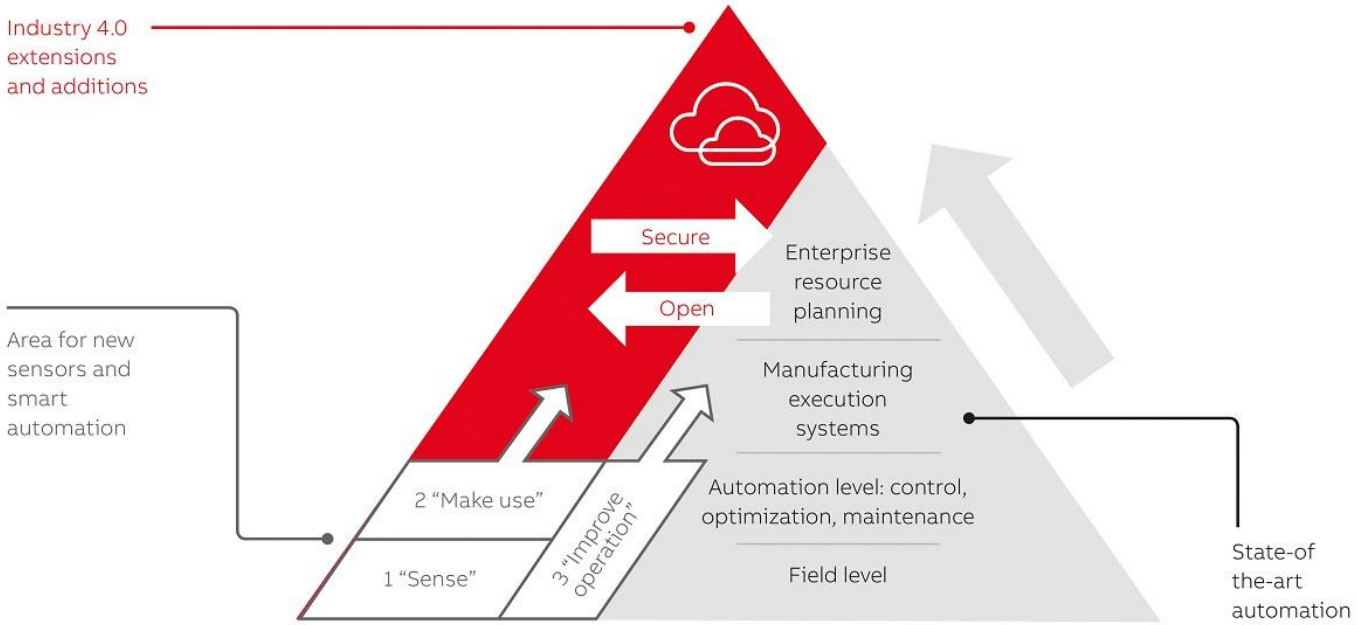
Benefits

Separations of concerns between Core Process Control and Monitoring and Optimization applications

Preserve safety, availability and cybersecurity of Core Process Control

Strategies for open system structures to enable innovative solutions including both greenfield and brown field scenarios

Definition of the system cybersecurity requirements of each NOA Security Zone

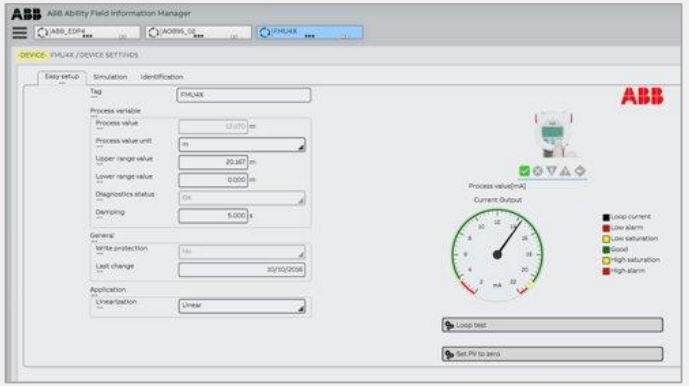


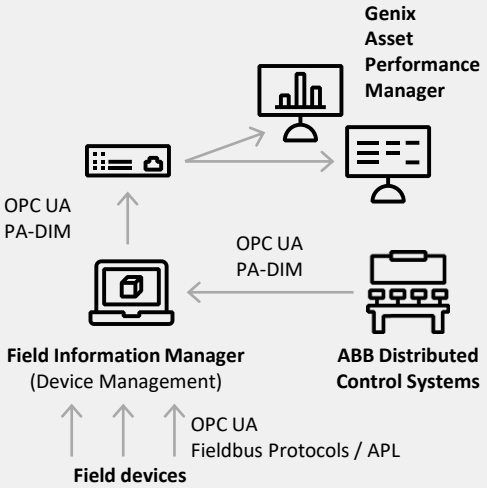
NOA case example: Device Management and Asset Performance

