Innovation Talk Webinar : EcoStruxure for Semiconductor & Battery 2022

Schneider Electric의 M580 PLC를 이용한 최적화된
Facility Monitoring and Control System (FMCS) Solution
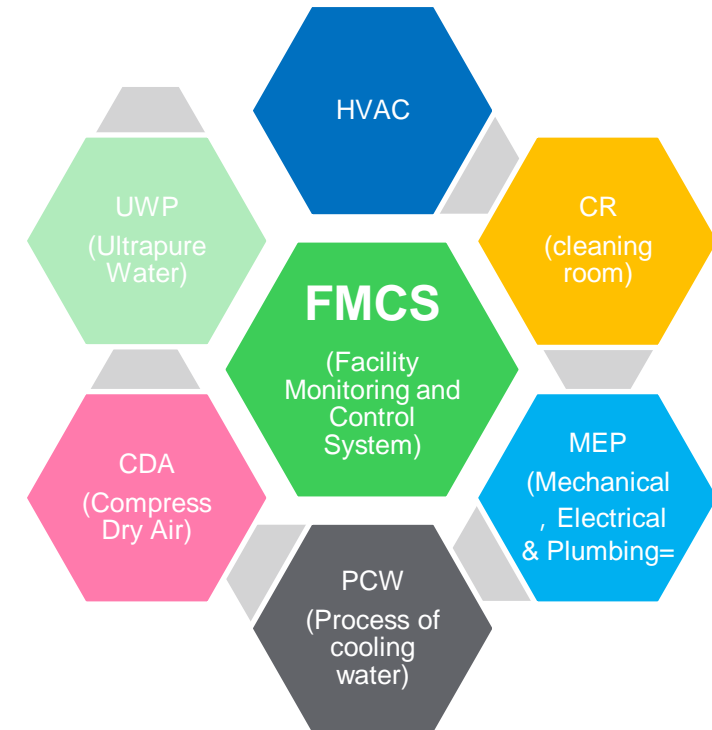
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▦ AGENDA

- FMCS
- Challenges for FMCS
- What is M580?
- Offer description with M580 for FMCS
- EcoStruxure Plant

FMCS

FMCS (Facility Monitoring and Control System) integrates the monitoring data of various sub-systems of the facility into the central monitoring system by using industrial communication in order to achieve the following purposes:

➢ Intercommunicate the whole plant information

➢ Uniform database to manage alarms and history

➢ Real-time trends & reports management

➢ Improve the overall management performance

➢ Simplify the operation and maintenance difficulty

➢ Reduce the management cost

HVAC

CR
(cleaning room)

UWP
(Ultrapure Water)

FMCS
(Facility Monitoring and Control System)

MEP
(Mechanical, Electrical & Plumbing=

CDA
(Compress Dry Air)

PCW
(Process of cooling water)

- WWT：Waste Water Treatment
- DOS：Diesel Oil System
- CVD：Chemical Vapor Deposition
- CDS：Chemical Dispense System

- WSD：Water Supply and Drainage
- BL：Boiler
- CH：Chiller
- CT：Cooling Tower

Typical challenges in FMCS plant

- Covid-19
  - Increasing PC and Electronic devices needs
  - Increasing data usage requires more servers & datacenters
  - Increasing needs for IIOT softwares like remote connection, fast maintenance, energy cost reduction & process optimization
  - New investments, new manufacturing plants or lines; increase new HW and Software needs
  - Requires more secure data, increasing cyber security needs.

- Various sub-systems, different platforms. It's hard to operate and manage

- FMCS must not be stopped. Requires stable, secure and high performance control system

- Central FMCS system allows to easier Maintenance

- Data visualization and transparent

- High management costs, complex operation methods

- Constantly evolving manufacturing process
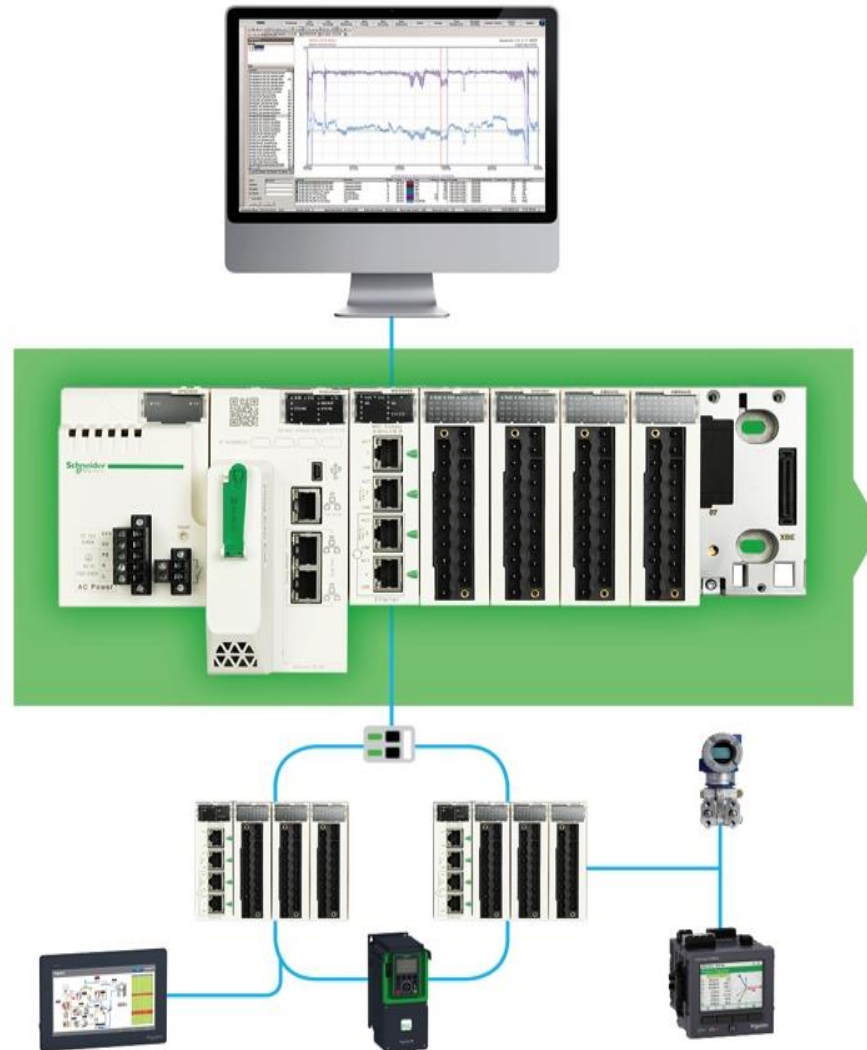
Innovation at Every Level: Modicon M580

