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Efficient Plant Engineering with TwinCAT MTP

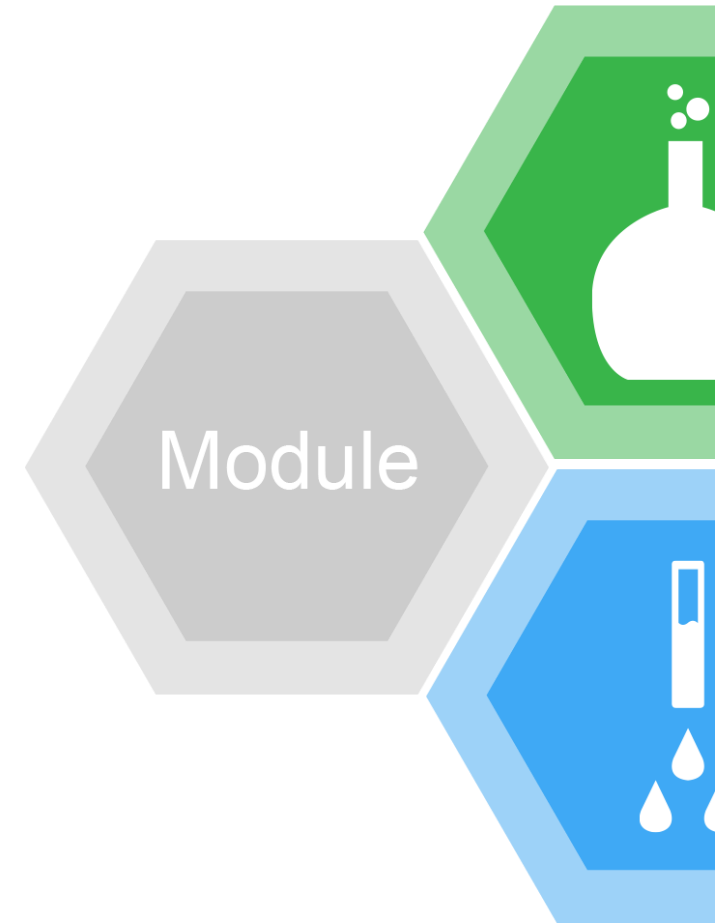
OPC UA Days 2024
21.11.2024, Espoo, Finland

Tuure Takala
Beckhoff Automation Oy

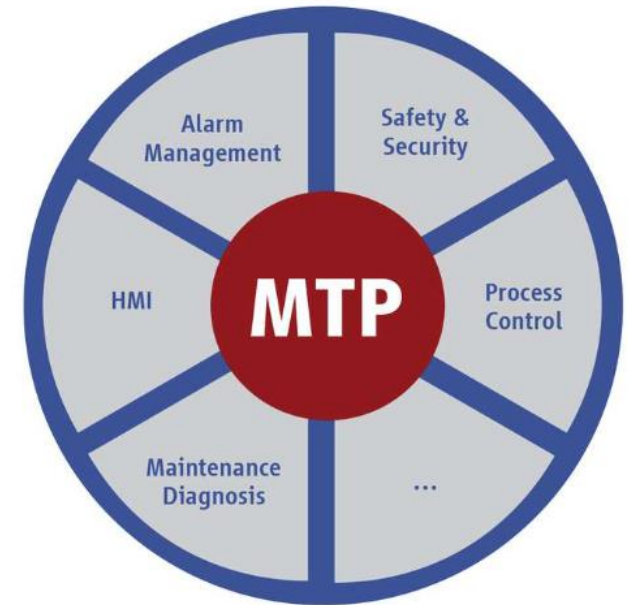


- *A production methodology for modular development*
- *A standardized and manufacturer-independent modularization concept for development of a modular plant*
- *A template file, or a package, that formally describes the interfaces and services of a process module*

⇒ MTP enables vendor-independent integration and operation of plant functional modules by a higher-level control system with the same look-and-feel



- What is a **module**?
 - a part of a larger plant or system
 - provides functionality for a part of the process
 - generally contains a controller, I/O and devices (sensors, actuators)
 - may include a local HMI
- MTP describes a module of a plant, which **enables *plug & produce***, i.e. plug & play in industrial level
- Standardization in VDI/VDE/NAMUR 2658 (adopted to IEC 63280)