Customer challenge

- Instrumentation and electrical equipment in production facility reaches in the thousands
- Optimized maintenance scheduling and monitoring is needed to reduce costs and increase asset utilization, availability and productivity
- Agility required to deal with device integration - which means can't be tied to core automation lifecycle

ABB solution





Scope

- System 800xA and FIM device management
- Edgenius w/Asset Performance Management

Outcome

- Introduction of NOA architecture in today's ABB DCS systems
- Separation of concerns between core DCS and plant production optimization

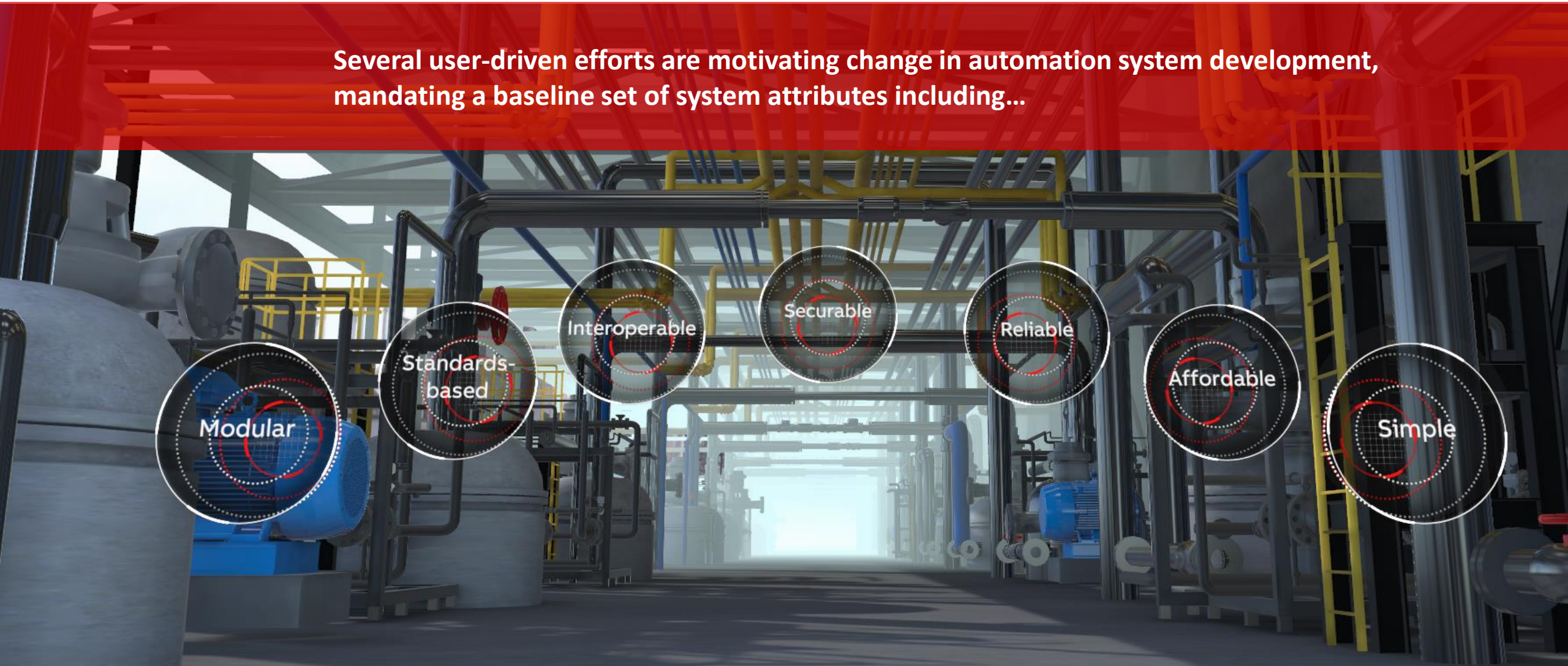
Benefits

- Reduced risk to core automation operation
- No need to upgrade DCS to get added condition monitoring functionality

User desired system attributes

Introducing the “Heavenly 7”