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Innovation at Every Level Positioning & Customer Value

Eco truxure™
Innovation At Every Level

Apps, Analytics & Services
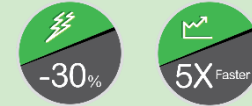
Edge Control

Connected Products

Profit From Visibility

-25% | +10 pts
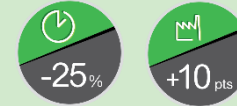
Optimized communications and system features embedded

Improve Productivity

-30% | 5X Faster

Better insight into operations with built-in Ethernet capability. Reduce downtime with redundant controllers and power supply with wireless & predictive maintenance

Manage Operating Risk

Safe

The most advanced cybersecurity implementation

Easy Device Integration

Architecture fully based on the most popular industrial standards, on both communication and software aspects

Modicon M580 : Customer Value Of FMCS

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Schneider Electric
M580

Measurable Benefit	Customer values		Product features	M580
Increase Revenue (reduce TCO)	Data access	Seamless, Enterprise wide data access →	Ethernet backbone	Yes
	Life cycle approach	Protect your automation investment →	Compatibility, modernization tools	Yes
Improve Productivity	Remote Diagnostic	Remote plant-wide diagnostics, access via smartphones →	Latest HTML5 Web Technology	Yes
	Performance	Do more with less, fast cycle times in discrete applications →	Processor speed (scan time) and memory	Yes
	Lower Operating Cost	Modify your system without stopping the process →	Can Configure and Change On the Fly	Yes
Reduce time to profit	Device Integration	Easy multi vendors plant system integration →	Built in, Full Function Ethernet	Yes
	Lower Engineering time	Reduce system test & commissioning time (FAT/SAT) →	Time stamping validated at the entire system	Yes
		Less time to design and upgrade, can re-use designs, →	Libraries, TVDAs, modernization solutions, common programming platform for hybrid	Yes
Improve Reliability and sustainability	Process Energy Efficiency	Plant wide energy management →	Libraries, TVDAs, access to all plant data to productively manage energy	Yes
	Process Availability	Less downtime, proactive maintenance →	Redundant architecture, red. Power supplies	Yes
	Scalability	Ready for future expansion →	Common I/O platform, processor memory	Yes
Manage Operating Risk	Cyber security	Protection against malicious/inadvertent attacks →	Built in enhanced security: firmware, memory, Ethernet communication, etc.	Yes

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M580 Redundant CPU – All in one

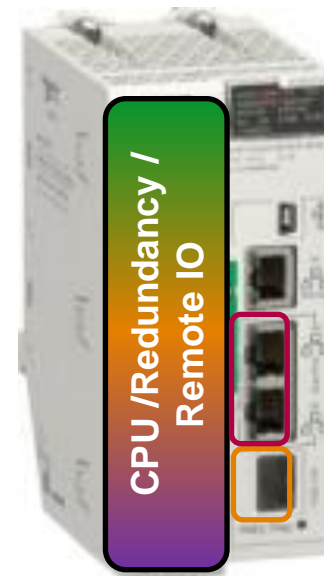### Traditional Solution

Three physical hardware features

CPU | Redundancy | Remote IO
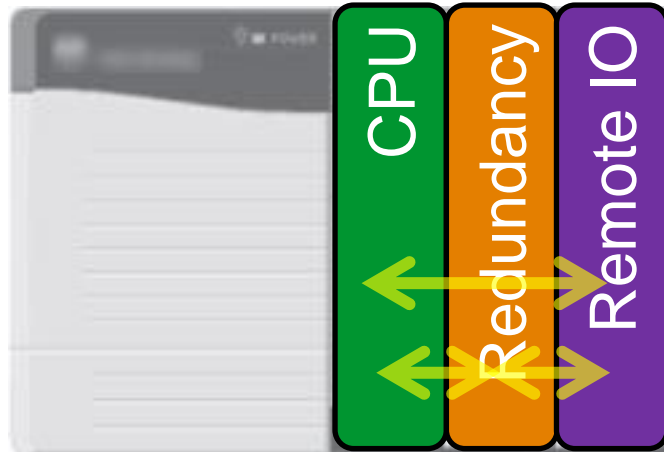
- There's a bottleneck.
- Complex operation mode.
- Need to check data consistency.

M580 Redundant

Three functions in one hardware

CPU /Redundancy / Remote IO

- No bottleneck.
- Simplified operation mode.
- Data consistency error prevention.
- Optimization of spare parts.
- The installation space is decreasing.

## Modicon M580 ePAC Products with high usefulness and reliability

Competitor Redundant

- A separate redundancy module is required.
- A separate Ethernet scanner module is required
- Ethernet Device integration or PC access requires E-TAP
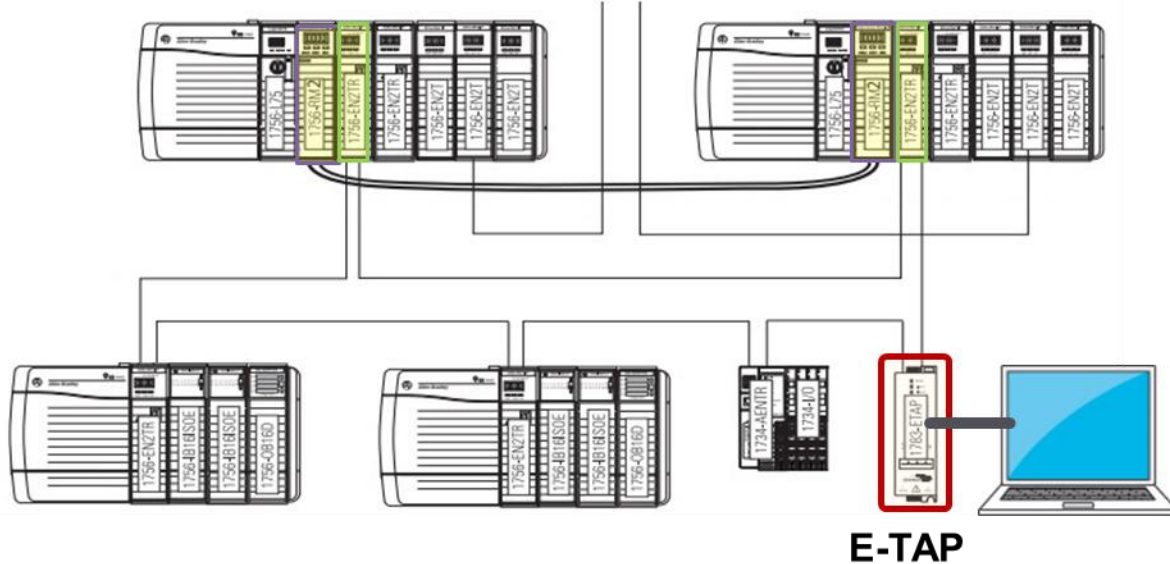
M580 Redundant