MTP – Architecture and Components

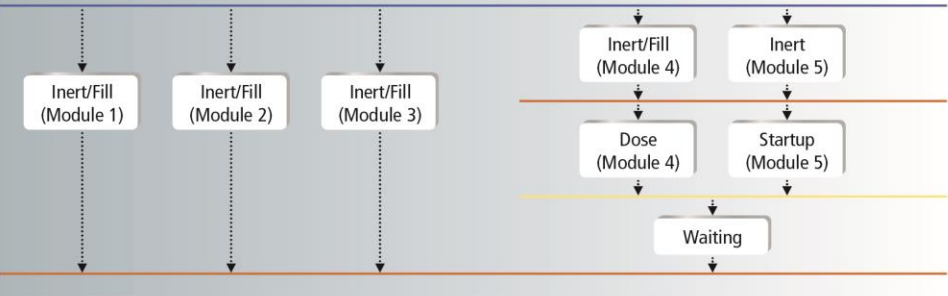
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Distributed Control System

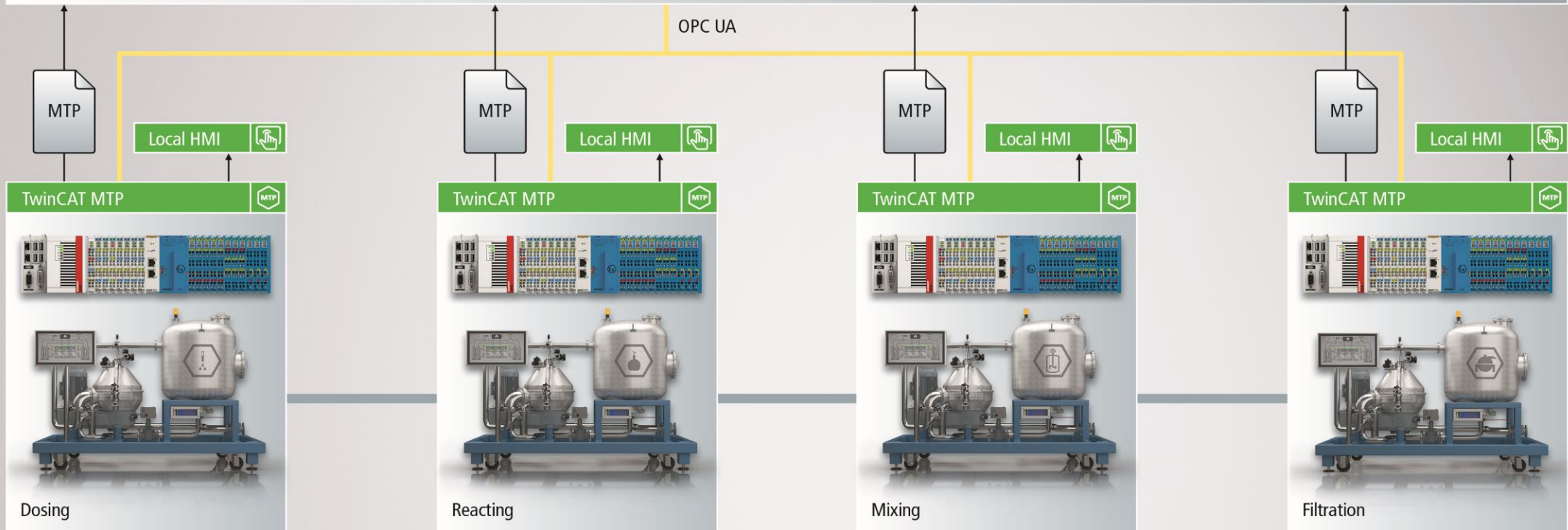
Visualization



Orchestration



OPC UA



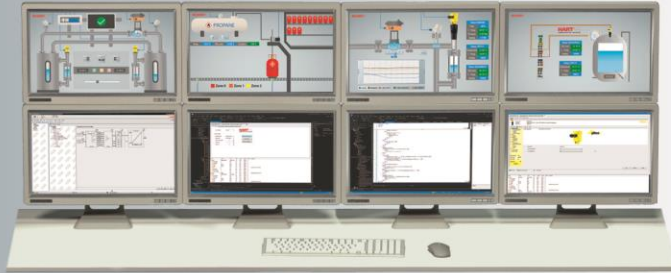
MTP – Architecture and Components