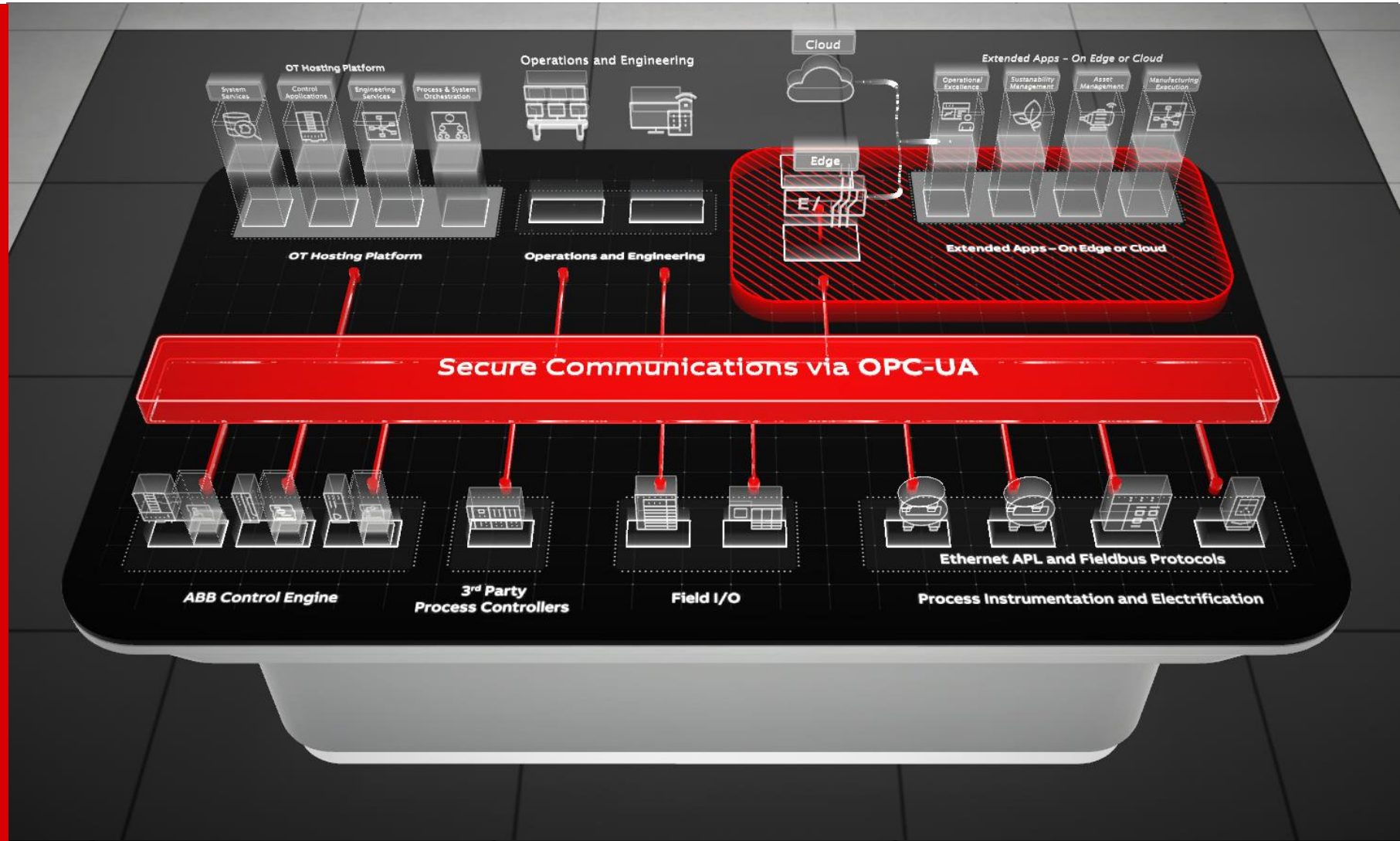
Several user-driven efforts are motivating change in automation system development, mandating a baseline set of system attributes including…



Future control system architecture

Example: ABB Process Automation System Vision

To achieve faster innovation and continuous performance improvements, ABB envisions an automation architecture that enforces a “separation of concerns” between an evergreen modular control core and an extended, digitally enabled environment for monitoring and optimization.