- No need for a separate redundancy module.
- No need for a separate Ethernet scanner module
- Connecting to the service port of the CRA when integrating Ethernet Device or accessing a PC

E-TAP

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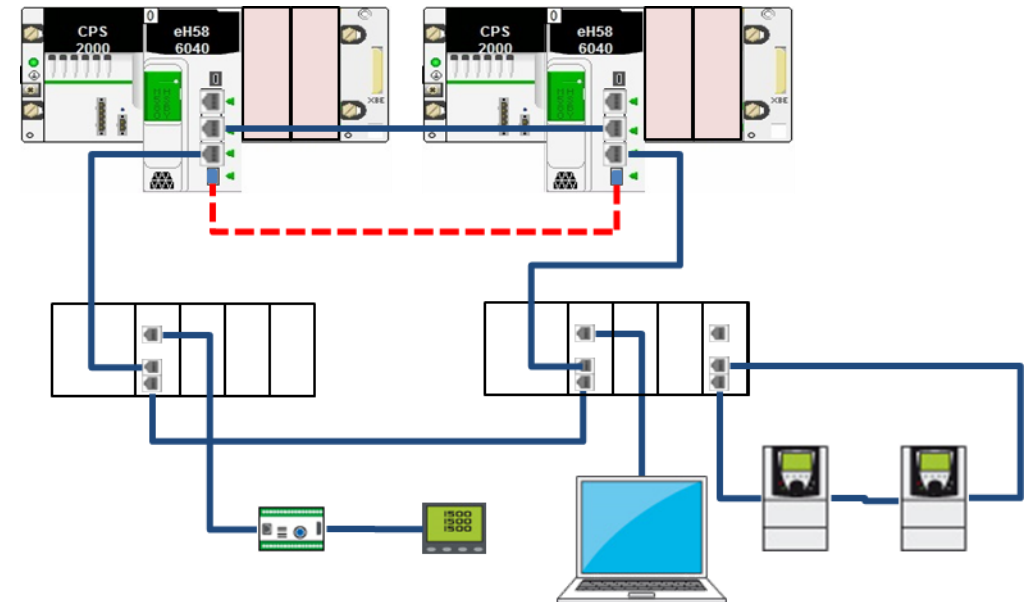
Cybersecurity

Cybersecurity ready with Achilles Level 2 certification and advanced built-in cybersecurity features

Embedded security features as defined by standard IEC 62443

M580 hardware platform:
- Unused services can be disabled
- Remote access to PLC can be controlled
- Implementation of standard IPSEC protocol helps to secure communication between control network and PLC/devices

M580 programming software with integrity check of EcoStruxure Control Expert executable files

Traceability for security events:
- PLC and EcoStruxure Control Expert implement a SYSLOG client

Secure SCADA protocols such as OPC UA, DNP3, IEC 60870-5-104
M580 controller is aligned with IEC 62443-4-2 Security Level(SL-1)

Achiles Level 2 certification

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Power Supply Redundant

The type to install power supply on the rack

- Even if there is a problem with a power supply, the other PWR supply will operate and the modules installed in the rack will operate normally.
- No need for external wiring.

Advanced diagnostic function available on M580.

- Monitoring the internal temperature.
- Monitoring voltage and current values of 3.3 VDC and 24 VDC.
- It marks you how long it's been operated as Master or Slave.
- Alarm you the number of times the voltage threshold is out of the specified specification.
- Alarm remaining life expectancy - **Preventive maintenance**
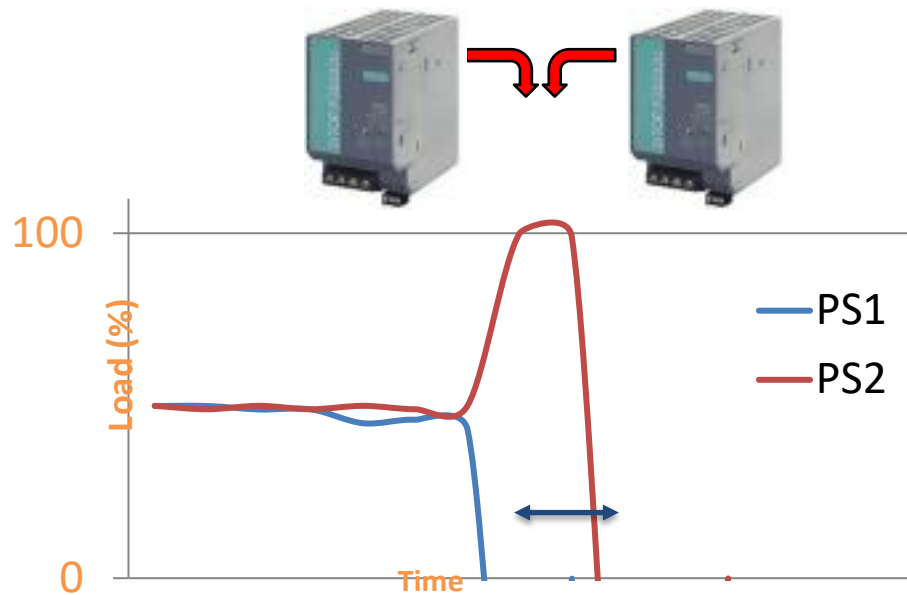- Change the role of the power supply (Master/Slave) in the program

Hi there!
It's maintenance time!