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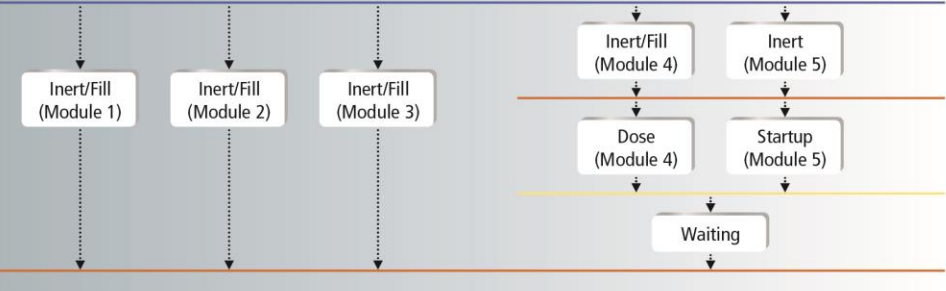
Process
Orchestration Layer
(POL)

Distributed Control System

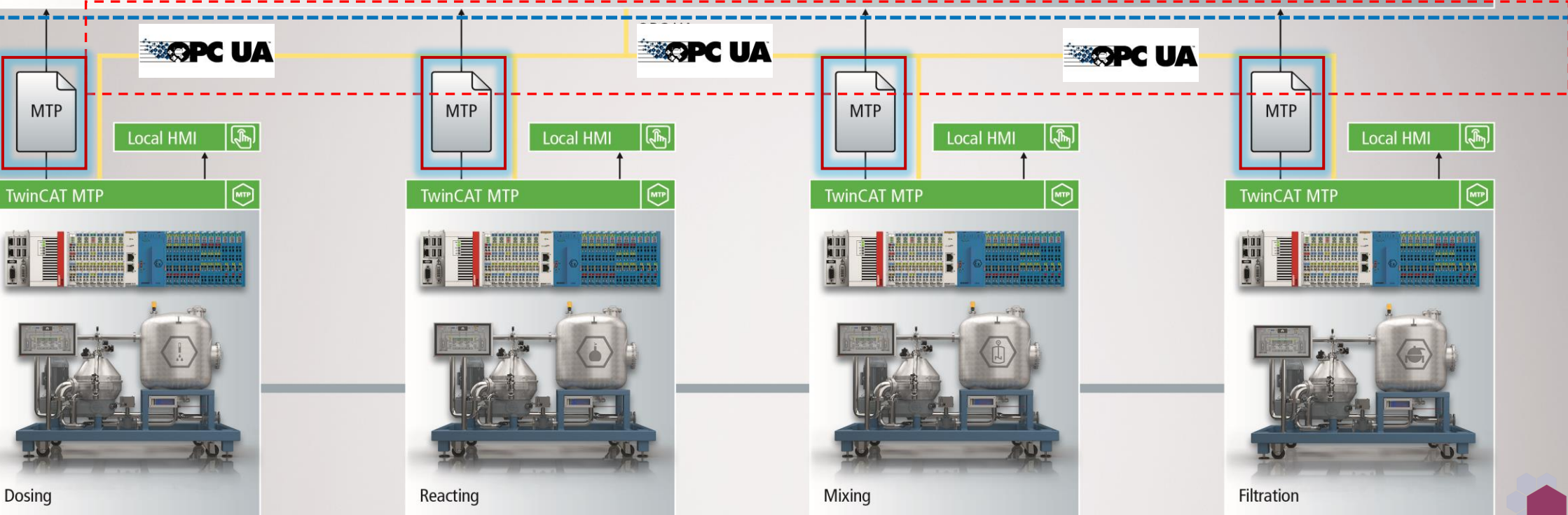
Visualization



Orchestration



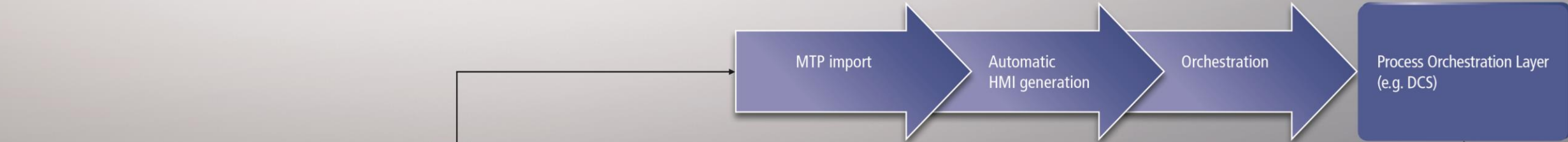
Process Equipment Assembly
(PEA)



