Update on ODVA's Initiative for the Process Industries

Optimization of Process Integration

Marketing Track

www.odva.org

Agenda

- Introduction to ODVA's Process Initiative
- Environmental Assessment
- ODVA's Approach to the **Optimization of Process Integration**
- Strategies for automation applications in the process industries from market leaders and ODVA principal members
- Next Steps
- Discussion

Introduction to the Process Initiative

Strategic Plan in Use by Board of Directors

Living Initiatives are a Central Aspect

- **2010: Energy**
- **2011: Machinery**
- **2012: Process**

With leading industrial automation suppliers, such as Endress+Hauser, as principal members, ODVA will be one of the first associations which strives to support Industrial Ethernet down to the field level in process automation.

ODVA technologies will provide manufacturers complete, plant-wide network services and infrastructure for discrete, motion, safety and process applications and from plant-floor to IT systems.

Introduction to the Process Initiative

SMRt Participants in the 16th Term

- Mirko Brcic
  Endress+Hauser
- **Shannon Foos**
  Rockwell Automation
- Michel Fontvieille
  Schneider Electric
- **Martyn Jones**
  Schneider Electric
- **René Pluis**
  Cisco Systems
- **Olivier Wolff**
  Endress+Hauser
- Sandra Wesner
  Endress+Hauser
- **Katherine Voss**
  ODVA

Introduction to the Process Initiative

White paper published in February 2014 completed ODVA's series of "optimization" white papers resulting from the formation of ODVA's initiatives.

3. Optimization of Process Integration (OPI)

Introduction to the Process Initiative

White paper published in February 2014 completed ODVA's series of "optimization" white papers resulting from the formation of ODVA's initiatives.

1. **Optimization of Energy Usage (OEU)**
3. **Optimization of Process Integration (OPI)**
2. **Optimization of Machine Integration (OMI)**

Environmental Assessment

Market Conditions for EtherNet/IP™…

… has been accepted and widely adopted in discrete applications.

…has helped to converge control solutions for discrete and hybrid applications

… creates, by virtue of its adoption in hybrid applications, a critical proof point for adoption in additional process applications

…makes it possible to replace multi-tier network architecture with a single architecture and provide easy access to process information

Environmental Assessment

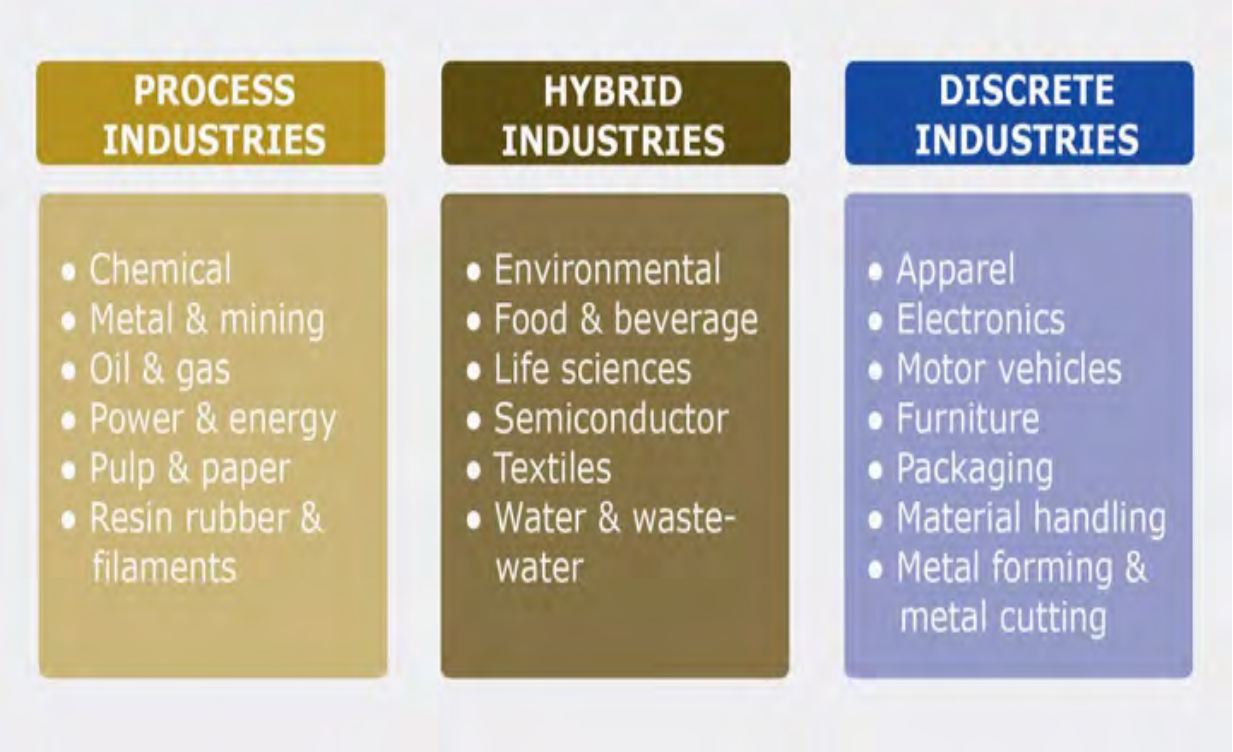
Technology conditions for EtherNet/IP and IP in manufacturing…

…an automation platform for convergence

Objects and services in CIP will create new opportunities for productivity improvements and ROI for process users.

Environmental Assessment

It is projected that the process industries will invest over US$100 billion globally in new control systems for process automation, split equally between modernization and new installations.[1]



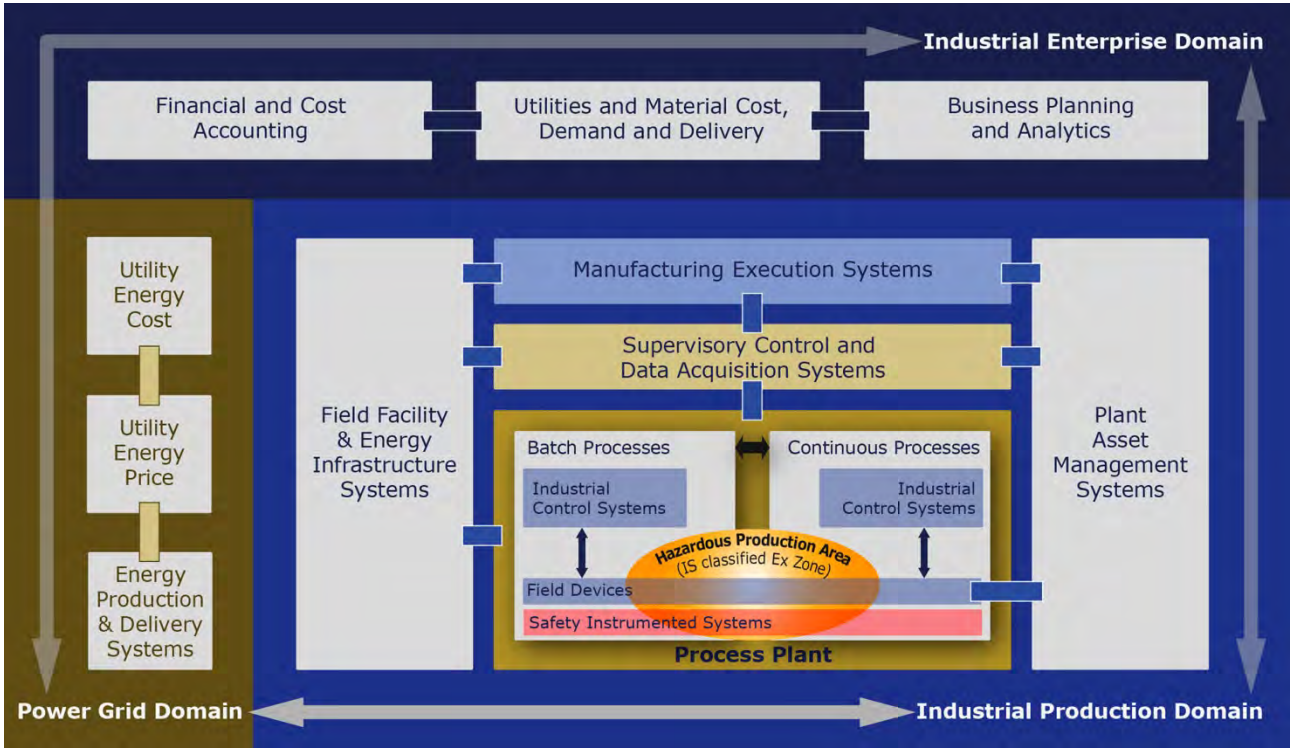
[1] L. O'Brien and W. Chin (2008, 3 January) "ARC Insights: North American Industrial Infrastructure Needs More Than Just a Facelift"

Environmental Assessment

- With some people forecasting the "Internet of Things" (IoT) to grow at a rate of 36% between now and 2021[2], more and more devices will be IP-enabled by default.
- The overall impact of IoT can already be seen today in the process industries where the number of Ethernet-enabled devices has been forecast to double by 2016 with a compound annual growth rate of over 15%.[3]
- This trend is also consistent with thought leadership on key standards and technologies for future process automation systems in which the basis of plant level communication is expected to be industrial Ethernet.[4]

[3] T Moore (2013. 15 February) "Industrial Ethernet and Fieldbus Technologies – World – 2013"
[4] D, Woll, L. O'Brien, D. Hill, and P. Miller (2011, March) "ARC Strategies: Evolving Collaborative Process Automation Systems Create New Opportunities"

ODVA's Approach to OPI



ODVA has a broad overall approach to OPI based on the three principle domains of the industrial ecosystem – production, enterprise and power grid.

ODVA's Approach to OPI

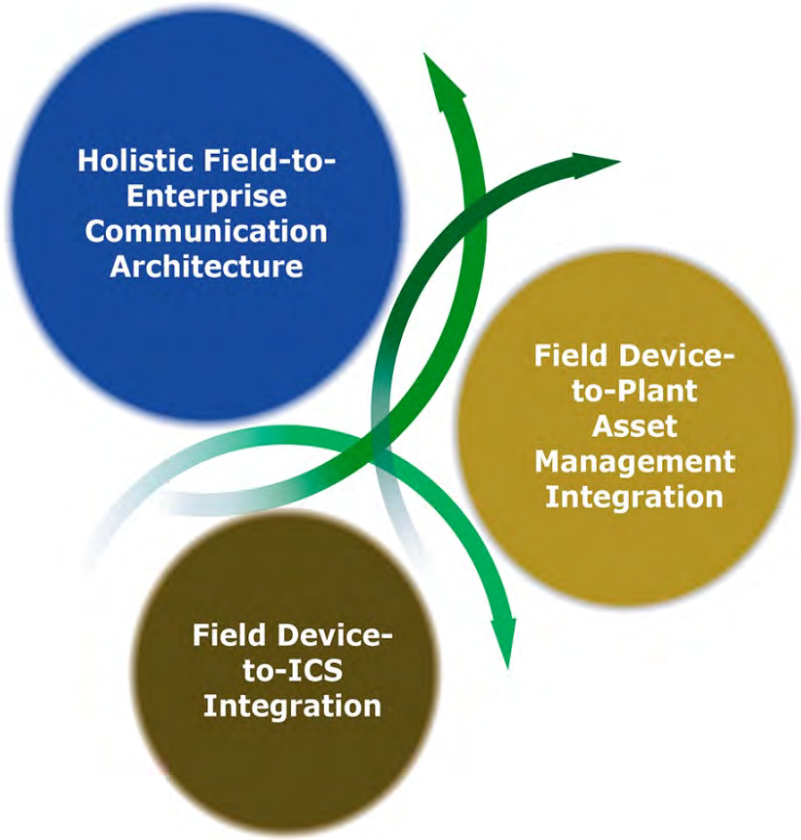
- **Convergent** in its long term approach to support the deployment of standard Ethernet and Internet technologies in the process industries across all domains of the industrial ecosystem.
- **Compatible** by enabling users to integrate new devices and systems with their installed base while evolving their automation architecture to complement the architecture for supervisory and enterprise systems.
- **Scalable** from simple field devices to complex systems of automation equipment in the enterprise environment.
- **Open** by virtue of its use of multi-vendor, interoperable standards managed by an independent, vendor-neutral organization.