Reduce **OPEX costs** by switching from post-maintenance to predict maintenance
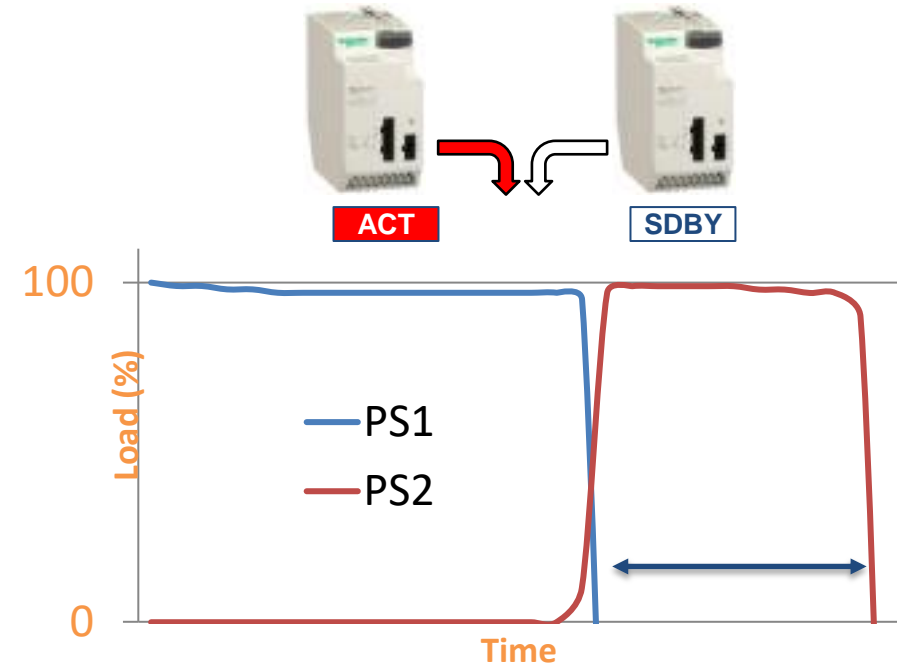
Modicon M580 : Redundant

Principle of redundant power supply operation

Competitor's Power Supply

M580 Power Supply

ACT   SDBY

- Two Power Supplies Share Load
- The overall lifespan is short because the two Power Supplies always operate together.

- Only one Power Supply is used at a time, and the other is Standby
- Secure longer life

EcoStruxure Plant Ethernet architectures provide transparent communication services to the entire operation through the implementation of standard, unmodified Ethernet protocols and services
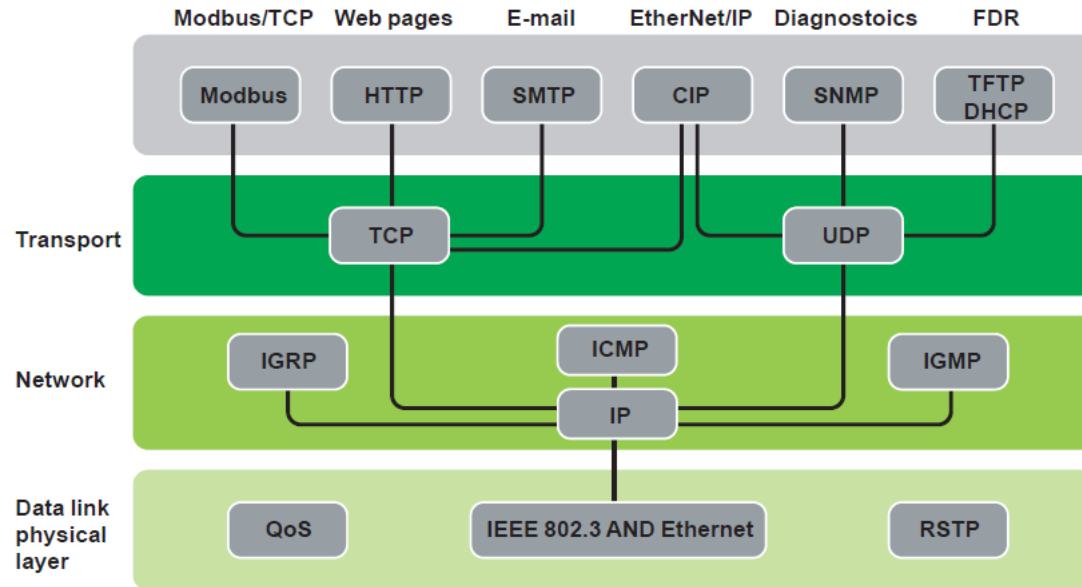

Industrial Ethernet services

- **Modicon M580 communication services**
- **Modicon M580 web services**

Ethernet communication modules are equipped with automation-specific services with the typical Ethernet services (HTTP, BOOTP, DHCP, etc.), such as:

- Device scanning using Modbus TCP and EtherNet/IP
- Messaging using Modbus TCP and EtherNet/IP
- Automatic replacement device configuration using FDR (Fast Device Replacement)
- Extensive diagnostics through SNMP
- Clock synchronization using NTP
- E-mail alarm notification via SMTP
- Packet prioritization using QoS
- Ring topology redundancy through RSTP

M580 Safety Basic Configuration

Safety PSU | Safety CPU | Safety Copro | Safety X80 IO | X80 IO
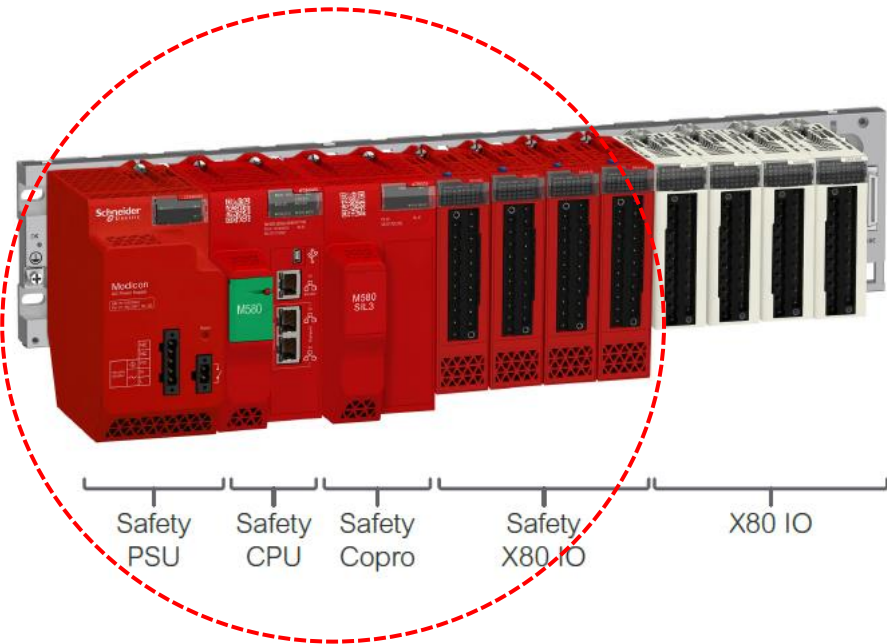
M580S configuration with mixed Safety & Standard X80 IO (Common Safety)

The Modicon M580 Safety is a M580 programmable automation controller (PAC) with embedded safety modules and functions; it is available as a standalone PAC or a redundant (HSBY) PAC.