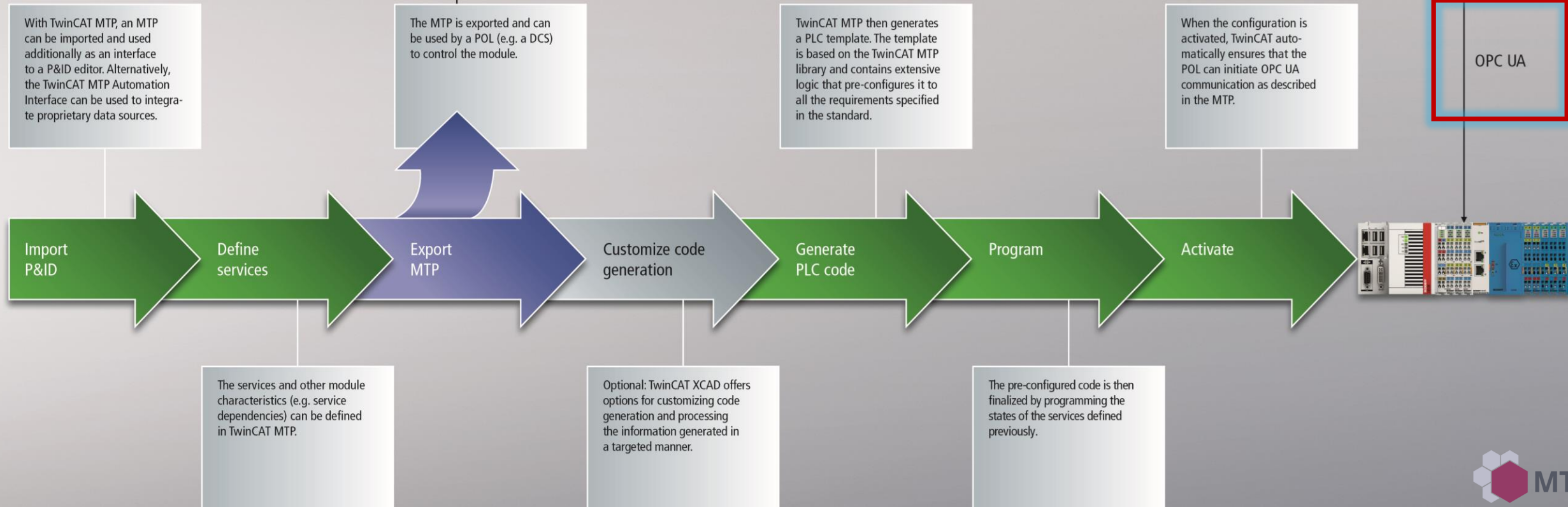
MTP – from Design and Development to Production

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Plant engineering



Module engineering



Benefits of the new development strategy for modular plants:

- Efficient development of plant processes and process modules + plant maintenance
- Simplified integration of a process/equipment/PLC modules to DCS/SCADA system
- Harmonized operator interface and design

Short Time-to-Market
(estim. -50% reduction)

Quick Time-to-Repair

Improved support
for small batches

- Significantly lower production costs (estim. in some cases of 40-50% reduction)
- Impacts may vary depending on industry (e.g. continuous vs batch processes)
- Other industry segments: discrete manufacturing, other?

Event Sponsor !