ODVA's Approach to OPI

Four-Part Working Hypothesis

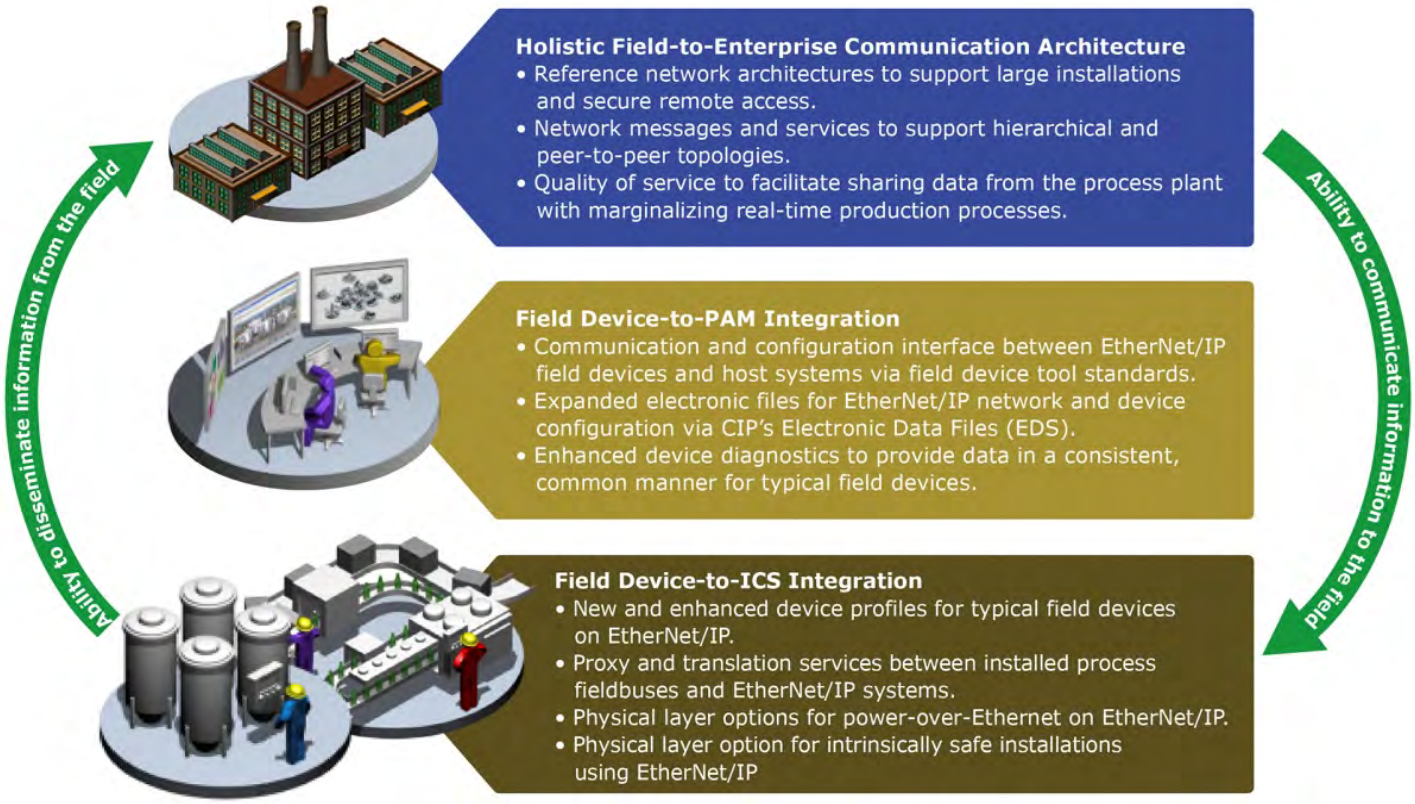
- Use of industrial Ethernet in process plants is growing and will accelerate, first with its use as the backbone for control systems and then expanding to new field devices. Ultimately it will converge multiple diverse networks and simplify the automation architecture.
- At the field level, industrial Ethernet will first be applied to devices with larger data exchange requirements such as flow meters which contain instrumentation data or control valves which contain process data). In the longer term, devices with smaller data exchange requirements, such as simple sensors and actuators, will follow as has been seen in hybrid industries.
- The scale of process automation control systems, in terms of number of devices and control loops, as well as geographic distribution of the overall system, tends to be larger than in hybrid and discrete production plants. This distribution calls for a network with a scalable architecture that can support a large number of devices and a peer-to-peer or distributed control architecture.
- The useful life of plant and equipment in automation applications in process industries will continue to be much longer than in hybrid and discrete industries. Users in the process industries will need a retrofit approach to the optimization of plant integration that accommodates an automation architecture that blends the old with the new.

ODVA's Approach to OPI



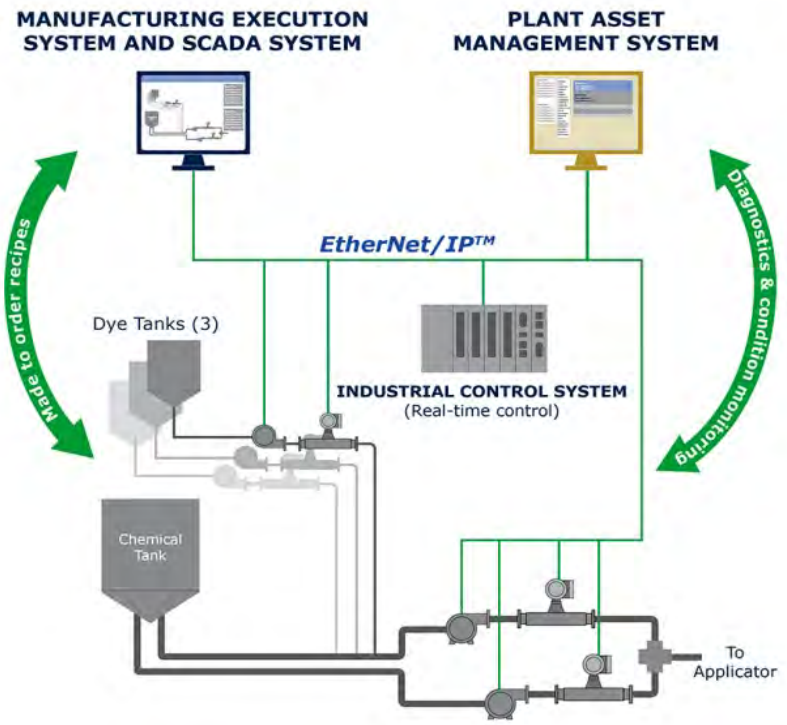
Three Inter-related Use Cases

ODVA's Approach to OPI



Technology Enhancements

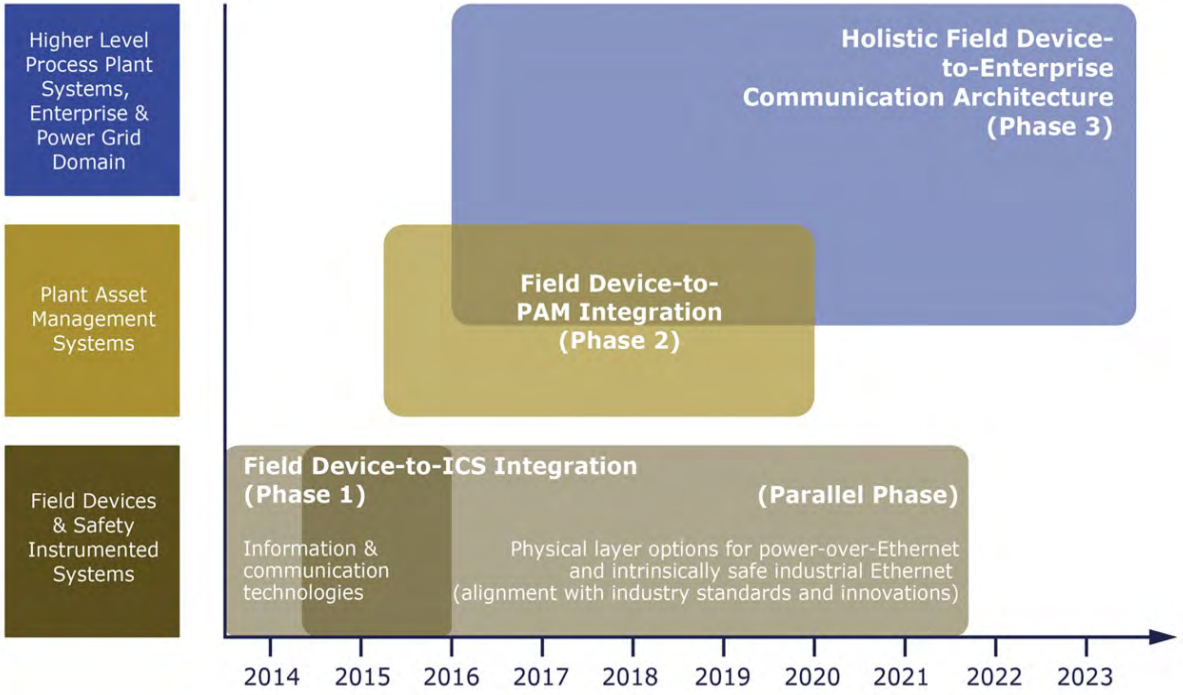
ODVA's Approach to OPI



Holistic Field-to-Enterprise Communication Architecture

OPI-enabled Chemical Dispenser

Next Steps



ODVA will begin Special Interest Group (SIG) work on Process Applications in 2014Q2

Strategies for Process Automation from Market Leaders & ODVA Principal Members

With its core values of vendor-neutrality, open participation and open technologies, ODVA provides the ideal forum for building consensus among market leaders in process automation.

EtherNet/IP is the ideal convergent and unified communication solution for realizing the next generation of productivity enhancements which are possible with a unified communication solution that leverages and makes the Optimization of Process Integration a reality.

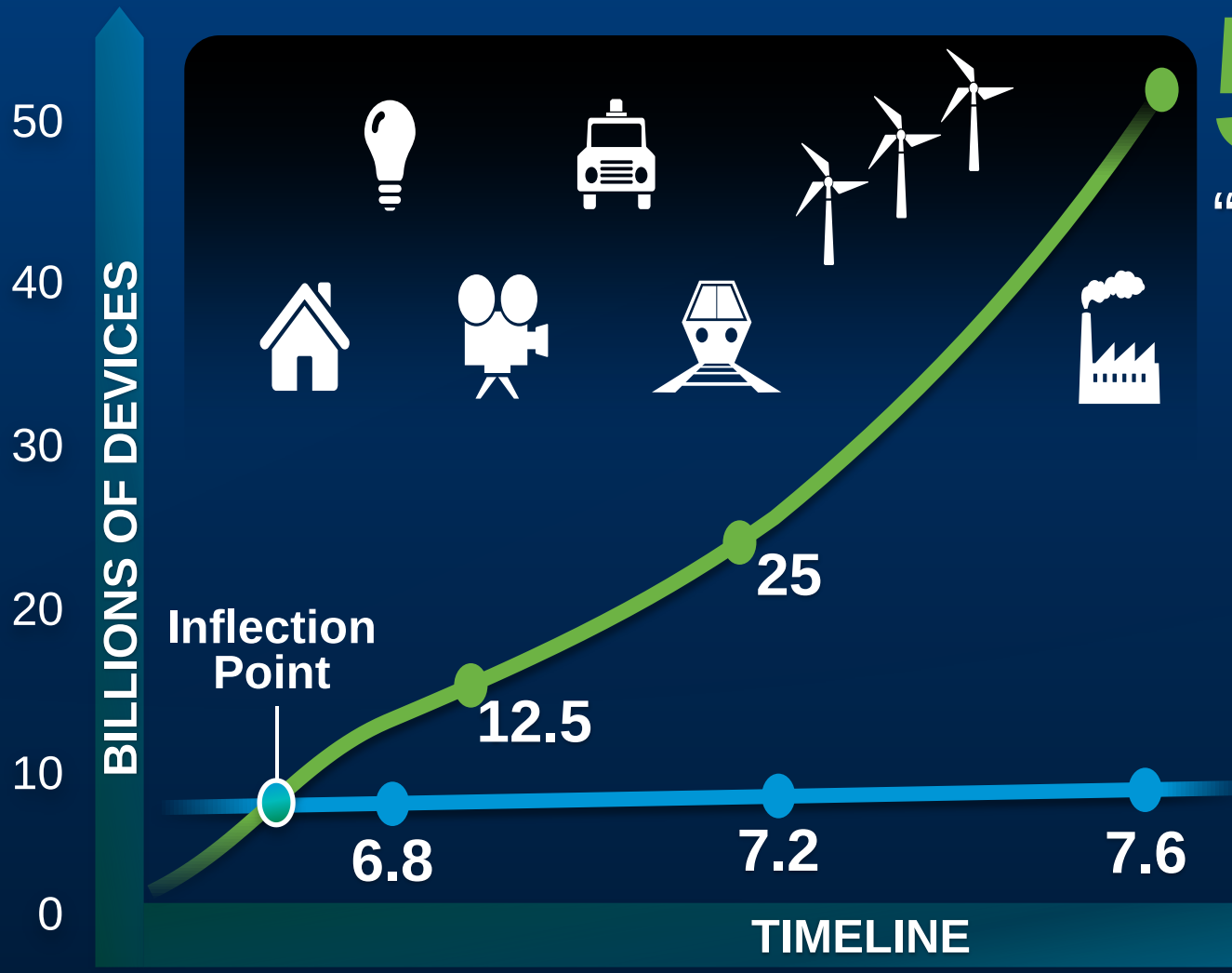
Now, let's learn about the strategy for automation applications in the process industries from market leaders and ODVA principal members - Cisco Systems, Endress+Hauser, Rockwell Automation & Schneider Electric – all of whom have collaborated inside ODVA to develop the vision for OPI.