The M580 Safety PAC is a safety-related system certified by TÜV Rheinland
- **SIL3 (Safety Integrity Level 3)**
- Cat.4/PLe (Performance Level e)

The Modicon M580 Safety PAC ensures safe operation while optimizing costs.

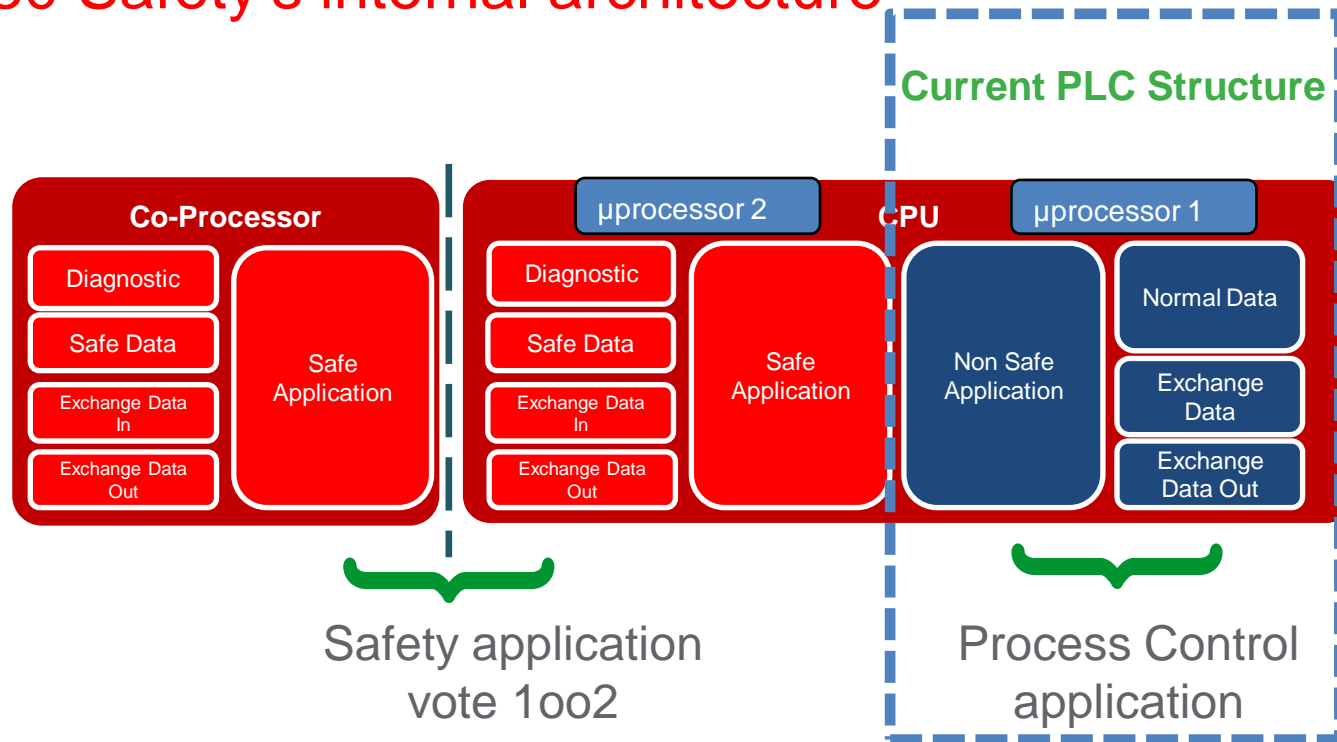A standalone PAC includes a single CPU with a safety coprocessor that is mandatory for dual execution.

It is based on the X80 platform, and the EcoStruxure Control Expert environment:
- M580 Safety CPU and coprocessor
- Redundant safety power supplies
- Safety local and remote I/O
- Safety communications
- Software libraries for process and machine safety

X80 Safety modules are compatible with the M580 Safety only.

M580 Safety's internal architecture

Current PLC Structure

| Co-Processor | µprocessor 2 | CPU | µprocessor 1 |

- Diagnostic
- Safe Data
- Exchange Data In
- Exchange Data Out
- Safe Application