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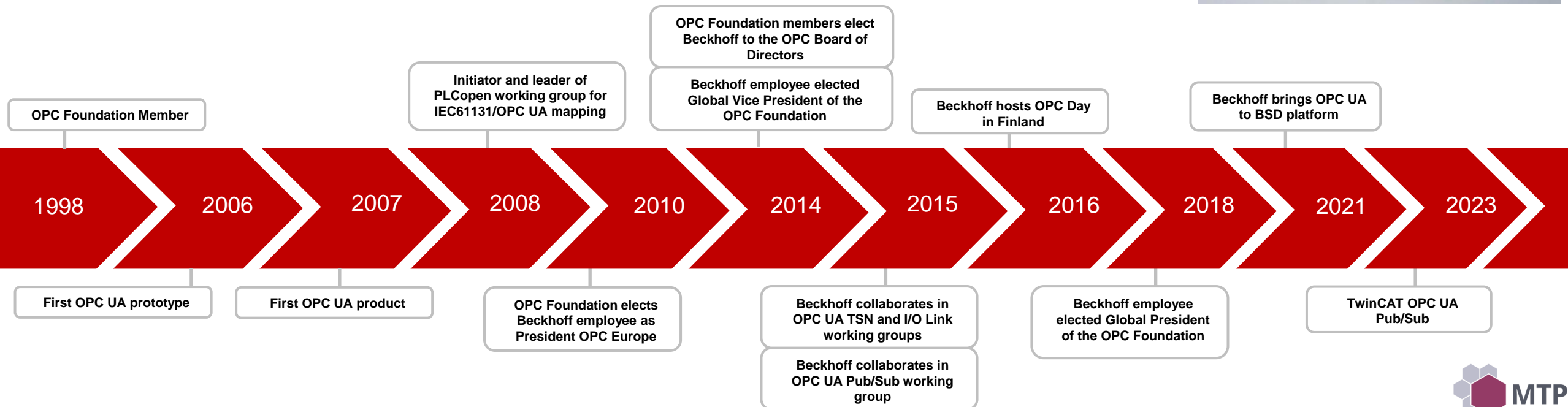
- Beckhoff Automation: global automation supplier specializing in open and modular PC-based hardware and software solutions

For more information of TwinCAT OPC UA and OPC UA Pub/Sub products, see e.g.:

<https://www.beckhoff.com/en-en/products/automation/twincat/tfxxxx-twincat-3-functions/tf6xxx-connectivity/tf6100.html>

<https://www.beckhoff.com/en-en/products/automation/twincat/tfxxxx-twincat-3-functions/tf6xxx-connectivity/tf6105.html>

- Beckhoff has a long history with OPC/OPC UA and has been sponsoring OPC UA days event



- TwinCAT MTP focuses on the module engineering segment
- Seamless integration with TwinCAT 3 Engineering

TwinCAT MTP Engineering

- Project management (e.g. MTP, PLC, HMI)
- MTP Editor:
 - Create, import & edit P&ID, import/export MTPs
 - Define e.g. DataObjects, Services and ProcessValues
- Automatic generation of PLC and HMI templates

TwinCAT MTP Runtime

- Interfaces with the higher-level control system (e.g. process control system) via OPC UA
- Contains IEC 61131 FB library that implement MTP interface types; e.g. used to generate PLC template project

For more information of TwinCAT MTP product, see e.g.:
<https://www.beckhoff.com/en-en/products/automation/module-type-package-mtp/>



TwinCAT MTP Engineering

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FAIR_MTP_Presenter_2022 - TcXaeShell

File Edit View Project Build Debug TwinCAT TwinCAT HMI TwinSAFE PLC Team Scope Tools Window Help

Release TwinCAT RT (x64) Attach... PLC_Pump_1

Build 4024.50 (Loaded) TwinCAT Project MTP <Local> HeatingMixingModule 1

Solution Explorer

Search Solution Explorer (Ctrl+u)

Solution 'FAIR_MTP_Presenter_2022' (2 projects)

- FAIR_MTP_Presenter_2022_Industry_Specific
 - FAIR_MTP_Presenter_2022_MTP
 - DataObjects
 - Services
 - ProcessValues
 - TextLists
 - HMI
 - TwinCAT Project MTP

HMI - Picture

Properties

FAIR_MTP_Presenter_2022_MTP TwinCAT.MTP.VSIX.Pr...