Optimization of Process Integration:
An Overview of EtherNet/IP value in the Process Industries

René Pluis
Manager Global Energy Industry, Enterprise Business Segment

March 2014

The Internet of Things is Already Here



50 Billion
"Smart Objects"

Rapid Adoption rate of digital infrastructure:
5X faster than electricity and telephony

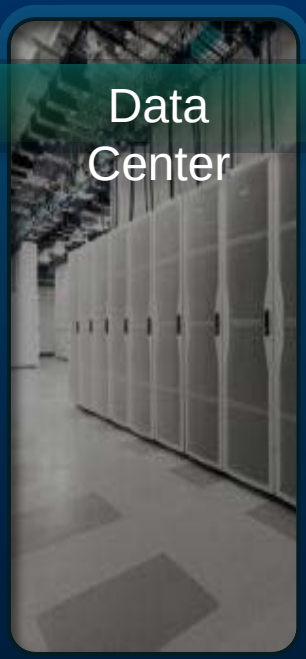
World Population

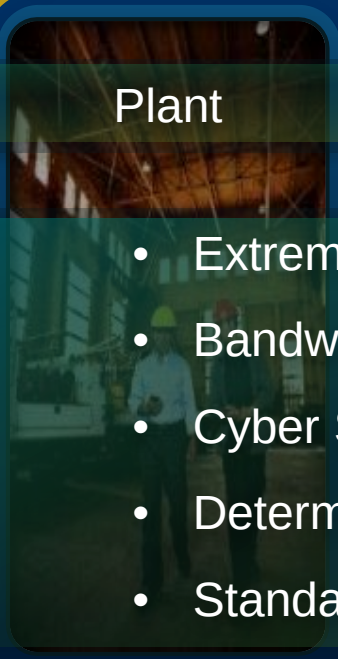
Source: Cisco IBSG, 2011

Internet of Things: New Places In the Network (PINs)

Information Technology (IT)

Operational Technology (OT)





- Extremely High Scale
- Bandwidth Constraints
- Cyber Security
- Determinism/Reliability
- Standards Convergence

IoT

Cisco Vision: IoT Network Platform

Sensors and Devices

- Location
- Identity + Policy
- Aggregation
- Security
- Mobility
- Lightweight IPv6

Networks, Computing, Storage

- Scale + Reliability
- Resource orchestration
- Difficult networks
- Privacy + Security
- Service Provider M2M
- ASICS + Software

Data Analytics

- Data Aggregation
- Video Analytics
- Streaming Data
- Data Federation
- Embedded analytics

Control Systems

- Determinism
- Safety
- Latency
- Virtual Machine Control

IoT Platform

Data Center

Intelligent Network

Cloud

Architectures

Cisco Internet of Things Portfolio


Manufacturing


Mining


Energy-Utility


Oil and Gas


Transportation


City


Defense


SP/M2M

Plantwide Ethernet, Intelligent Transportation, Smart Cities, S&C Refinery, Smart Connected Vehicle, Smart Grid

Plant Switching

IE 2000
IE 3000
CGS 1000
CGS 2500

Plant Routing

CGR 2000

Field Network

CGR 1000

819H M2M ISR Gateway Router

1552 Rugged Wireless

Embedded Networks

5915 Embedded Services Router

3200 ESS2000

Physical Security

Video Surveillance Manager and IP Cameras

IPICS

Physical Access Manager

Network Management and IoT Security

Fog Computing

Data Center/Virtualization

IoT brings Information and Operations Together

Information Technology IT

IoT

Operations Technology OT

Commitment to Architecture, Product Roadmaps: Connected Industries

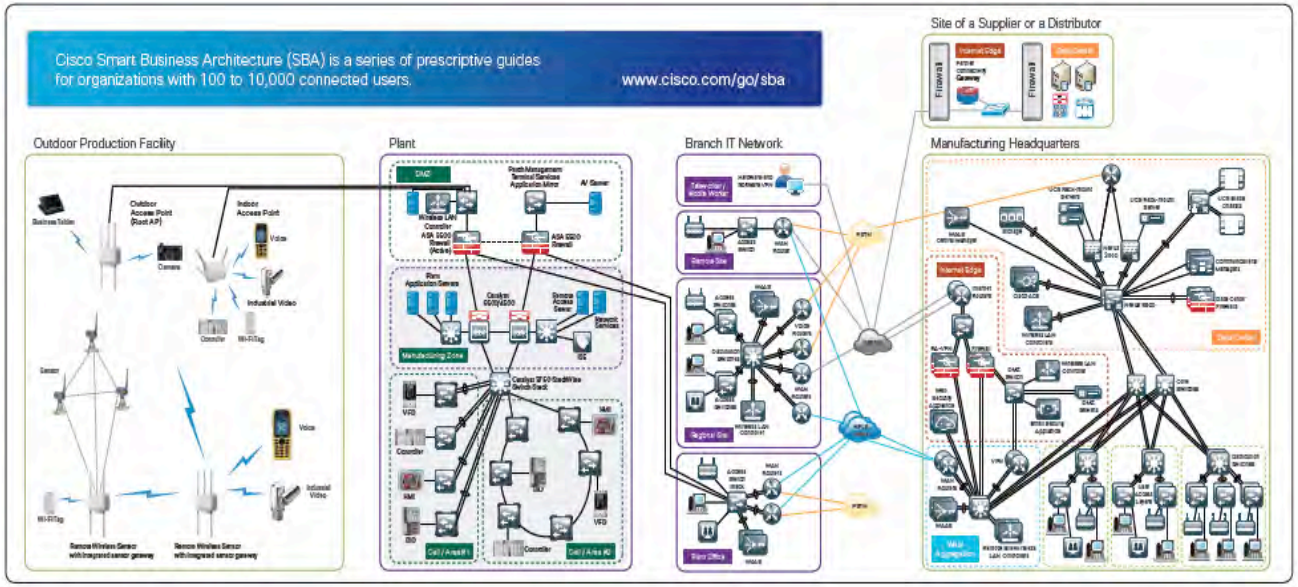
Cisco Industrial Smart Solution Business Benefits

Faster decision-making and improved performance
Deliver real-time plant performance information across the enterprise to management and expert teams worldwide. Enable manufacturers to remotely access production automation systems for faster issue resolution on the plant floor.

Rapid Network Deployment
Quickly deploy a reliable, secure industrial network with a validated and documented "Cisco Smart Business Architecture".

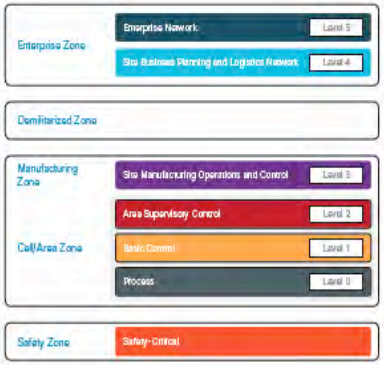
Improved Workflows and Innovation
Connect fragmented supply chains. Connect business applications to industrial systems for higher quality and production traceability. Build one common, converged rugged plant-to-business-to-plant network via open, standard industrial IP Ethernet.

Immediate Access to Systems, Devices, People
View dispersed and disparate systems and device statuses in one place, in real-time. Collaborate globally between machines and people; suppliers and customers; design teams and decision makers.



Converged Plantwide Ethernet

A joint Cisco and Rockwell Automation architecture



Cisco Industrial Smart Solution Products: Rugged, Secure, Reliable


M2M Gateway: Secure, small hardened Cisco IOS router with 3G, 3G + WiFi or 4G LTE wireless WAN.


1552-S Access Point: Hardened, secure outdoor 802.11 a/b/g/n Wi-Fi AP, Class 1, Div 2/Zone 2 Hazardous Location certified and integrated ISA100.11a wireless sensor gateway (Honeywell OneWireless compatible). CleanAir.


IE2000: Compact, secure, fixed hardened Layer 2 access DIN-rail mounted switch with REP, IEEE 1588 support; 2 x GE & 4, 8, or 16 x FE ports, swappable flash memory. PoE and conformal coating available.


IE3000: Compact, secure, modular hardened Layer 2/3 access DIN-rail mounted switch with REP, IEEE 1588 support; 2 x GE & up to 24 FE ports, swappable flash memory. PoE available.


IE3010: 1 RU, fixed, hardened switch with REP support; 2 x GE & up to 24 FE ports (copper) or 16 FE SFP and 8 FE (with PoE), swappable flash memory.

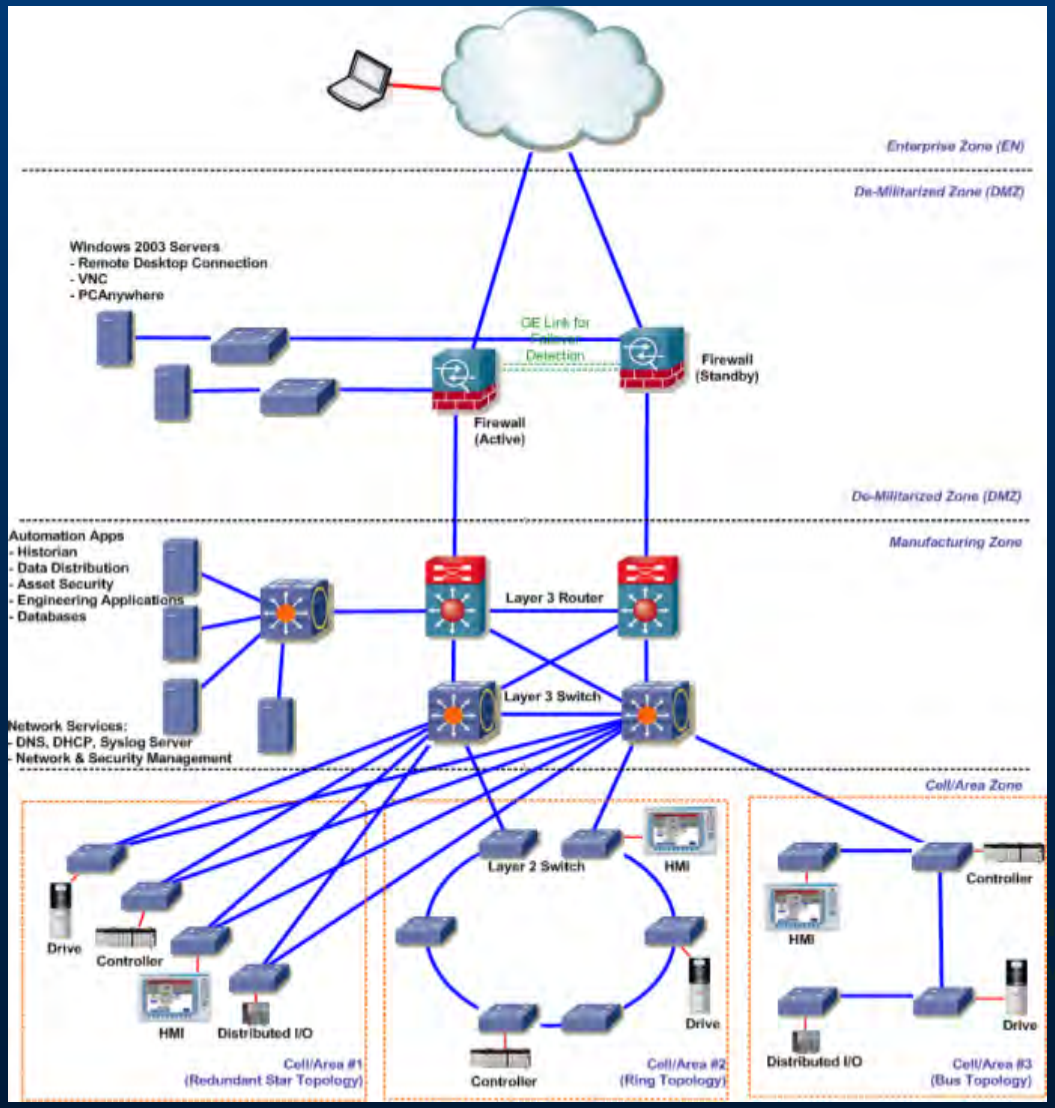

Allen-Bradley Stratix 8000™ and 8300™ and Allen-Bradley Stratix 5700: Industrial Ethernet Switches L2/L3, Modular, DIN rail mounting, with Cisco technology, Premier (CIP) integration with Rockwell Automation Integrated Architecture.


Cisco 7925G-EX phone: For hazardous environments IP 64 rating


2600 Series Indoor Access Point: Extended temperature, secure, 802.11 a/b/g/n Wi-Fi AP, CleanAir and PoE powered.


Rugged Small form-factor Pluggables (SFP): Rugged FE and GE SMF and MMF optical transceiver modules with LC/PC connector and DOM support.

Purdue zoning and Ethernet / IP



Levels 4 – 5: **Office Domain**	**Connection to industrial site through Enterprise network**
Demilitarized Zone **(DMZ)**	**Separation between Enterprise & Control Networks**
Level 3: **Manufacturing Zone**	**Interconnection between DMZ, Cell Zones and Server Farms**
Levels 0 – 2: **Cell / Area Zone**	**Network Connection for PLCs, HMIs, I/Os, & Drives**

Thank you.