Non Safe Application

- Normal Data
- Exchange Data
- Exchange Data Out

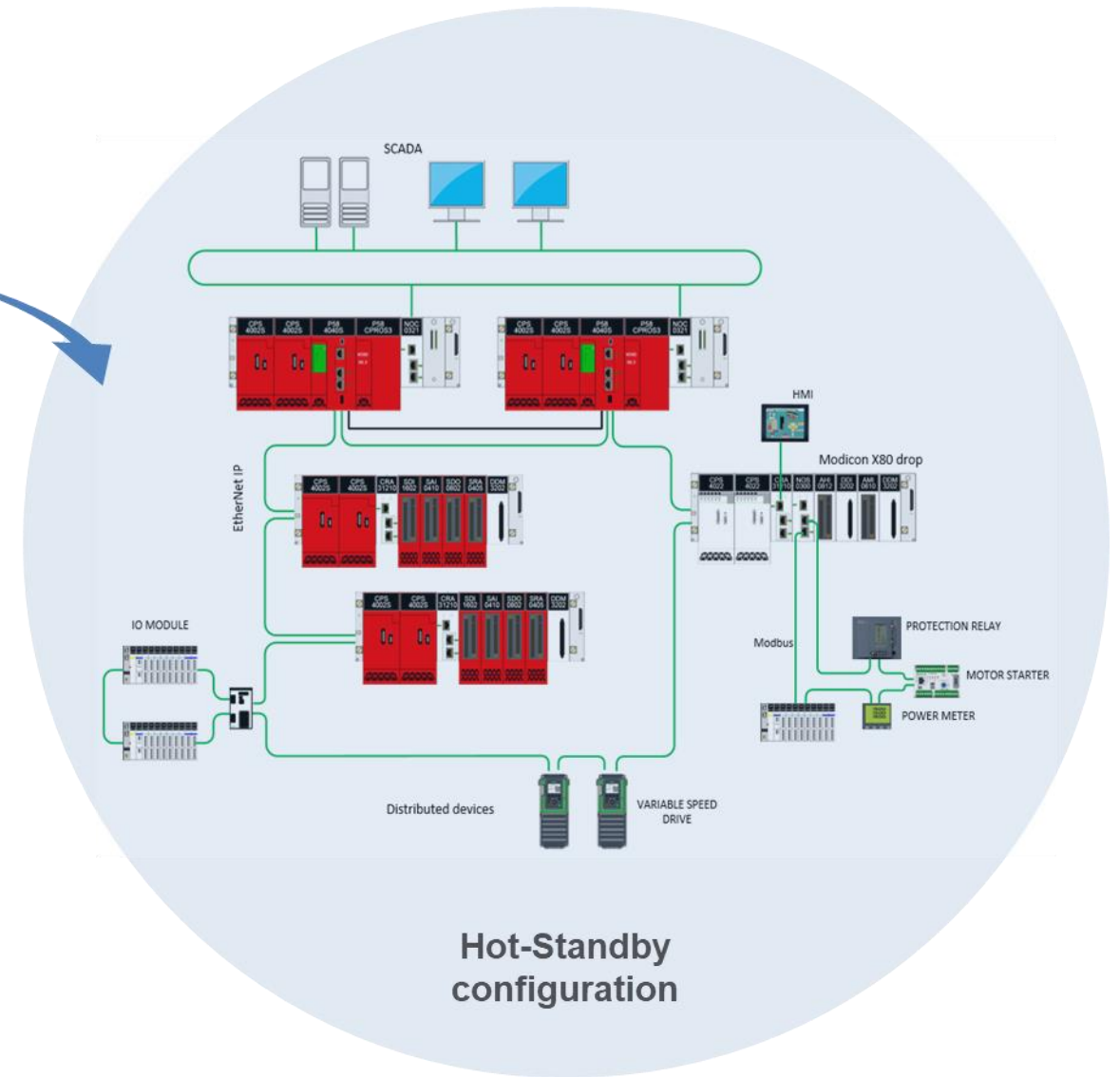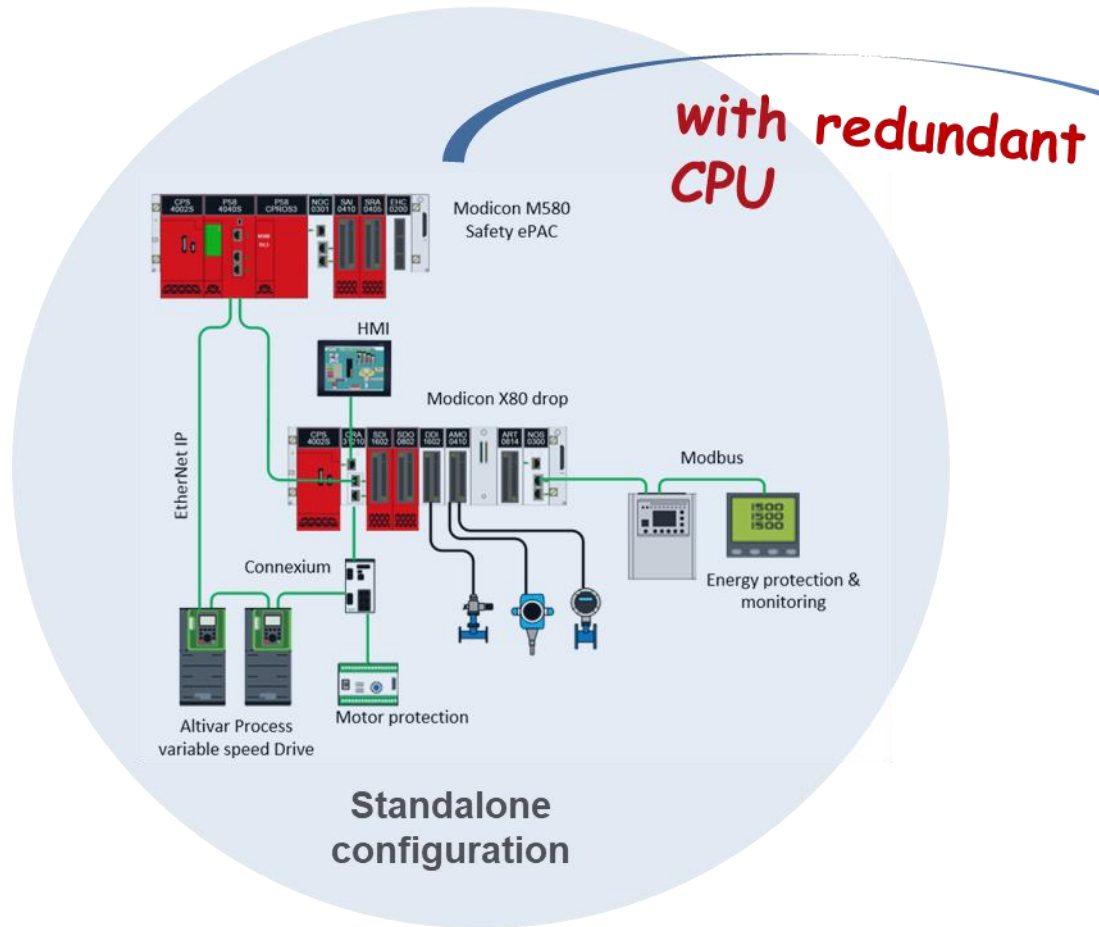Safety application vote 1oo2

Process Control application

The M580 Safety PAC is a safety-related system certified by TÜV Rheinland
- **SIL3 (Safety Integrity Level 3)**
- Cat.4/PLe (Performance Level e)

- Physically and safely isolated memory.
- The safety function is related to running on a dedicated core processor.