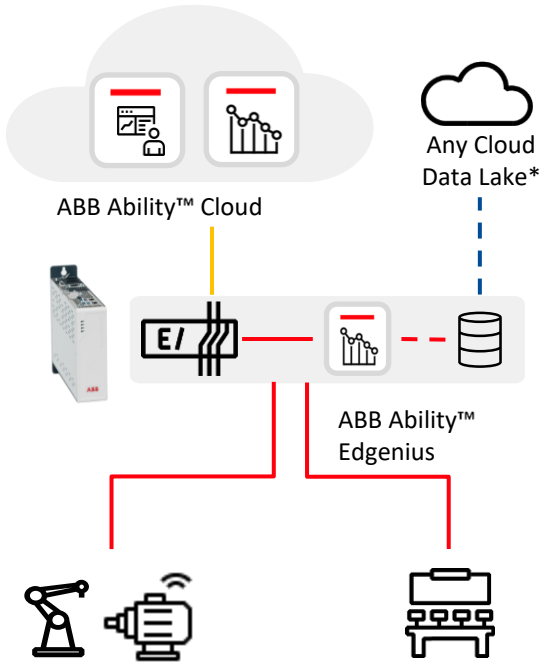
Edge operational modes

Management at the edge or at the cloud – you decide

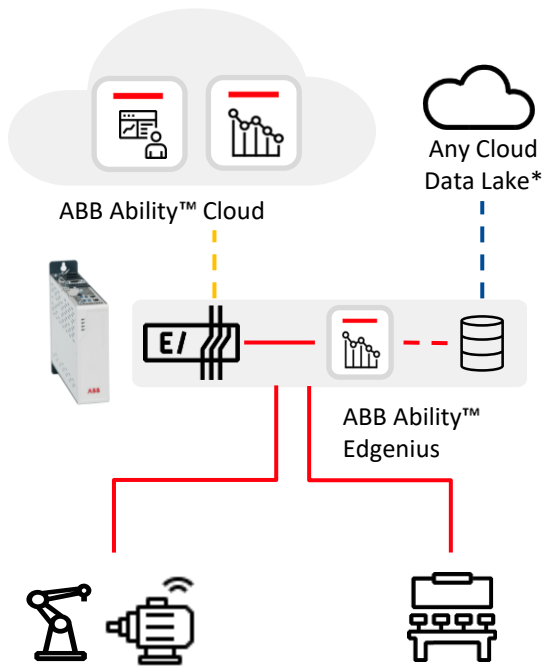
Operational modes

1. **Connected edge**, for edge & cloud computing
   - Cloud managed edge
   - Data routing to Ability cloud to enable cloud computing applications
2. **Connect on demand edge**, for edge computing only
   - Cloud managed edge (on demand)
   - No data routing to Ability cloud
3. **Disconnected edge**, for edge computing only
   - Locally managed edge
   - No data routing to Ability cloud

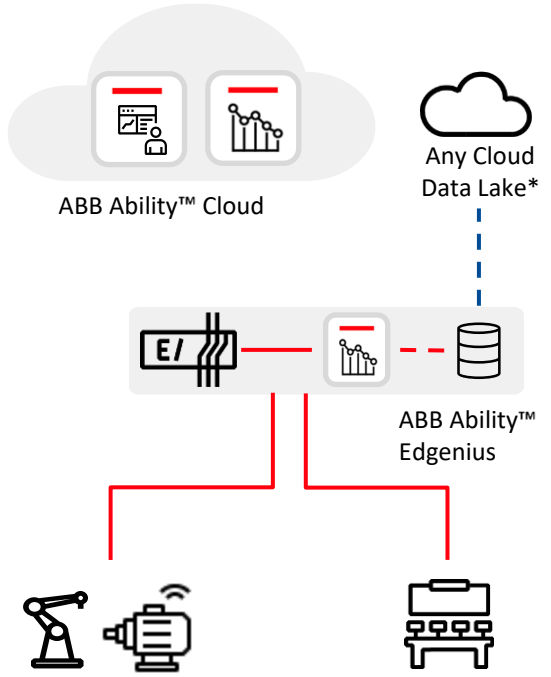
Connected Edge



Connect on demand edge



Disconnected edge



*Azure Data Lake Storage Gen2

Extended digital environment

Built for agile innovation

New range of DCS business models

Traditional DCS purchasing is typically hardware-based, tends to be a long engagement cycle (project specifications, proposals, and a large one-time, capital expenditure)

Separated from the critical-core, extended apps follow a separate, much quicker pace software purchase process

- Shift from capital to operating budget spending
- Software-as-a-Service (SaaS)
- Platform-as-a-Service (PaaS)

Digital ecosystem marketplaces

Digital ecosystem application marketplaces will align buying experiences with every-day consumer purchasing.

Self service capabilities include:

- Free trials
- “Pay-as-you-use”
- Ensured performance offerings

Subscribe to those applications and services that solve true business needs and discontinue them when no longer needed

Extended digital environment

Defining edge interoperability: Margo project (hosted by the Linux Foundation)

Margo project mission

Deliver a new and open interoperability standard for the industrial edge, allowing edge devices, apps, and orchestration software to be interoperable in industrial user's ecosystems, helping them to mitigate scale challenges when digitalizing their operations and to increase adoption of repeatable software patterns, supporting their heterogenous ecosystem of many suppliers.