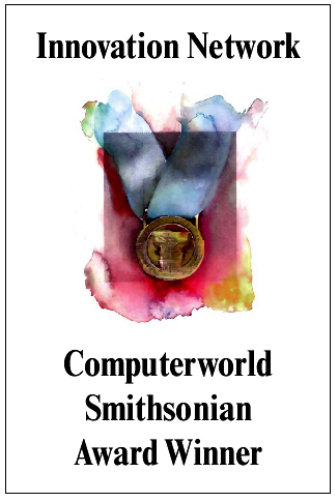
Optimization of Process Integration in Schneider Electric's PlantStruxure architecture

Michel Fontvieille & Martyn Jones

ODVA Annual Meeting & Technical Conference
Phoenix, AZ 12 March 2014

Schneider Electric

Schneider Electric – A Pioneer in Industrial Ethernet



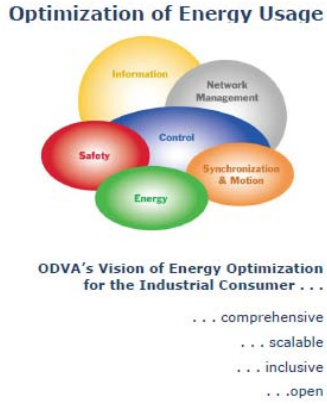
1997
Introduction of **MB/TCP** and '**Transparent Factory**' for Automation

1999
Computerworld Smithsonian award winner

2004
MB/TCP submitted for standardization in **IEC** 61158 and 61784

2007
Schneider Electric joins **ODVA**

2010
First "converged Ethernet" offers launched combining MB/TCP and **EtherNet/IP**



2011
SE joins ODVA Strategic Initiative for **Energy**

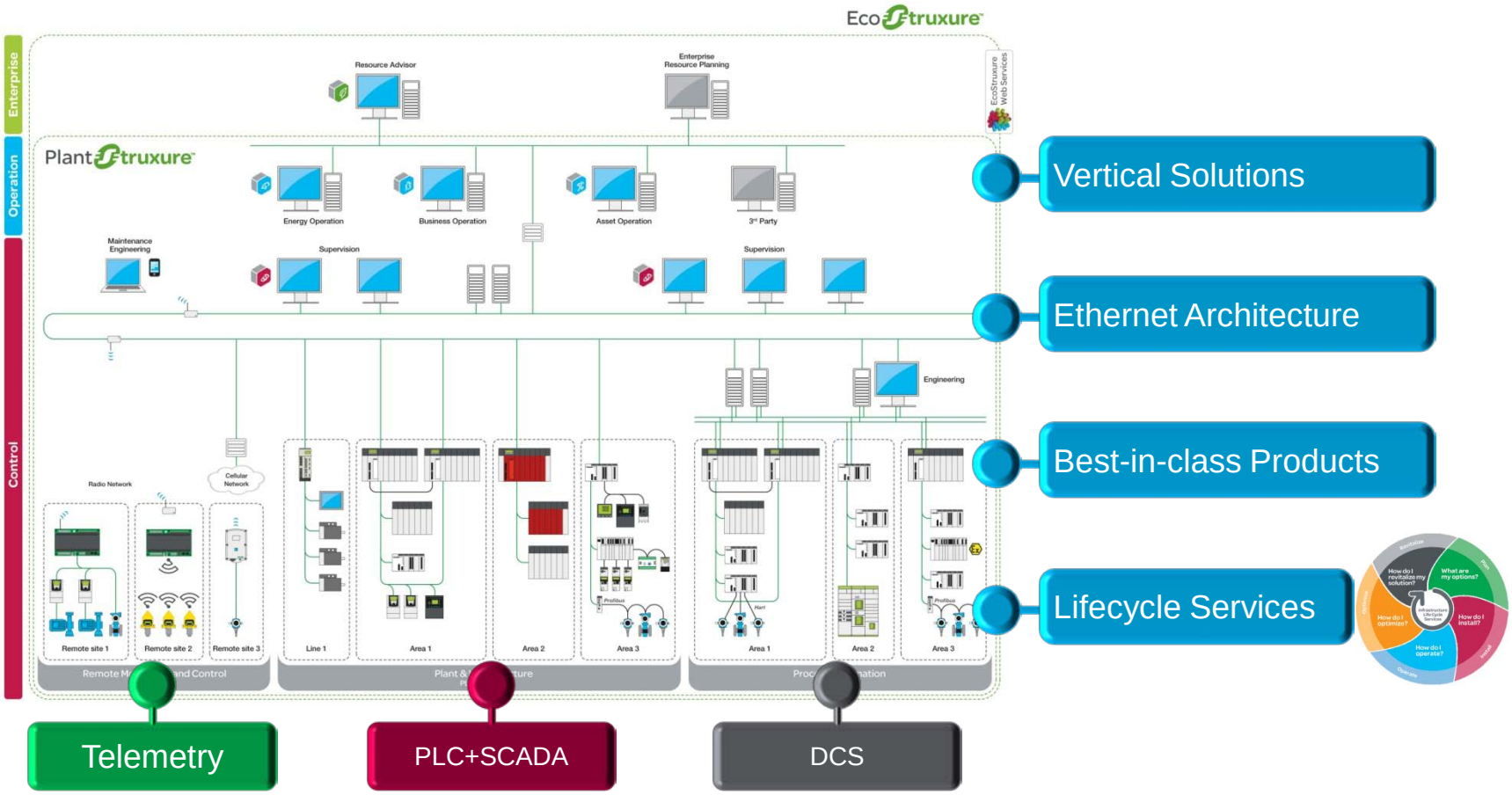
2012
SE joins ODVA Strategic Initiatives for **Machinery** and **EtherNet/IP Marketing**

2013
SE joins ODVA Strategic Initiative for **Process**

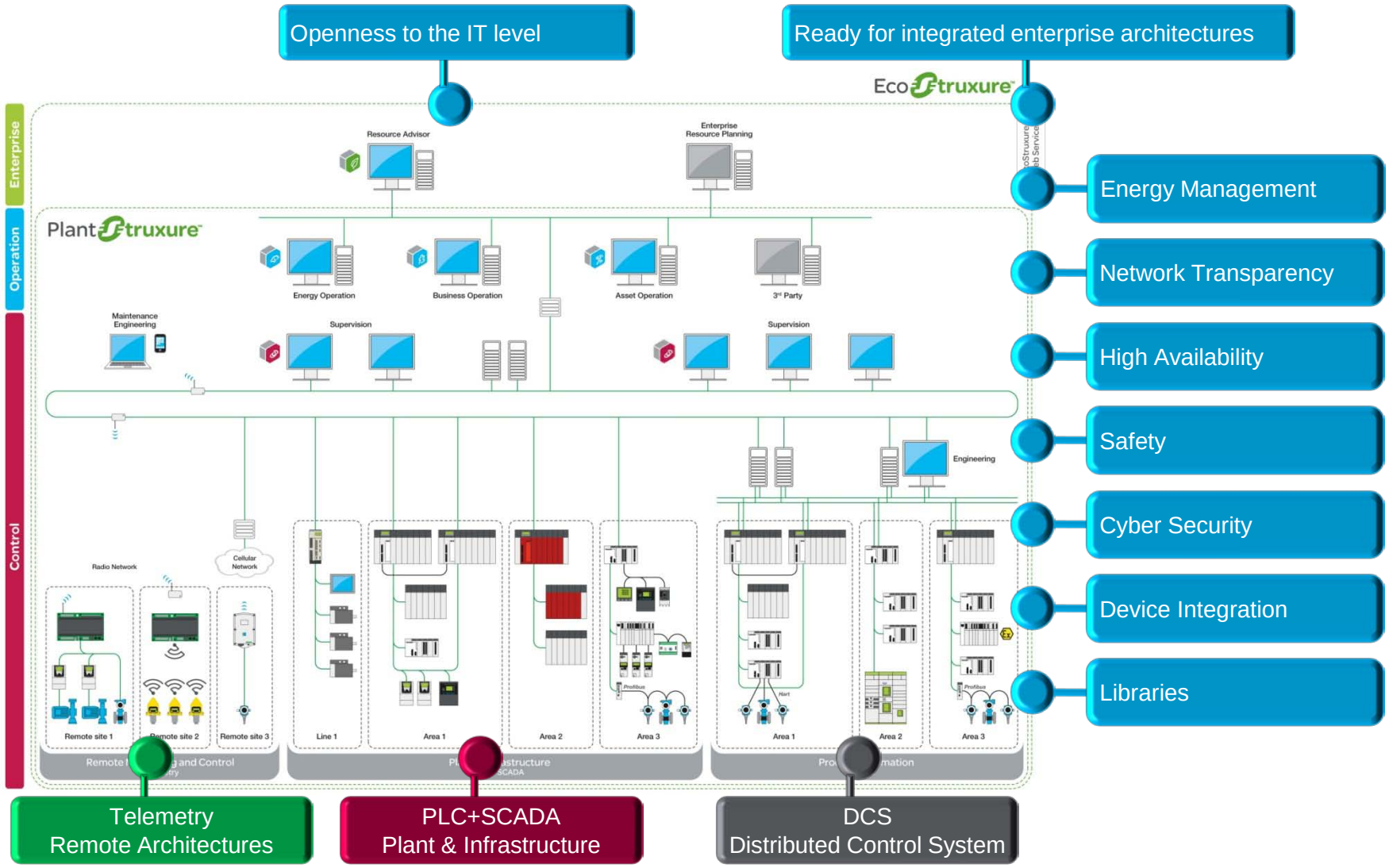
1990s - Innovation | **2000s - Standardization** | **Today - Proliferation**

PlantStruxure

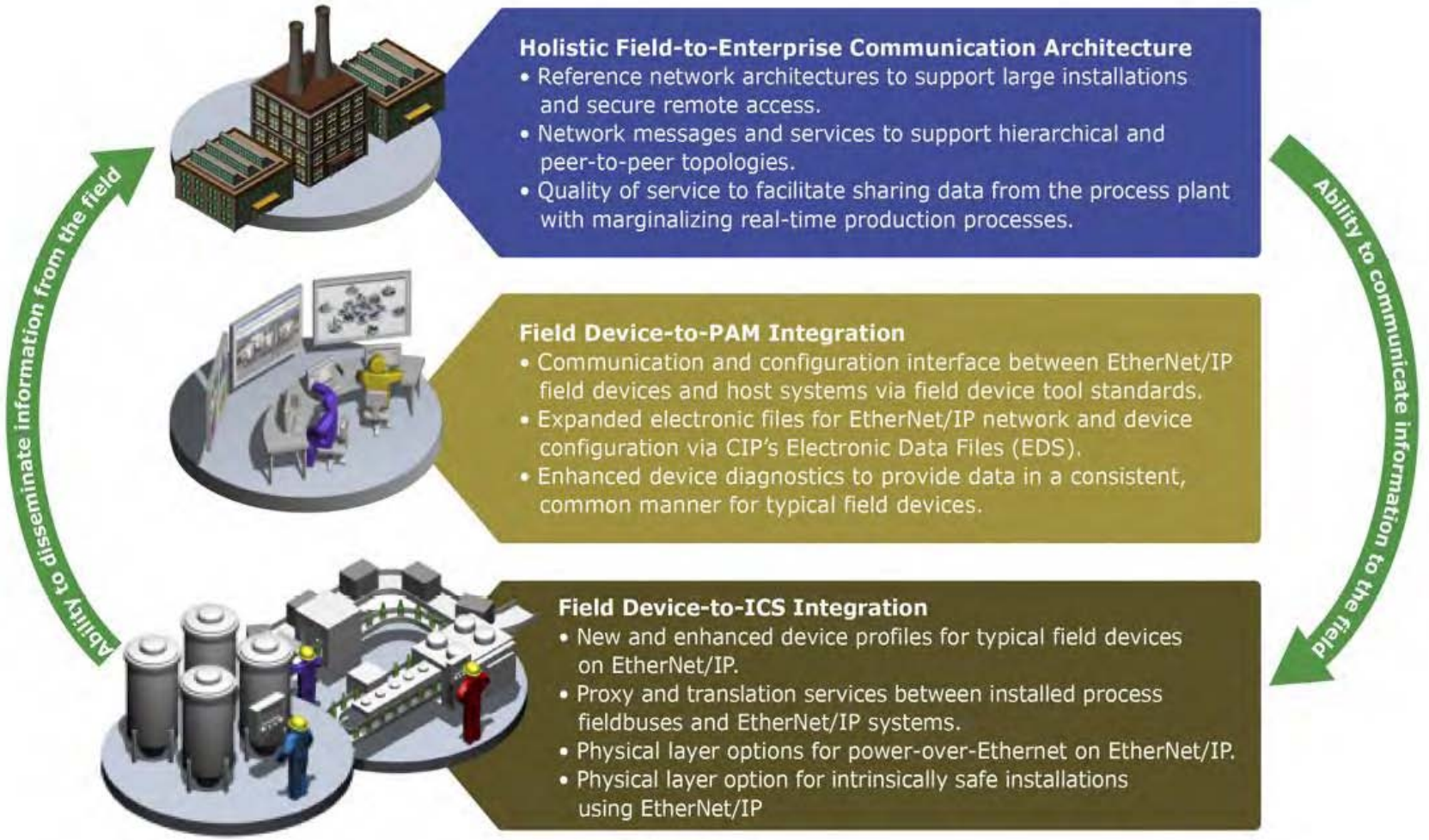
– Schneider Electric's Process Automation System is based on an architecture with 3 pillars