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A safety & high available solution

with redundant CPU

Modicon M580 Safety ePAC

HMI

Modicon X80 drop

Modbus

Energy protection & monitoring

EtherNet IP

Connexium

Motor protection

Altivar Process variable speed Drive

Standalone configuration

SCADA

EtherNet IP

HMI

Modicon X80 drop

Modbus

IO MODULE

PROTECTION RELAY

MOTOR STARTER

POWER METER

Distributed devices

VARIABLE SPEED DRIVE

Hot-Standby configuration
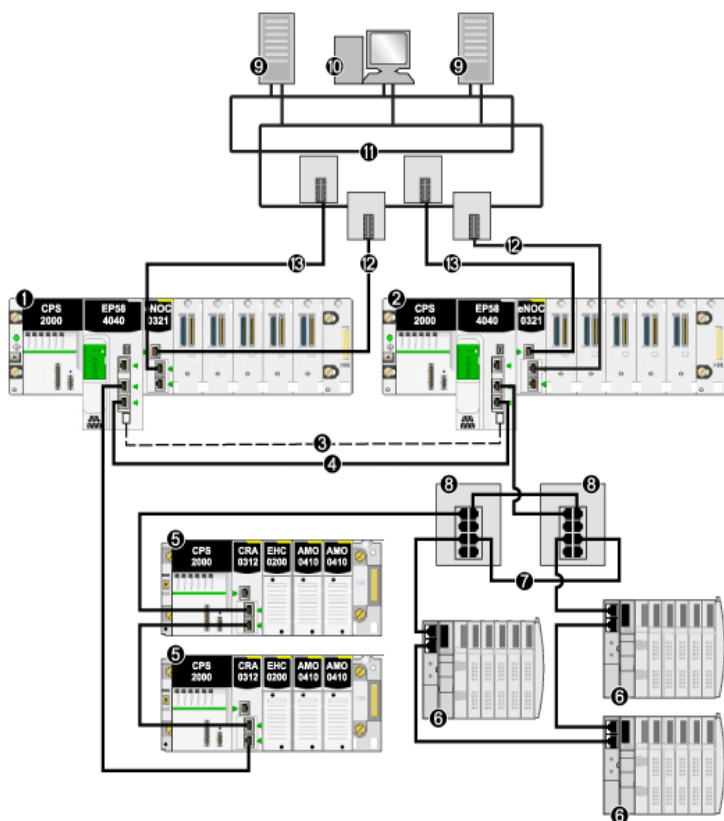
Flexible Safety Topologies

Enforcing isolation and independence between safety and non-safety related operations
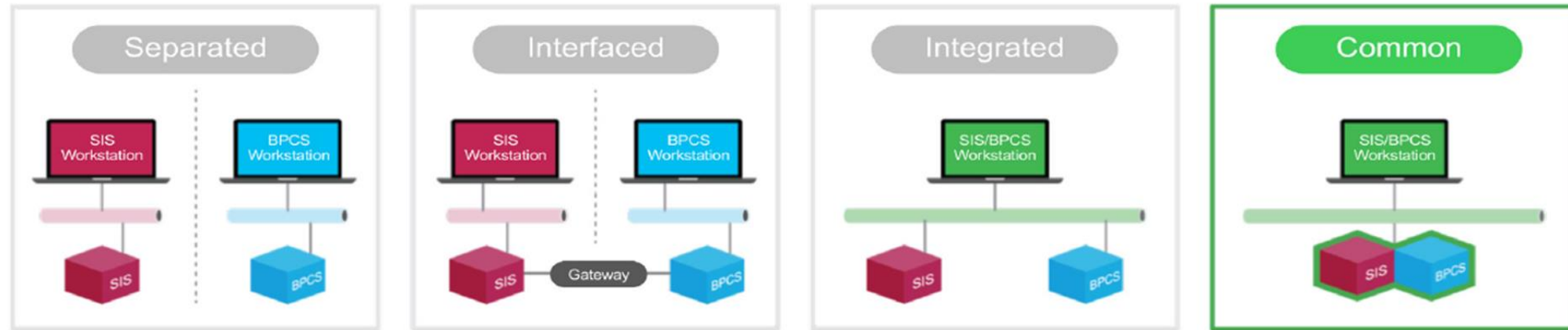
- The M580 Safety ePAC advanced safety architecture provides a flexible platform to implement safety systems, whether your process requires Separated, Interfaced, Integrated or Common Safety topologies.

- With our state of the art Common Safety technology, the M580 Safety enables full integration of process and safety functions while enforcing isolation and independence between safety and non-safety related operations.

- Safety and non-safety hardware modules can be mixed seamlessly to provide a high level of flexibility, adaptability and ease-of-use with a common engineering environment, full authentication and authorization of protected safety tasks.

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Now

Next Level

Modicon M580 Redundant controllers

Ethernet PRP

PRP RedBox Switch
Hirschmann RED25

LAN A — Redundant IO Network — LAN B

Switch
Modicon or 3rd party
(no need of DRS)

X80 RIO Drop redundant communication adapter (CRA) – PRP
BMECRA31310(H)