Value objectives

Openness and Flexibility

- Interoperability enables freedom and flexibility to design and operate best of breed solutions without compatibility constraints or unnecessary integration costs and delays.

Simplification

- Reducing solution complexity and the need for specialized knowledge streamlines deployment, scaling, and operation of multi-vendor systems.

Innovation and Growth

- Repeatable deployment patterns and trusted security models make it easy to accelerate innovation, scale solutions, and grow operations

Learn more: margo.org

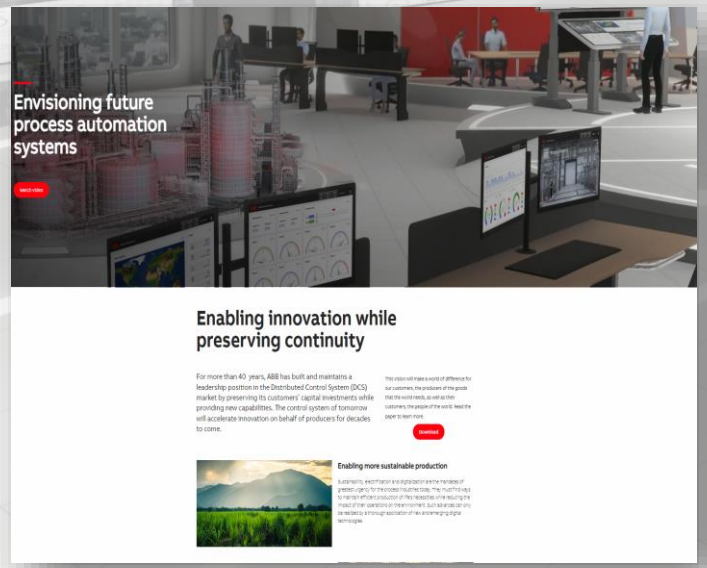
Linux Foundation launches Margo initiative

Summary

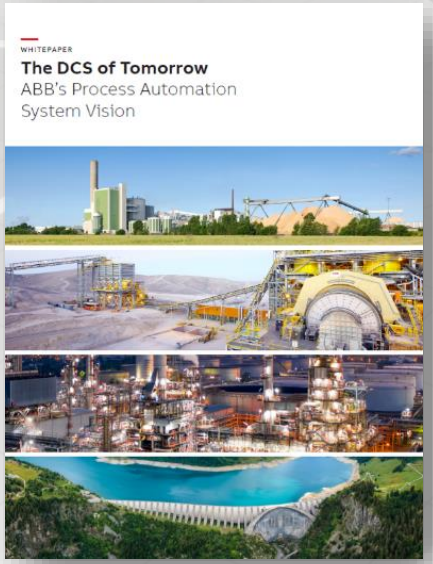
Automating tomorrow – The blueprint for future-ready process automation. (youtube.com)

ABB Process Automation System Vision

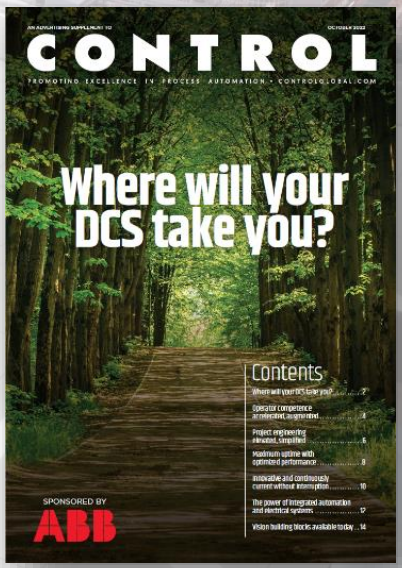
Further reading



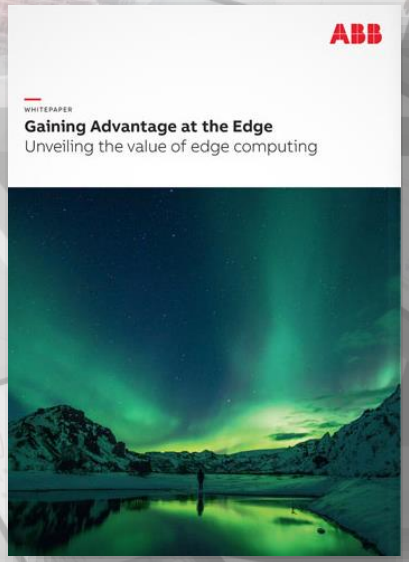
[Visit the web site]



[Read the paper]



[Read the articles]



[Read the paper]

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Let’s talk

Q&A Session


ABB