Transversal functions across 3 Profiles



ODVA's **Optimization of Process Integration**

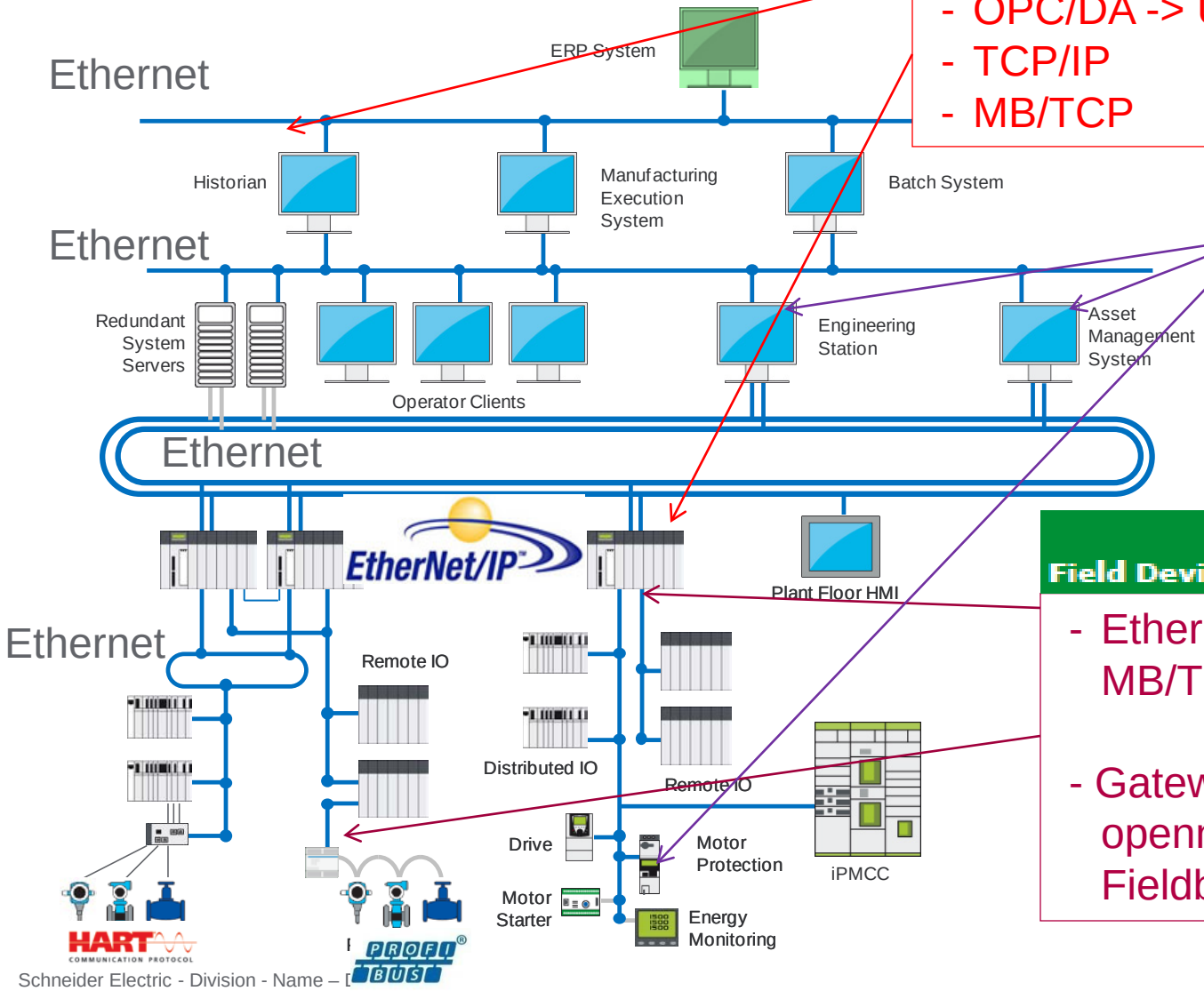


Standardization and Transparency

Enterprise

Operation

Control



Use Case Type 3:
Holistic Field-to-Enterprise Communication Architecture

- OPC/DA -> UA
- TCP/IP
- MB/TCP

Use Case Type 2:
Field Device-to-PAM Integration

- FDT DTM

Use Case Type 1:
Field Device-to-ICS Integration

- EtherNet/IP and MB/TCP at field level
- Gateways for openness to other Fieldbus standards

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Optimization of Process Integration:

An Overview of EtherNet/IP Value in the Process Industries

Shannon R. Foos
Process Automation Segment Manager

PUBLIC INFORMATION

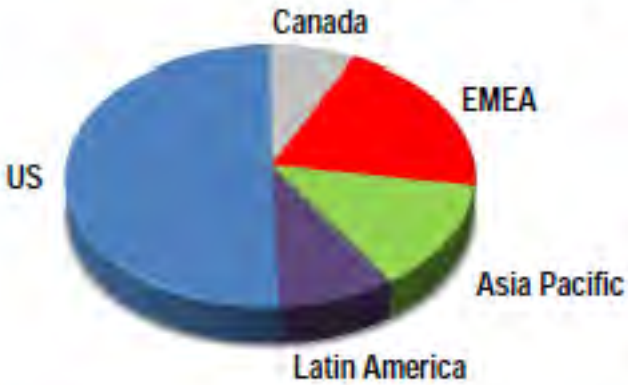
Allen-Bradley • Rockwell Software

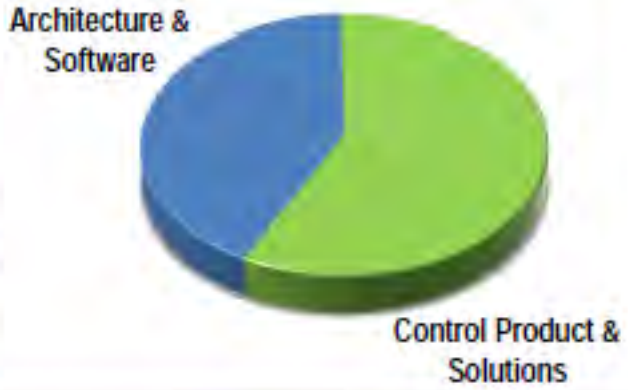
Rockwell Automation

Rockwell Automation at a Glance

Rockwell Automation

Fiscal 2013 Sales of $6.35B





22,000 employees in 80+ countries

Leading global provider of industrial power, control and information solutions

Automation solutions for a broad range of industries

Serving customers for 110 years

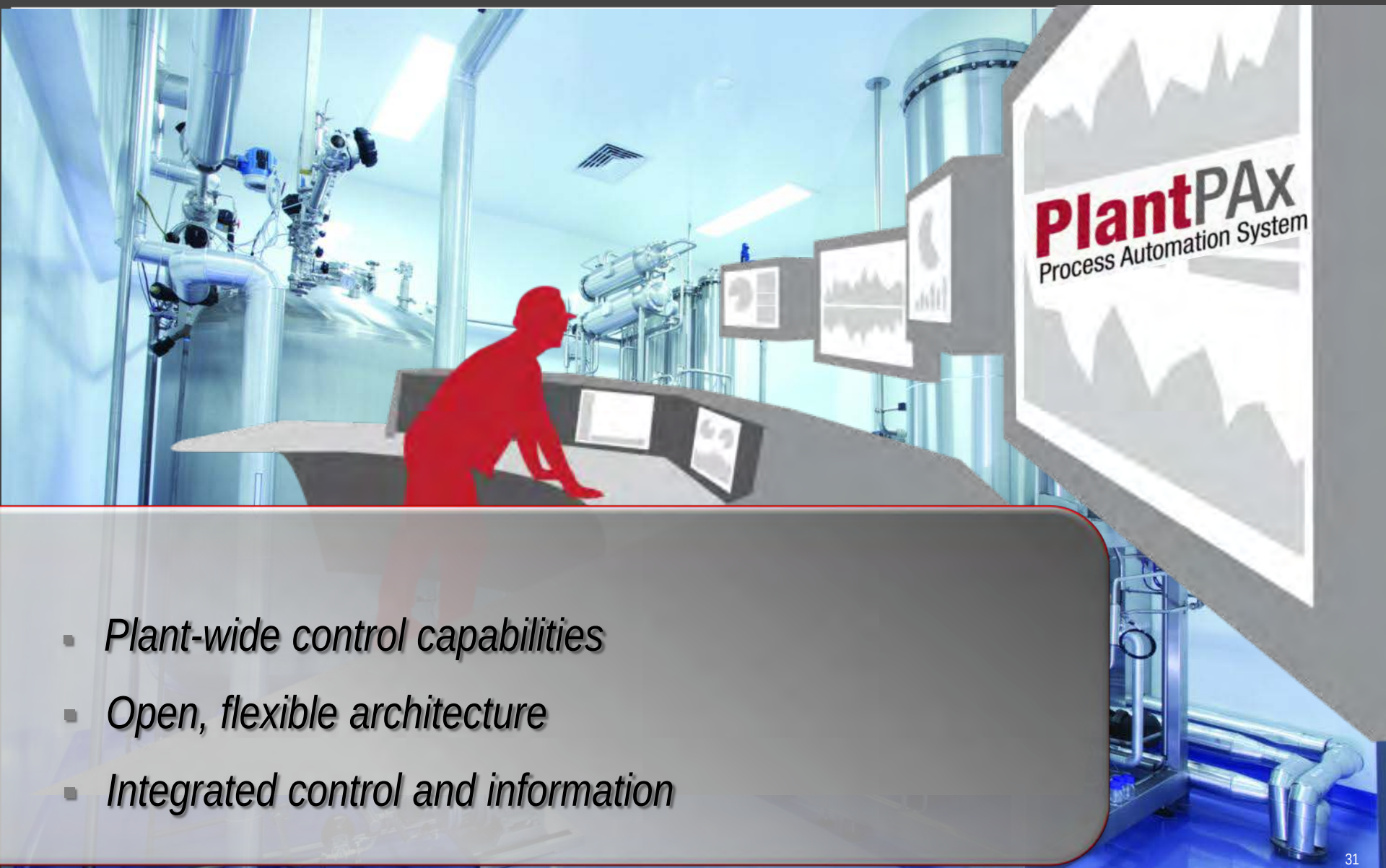
A-B QUALITY

Strong culture of integrity and corporate responsibility

2013 WORLD'S MOST ETHICAL COMPANIES
WWW.ETHISPHERE.COM

Differentiating Values for the Process Industries

Rockwell Automation

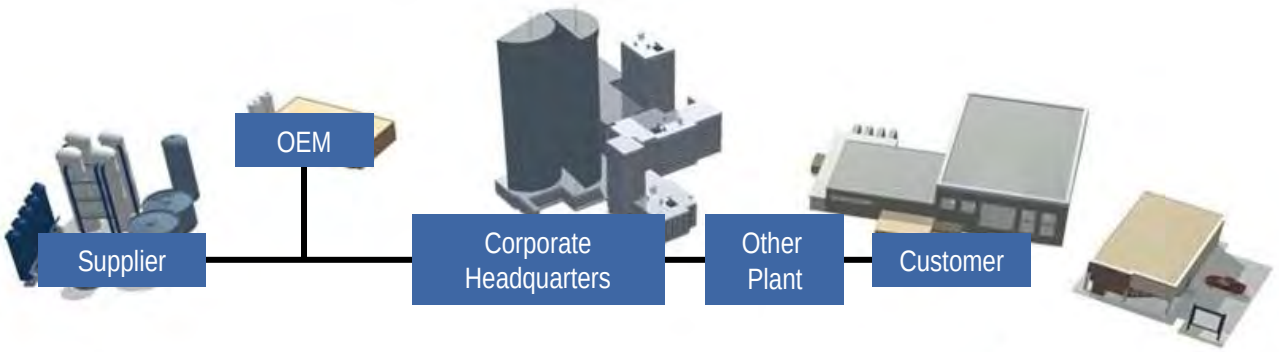


- *Plant-wide control capabilities*
- *Open, flexible architecture*
- *Integrated control and information*

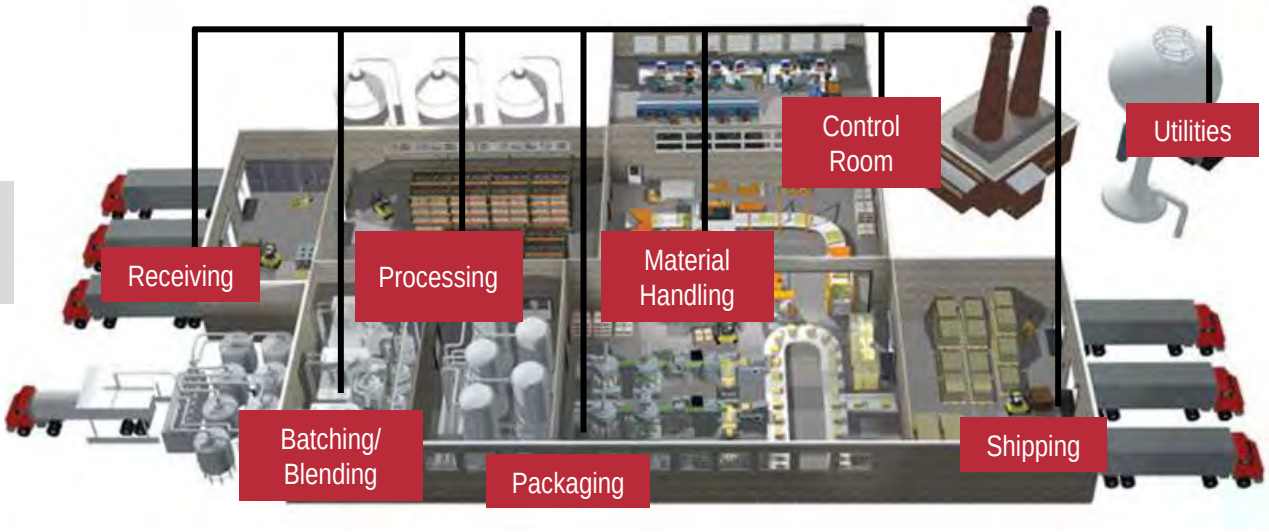
The Process & Business Environment . . .