Basic

Module Name	HeatingMixingModule
Device Class	HeatingMixingModule
Device Manual	
Manufacturer	Beckhoff Automation
Manufacturer Uri	https://www.beckhoff.com/
Product Code	HeatingMixingModule2023
Product Instance Uri	https://www.beckhoff.com/
Serial Number	BTN-000T3J2Y
Version	1.0.0
Device Revision	1.0.0
Software Revision	1.0.0
Hardware Revision	1.0.0
Revision Counter	0
Web Server Uri	https://192.168.14.142:1020
OPC UA Namespace	urn:BeckhoffAutomation:Ua...
OPC UA Port	4840
OPC UA Maximum Sessio	10
Enable Standard Server Pr	True
IPV4 Address	192.168.14.142
IPV4 Subnet Mask	255.255.255.0
NTP URIs	String[] Array
Enable Extended Server Pr	True
Use DHCPV4	True

Advanced

Component Name	HeatingMixingModule
Device Health	255

Settings

Default Language	en-US
Enable Templates	False
PLC Reference	TwinCAT Project MTP:Heating
HMI Reference	
Enable XCAD	False

Module Name

Name of the Module

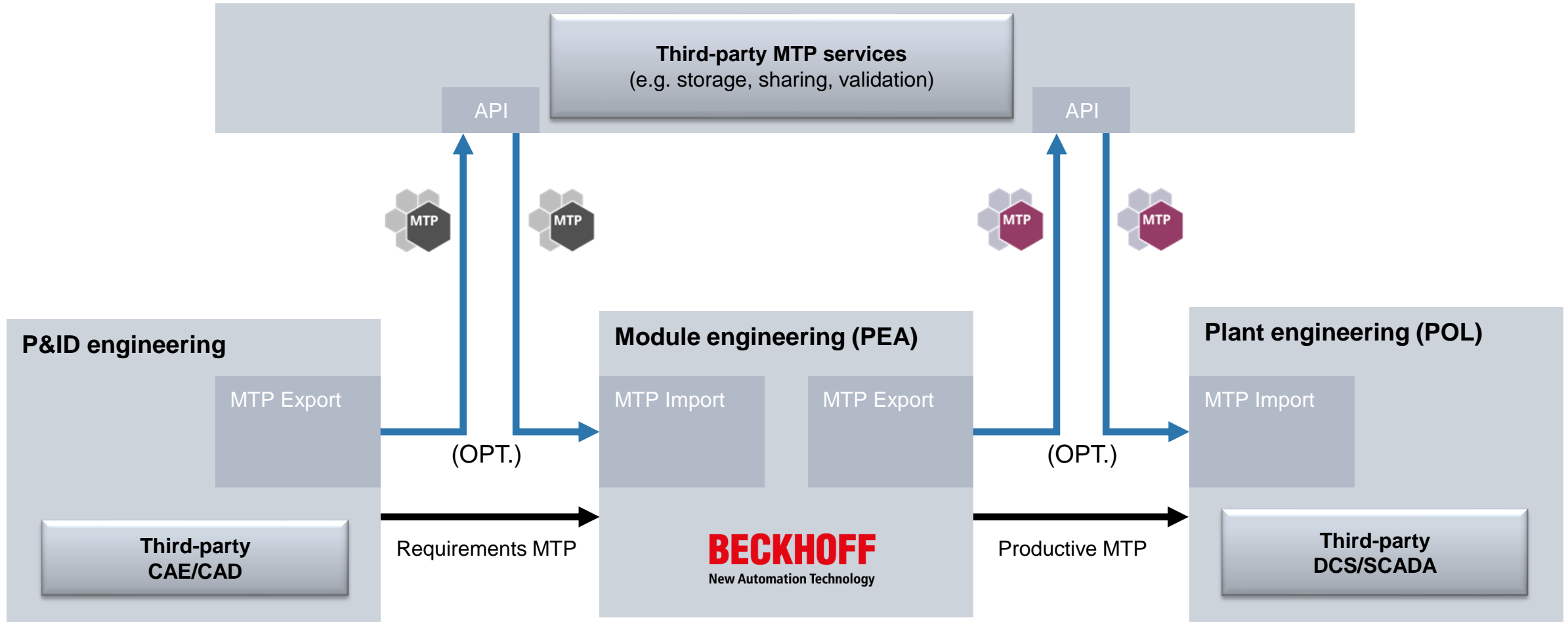
TwinCAT HMI Configuration

Enter a search term...

TwinCAT HMI Configuration Error List Output

This item does not support previewing

Add to Source Control



- MTP specification still under revision by members
- TwinCAT MTP products available in near future (possibly by the end of spring 2025)
- **NB.** The executable beta versions are available and can be requested by email:
processindustry@beckhoff.com



Thank you and enjoy the rest of the day!

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