Redundant connection to **control Network**

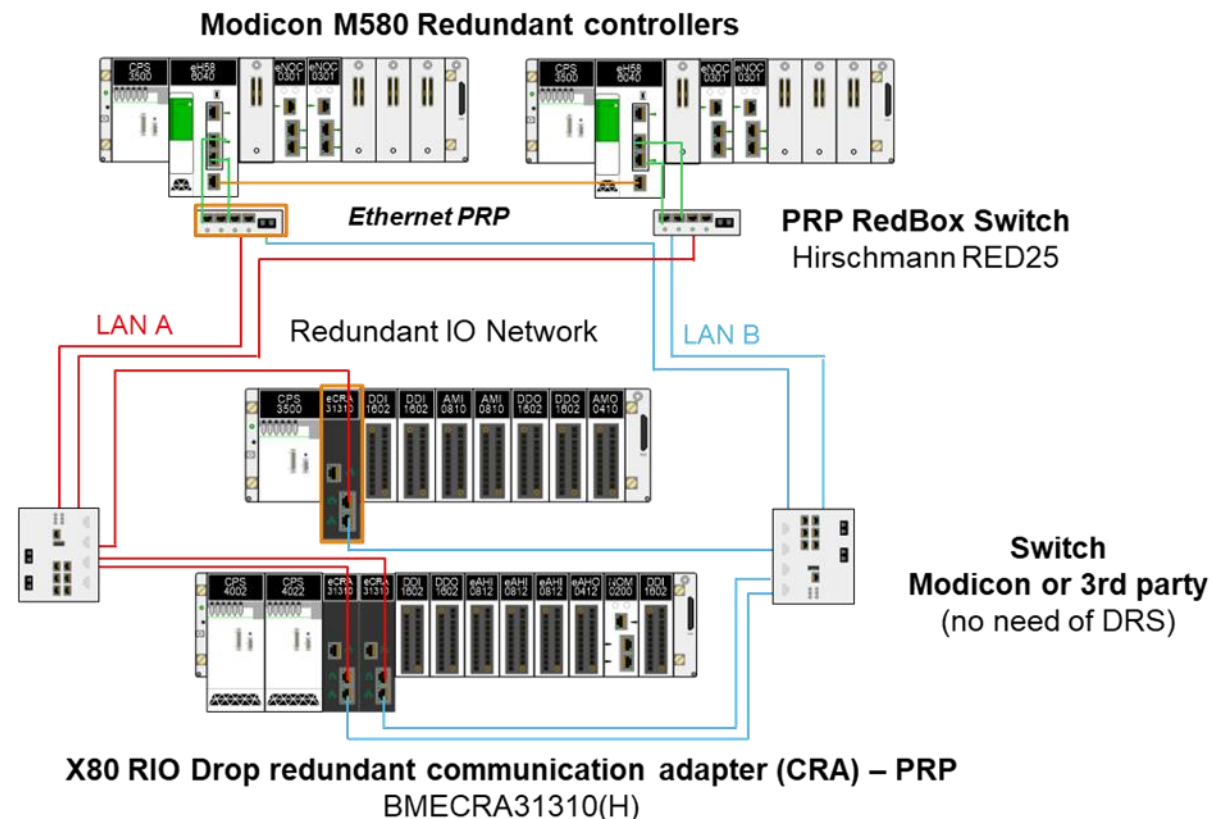**Redundant Processors**

Ring network **topology** of **IO remote racks** (drops)

DRS **switches redundancy**

Redundant Power Supply

Redundant RIO network infrastructure relying on PRP

- Parallel Redundancy Protocol PRP

- Open standard. Proven in use, Transparent for the user

- Zero recovery time. Multi-fault tolerant.

New Redundant X80 RIO drop adapter BMECRA31310

The World's Most Comprehensive Industrial Control Portfolio
From Edge to Analytics Level
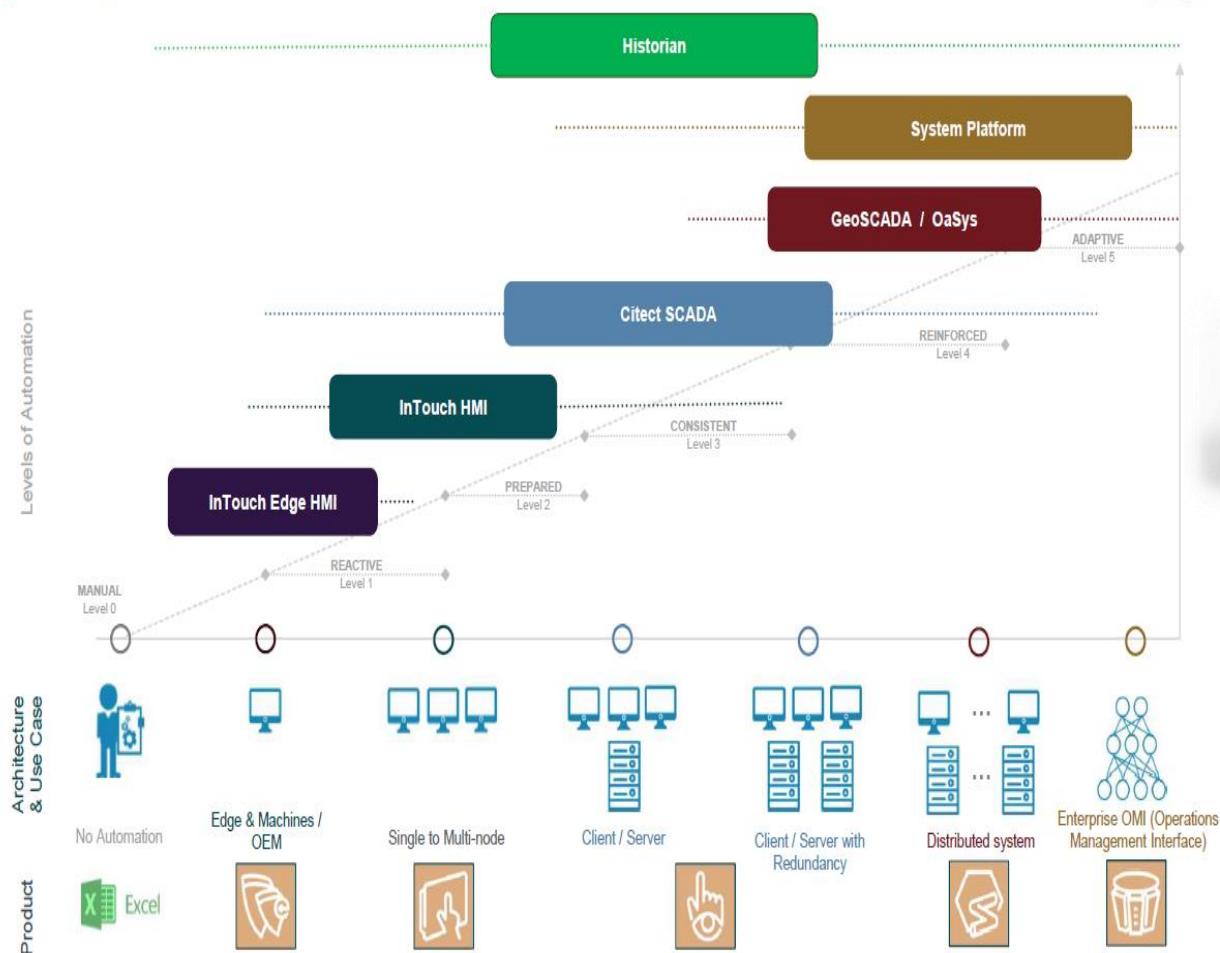
Monitor & Control

Create synergy with SE products and AVEVA Solution

1. Optimized Engineering

2. Improved Operations management

3. Increase Efficiency & Revenue

+ AVEVA

Levels of Automation

- Historian
- System Platform
- GeoSCADA / OaSys — ADAPTIVE Level 5
- Citect SCADA — REINFORCED Level 4
- InTouch HMI — CONSISTENT Level 3
- InTouch Edge HMI — PREPARED Level 2
- REACTIVE Level 1
- MANUAL Level 0

Architecture & Use Case

| No Automation | Edge & Machines / OEM | Single to Multi-node | Client / Server | Client / Server with Redundancy | Distributed system | Enterprise OMI (Operations Management Interface) |

Product

Excel

Modicon Driver + Libraries

- Machine Scada Expert → Integrated Machine Automation Solutions
- Control Expert Asset Link → Integrated Control Automation Solutions
- Process Expert For AVEVA System Platform → Integrated Process Automation Solutions

THE END