Rockwell Automation

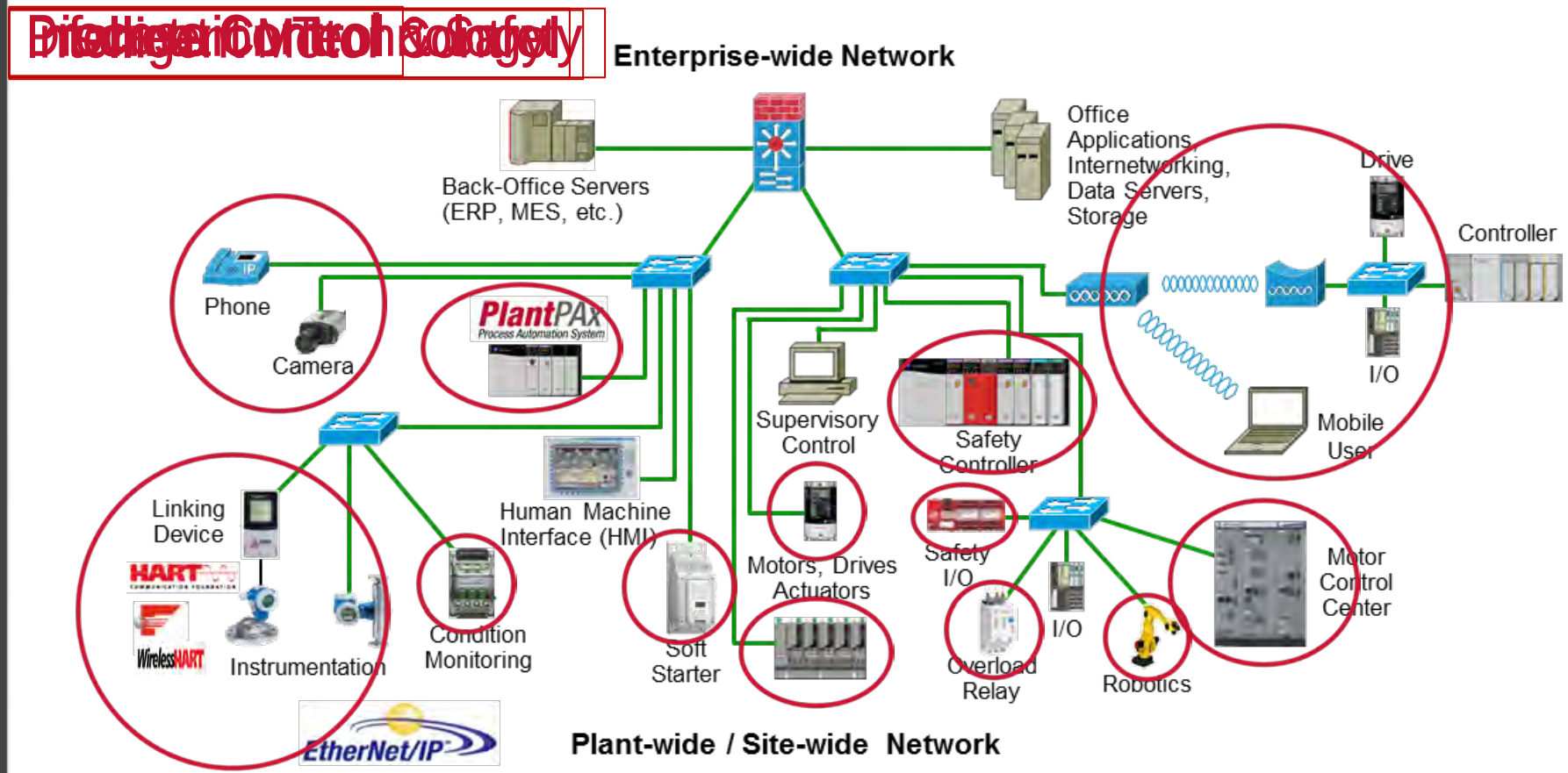
Enterprise-wide Systems



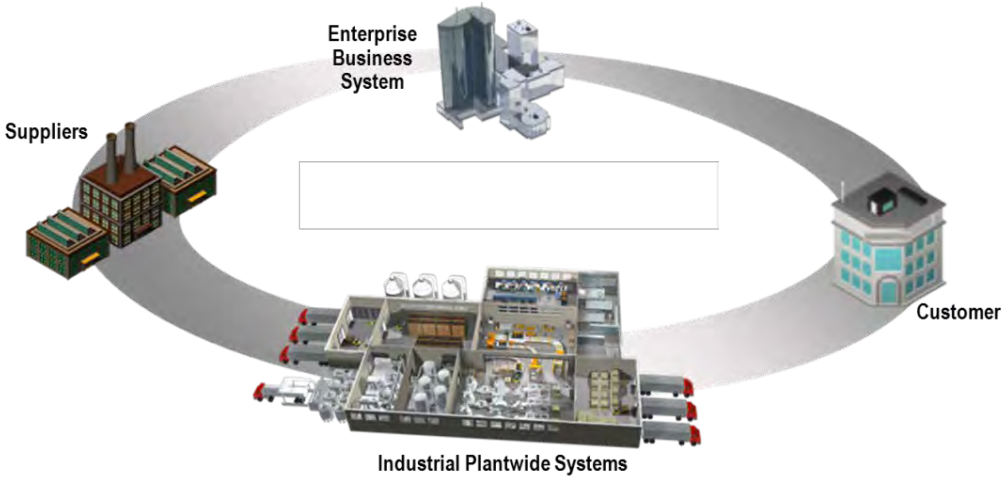
Plant-wide Systems



The Deep and Wide Enterprise . . .

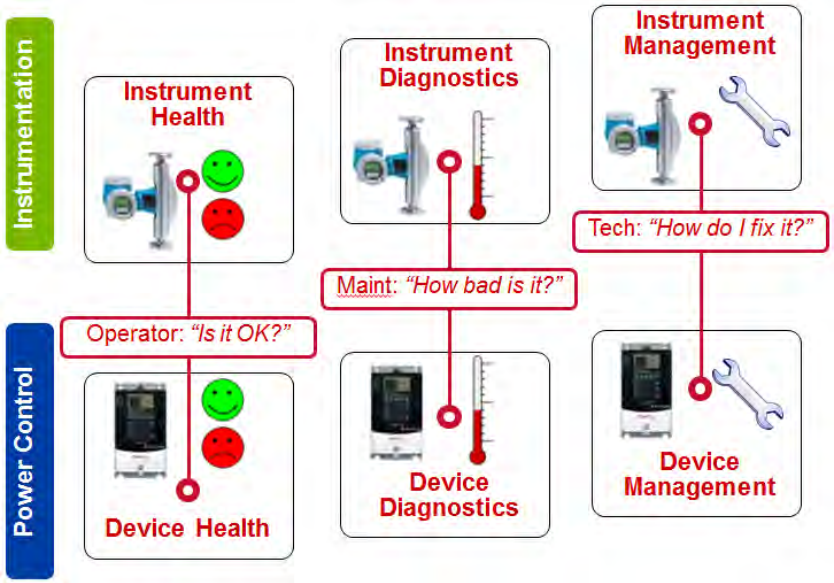


Driving Efficiencies . . .



The Deep Enterprise:
Increase 'market' velocity

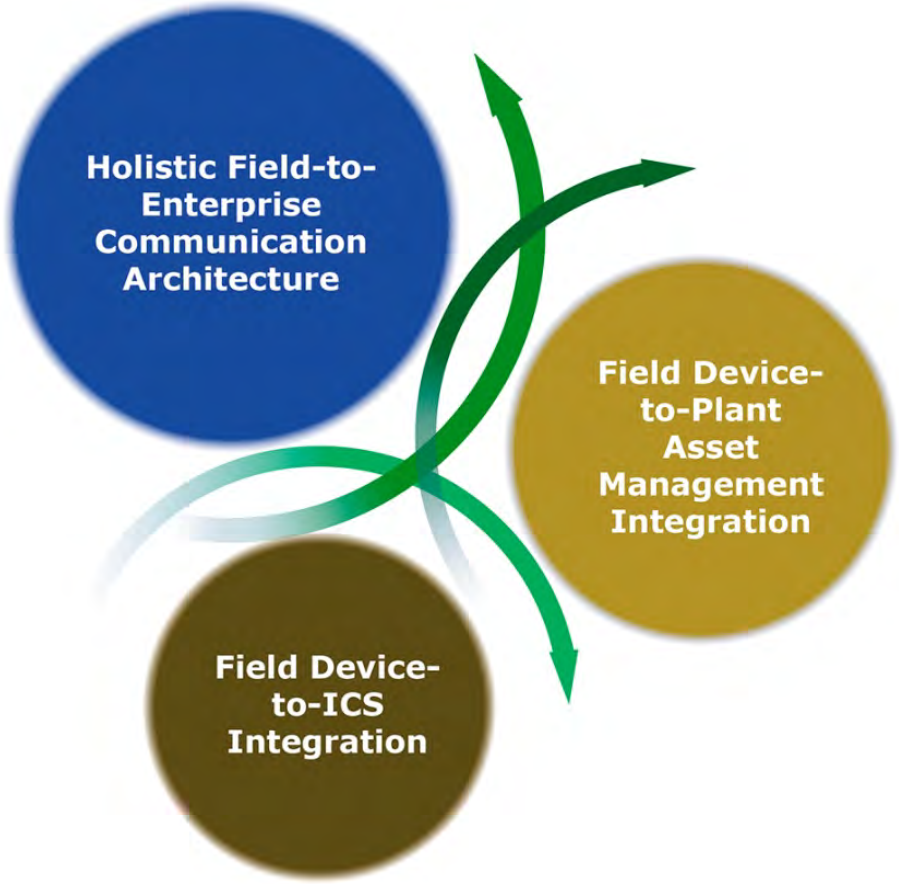
The Wide Enterprise:
Increase 'make' velocity



The 3 OPI Use Cases

Rockwell Automation

3 Extend System Features, including Security to Connected 'Things'



2 Focus on Device Integration Technologies

1 Standard integration methods for traditional process networks
Enablers for EIP Field Instrumentation

LISTEN.
THINK.
SOLVE.®

Shannon R. Foos

SRFoos@ra.rockwell.com

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Rockwell Automation

Optimization of Process Integration

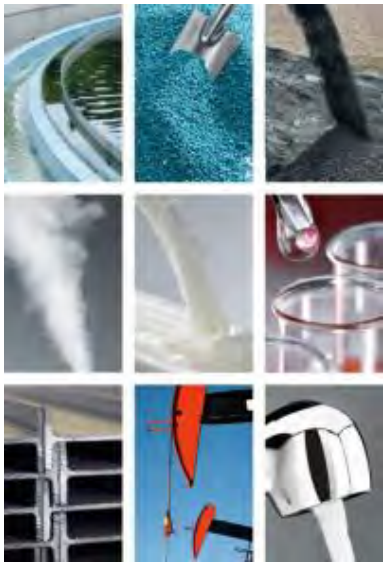
How it fits to Endress+Hauser’s strategy.

Endress+Hauser: The legacy

- Endress+Hauser is a leading manufacturer of field devices for the process industries
- Measuring and registering all process variables
- With all required process connections
- Operating reliably in all industries worldwide

All process variables

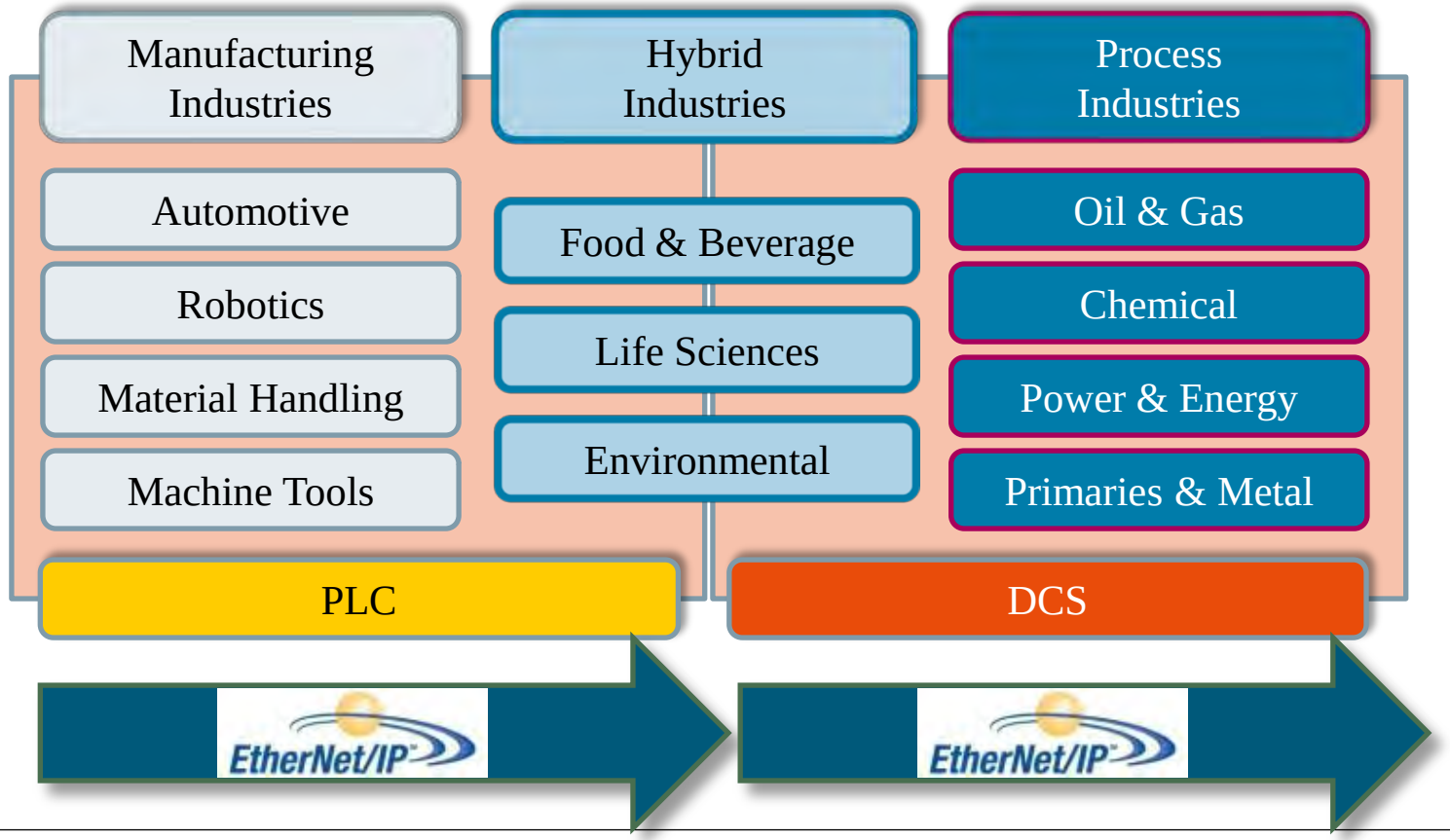
All industries



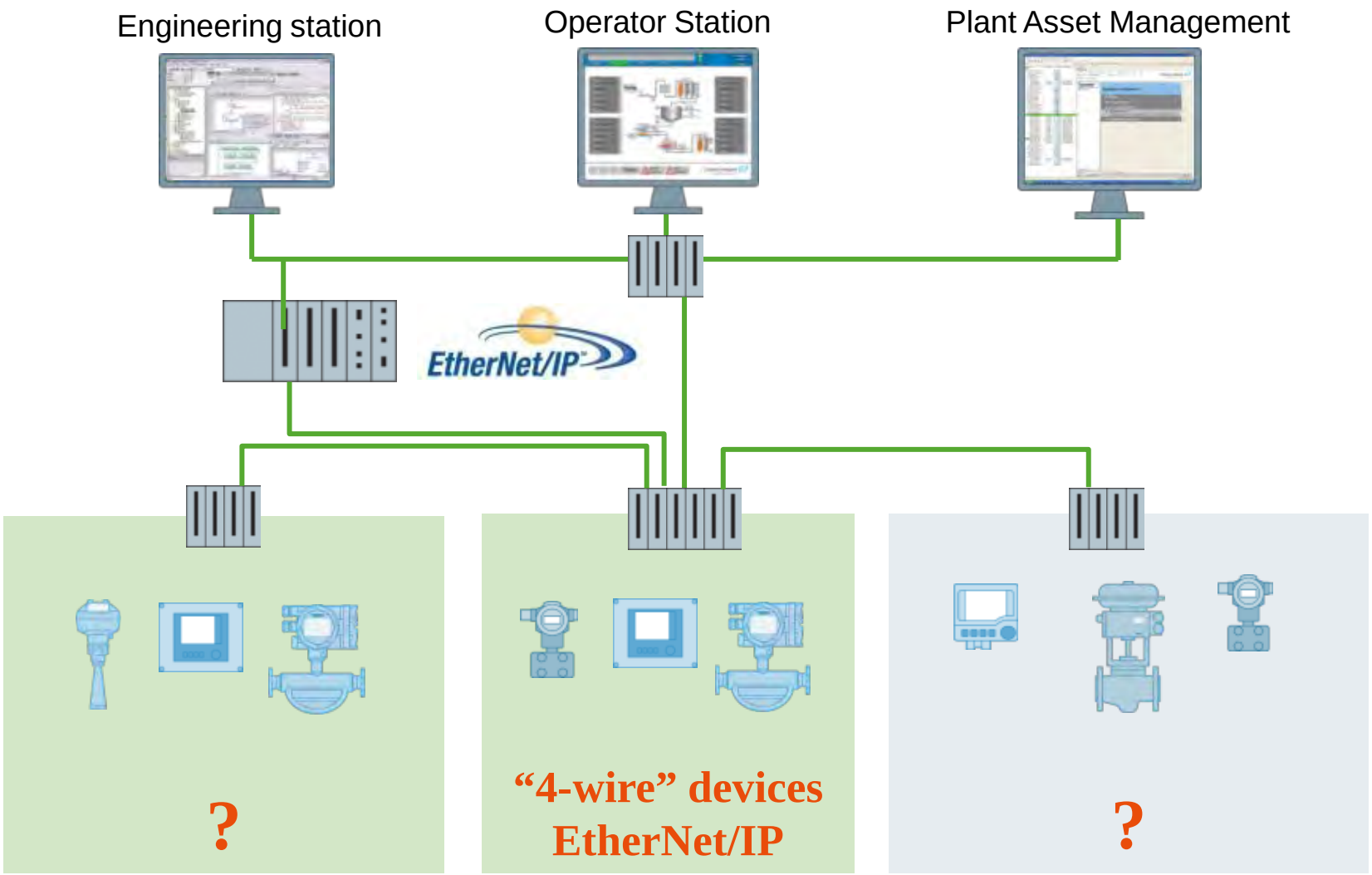
All process connections

Endress+Hauser focus industries

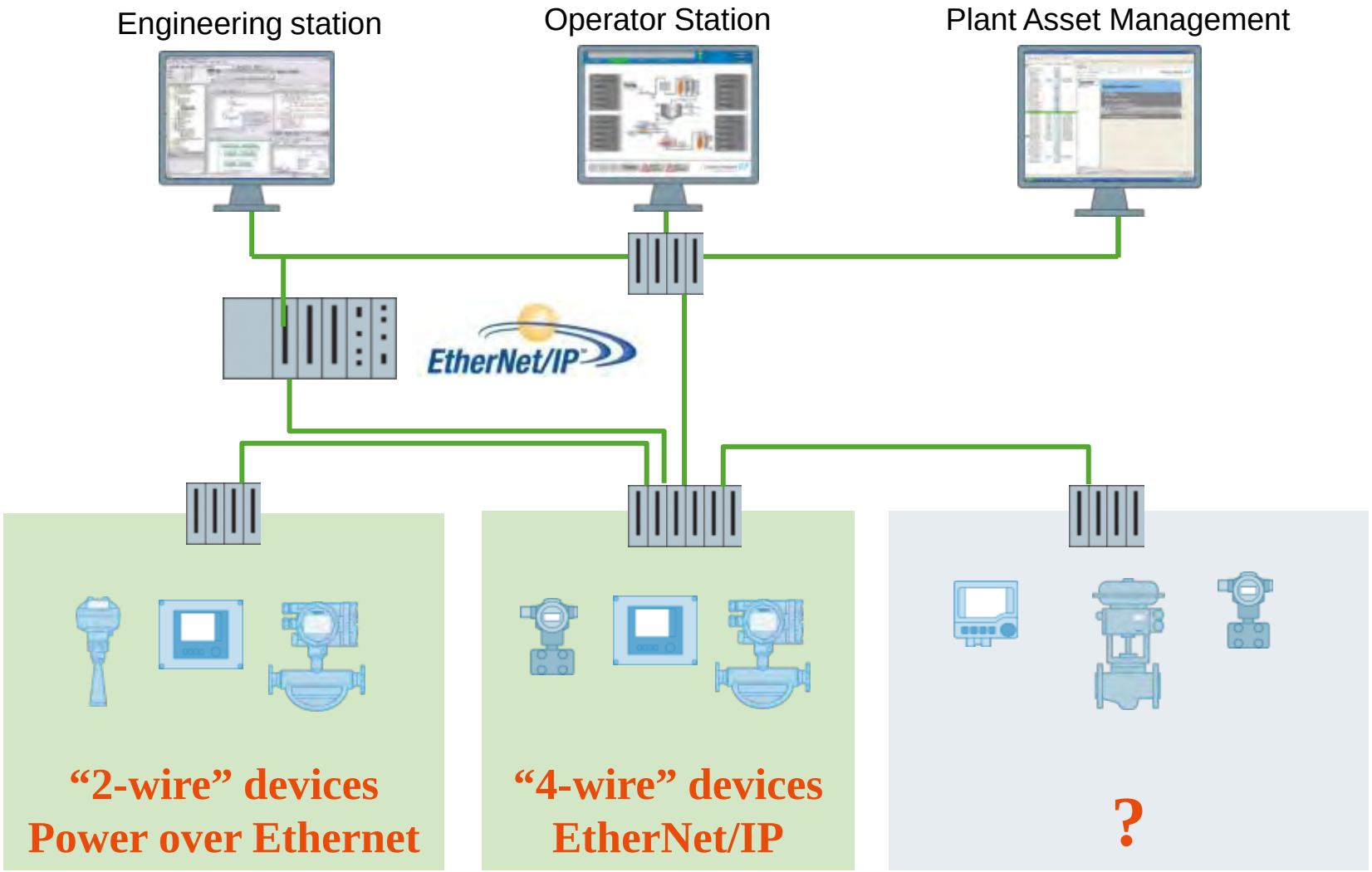
After success within the **hybrid industries** Ethernet will go to the field of **process industries**.



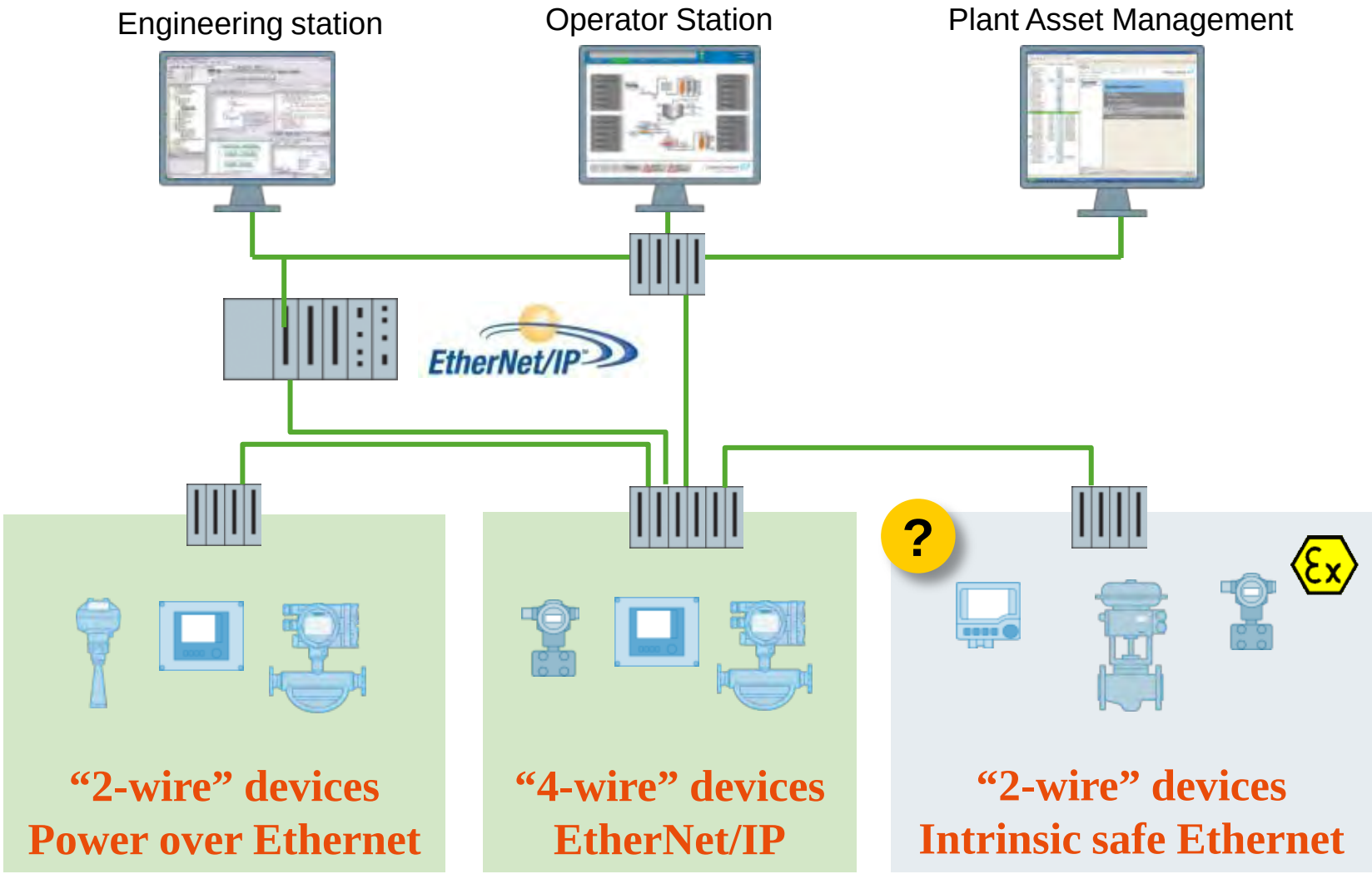
Ethernet to the field



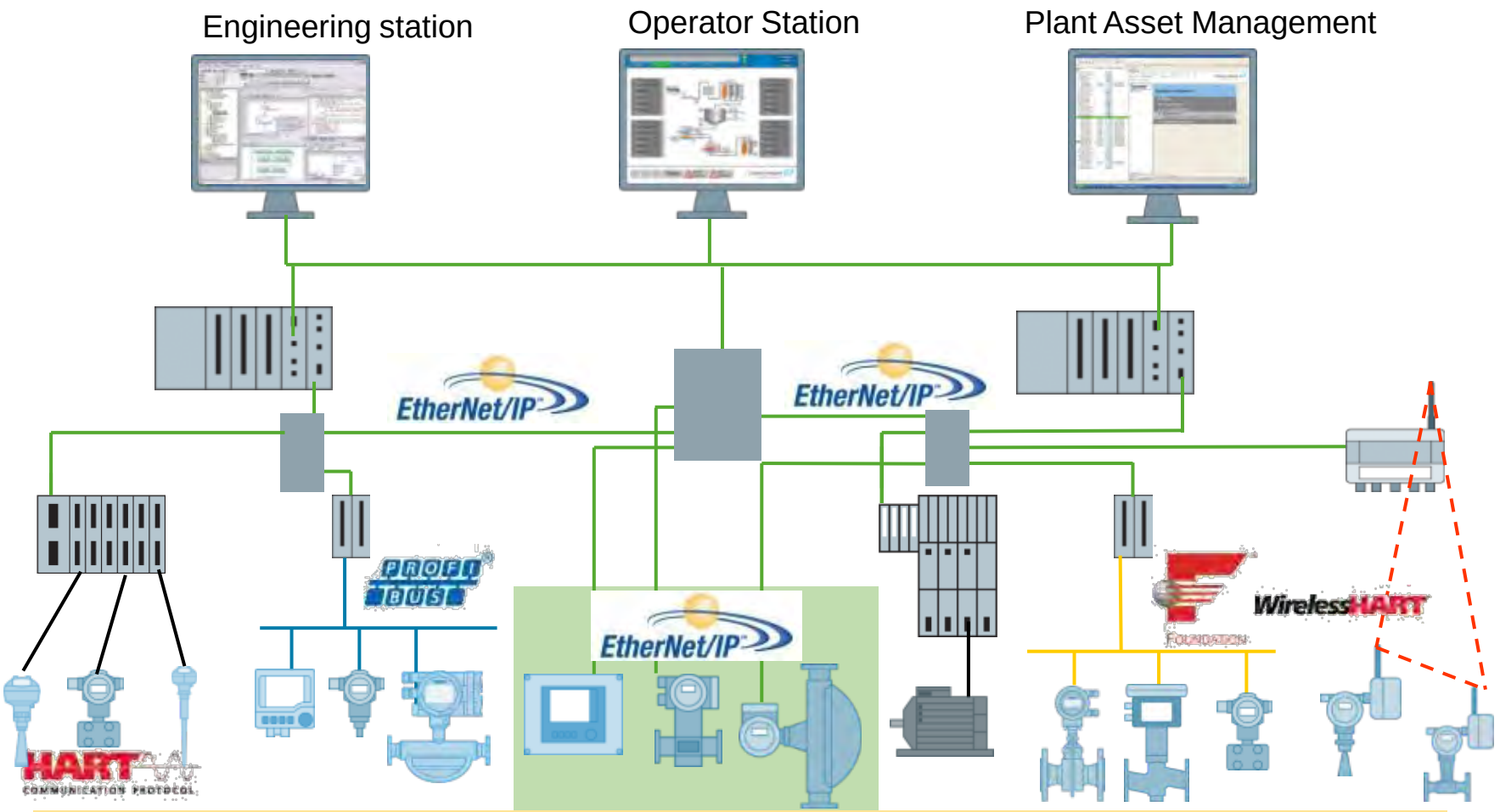
Ethernet to the field : requirements



Ethernet to the field : requirements



Integration into classical fieldbus architectures



Field Device-to-ICS is already a reality

Endress+Hauser

Intelligent field devices and diagnostic information

Analogic techniques

Digital techniques

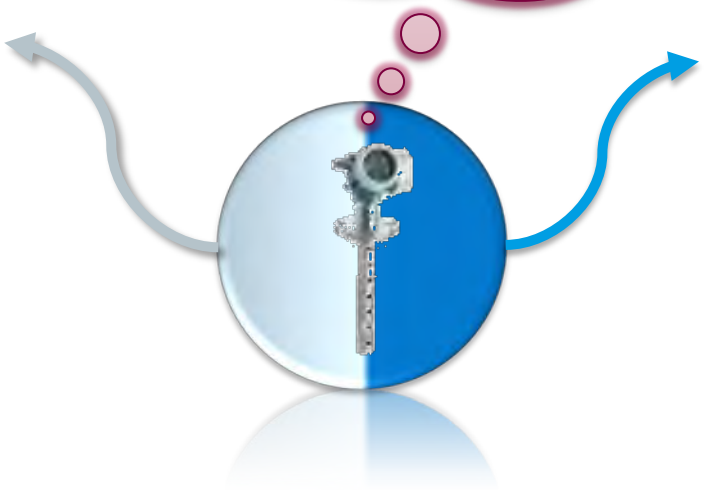
"Error – Level in blocking distance"

Value >20mA

Failure

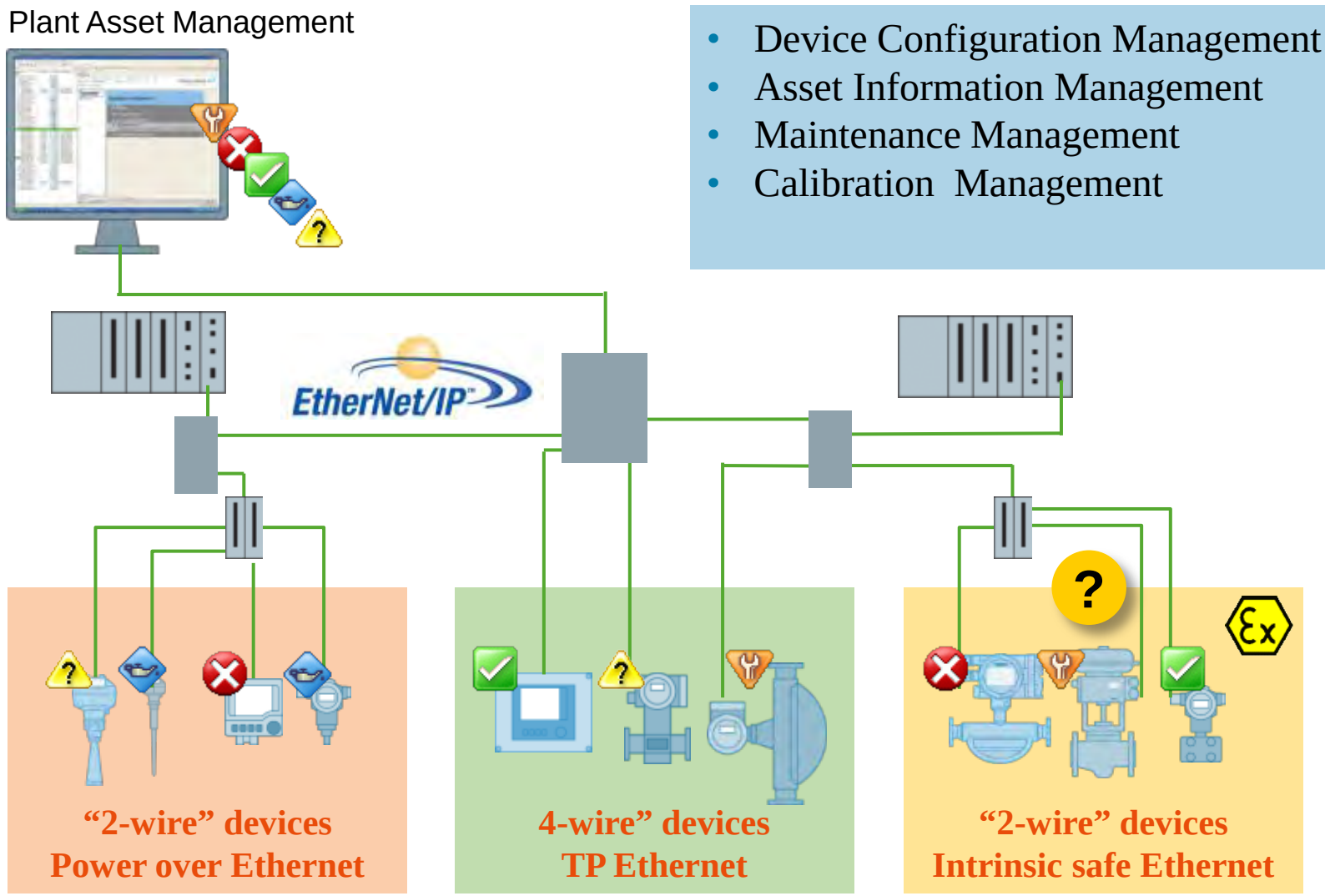
"Error – Level in blocking distance"

Out of Specification



Intelligent field device are enabling Field Device-to-PAM Integration

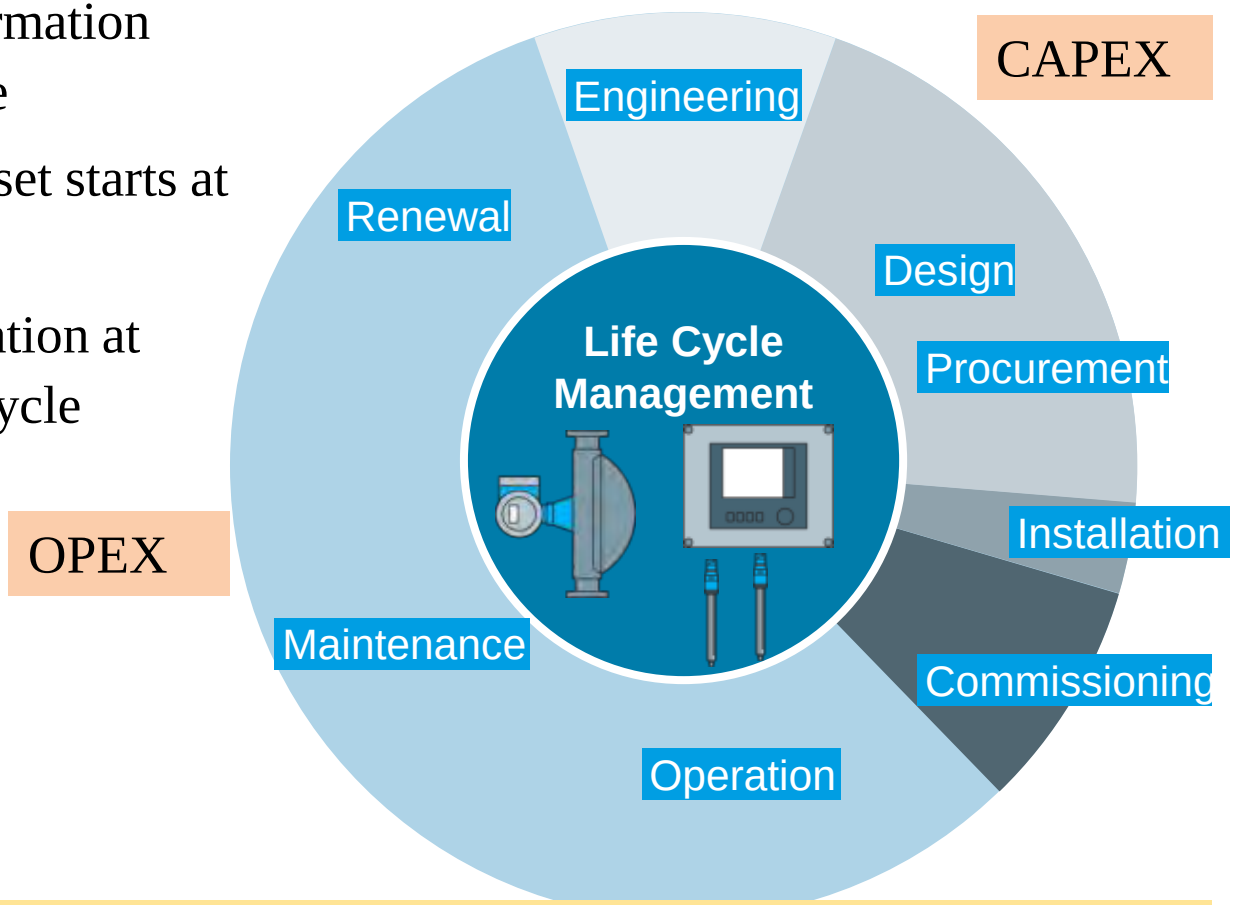
Plant Asset Management



- Device Configuration Management
- Asset Information Management
- Maintenance Management
- Calibration Management

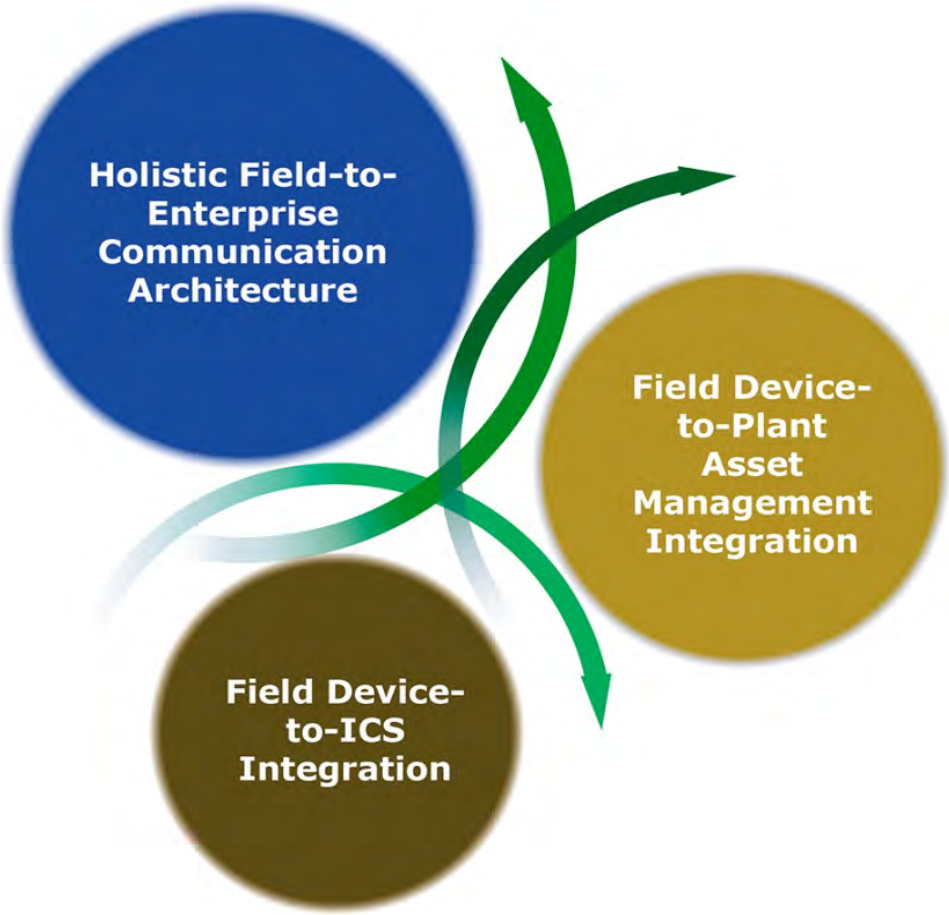
Field device management over the life cycle

- Manage asset information over total life cycle
- Asset information set starts at production
- Additional information at every step of life cycle



Enabled by Holistic Field-to-Enterprise Communication Architecture

Time for Discussion



Optimization of Process Integration