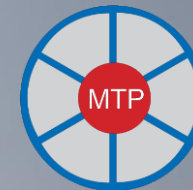


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Flexible and efficient automation using TwinCAT MTP and CoAgent

**TwinCAT CoAgent
Module Type Package (MTP)**

FIIF, 12.06.2025, Tampere

**Dr. Mikko Heikkilä &
Tuure Takala
Beckhoff Automation Oy**

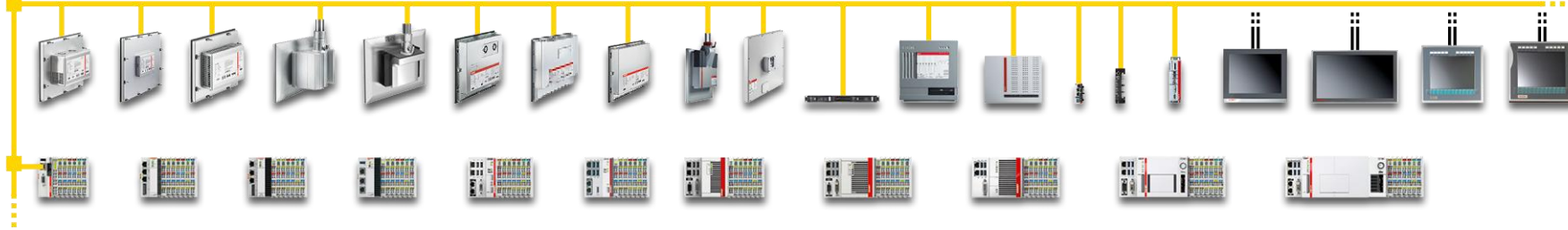


System overview

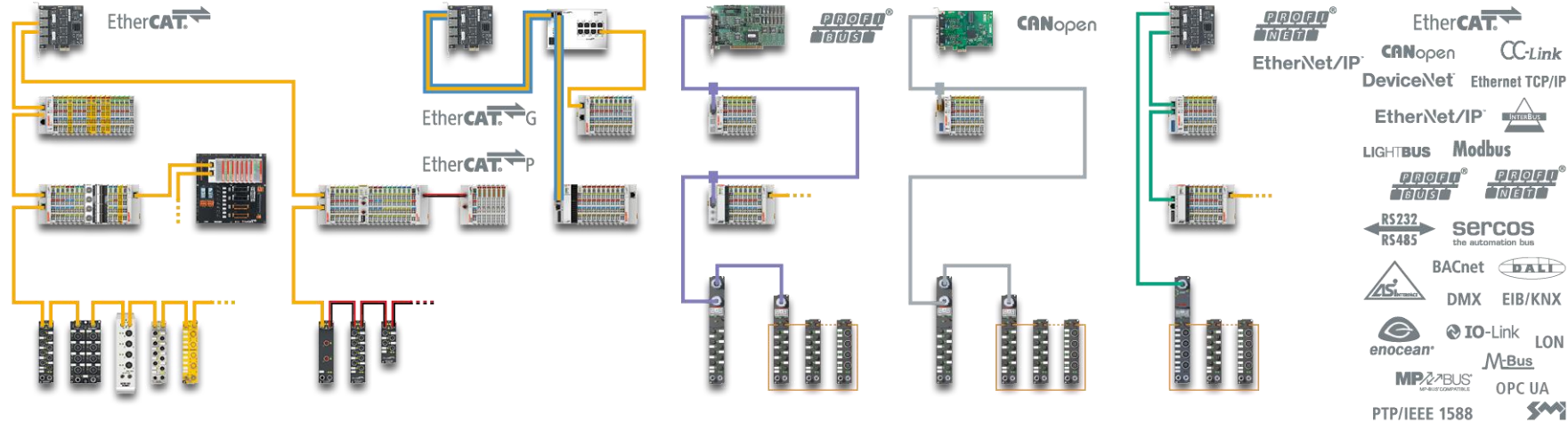
Building blocks for automation and machine builders

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IPC



I/O



Motion



Automation



MX-System



Vision

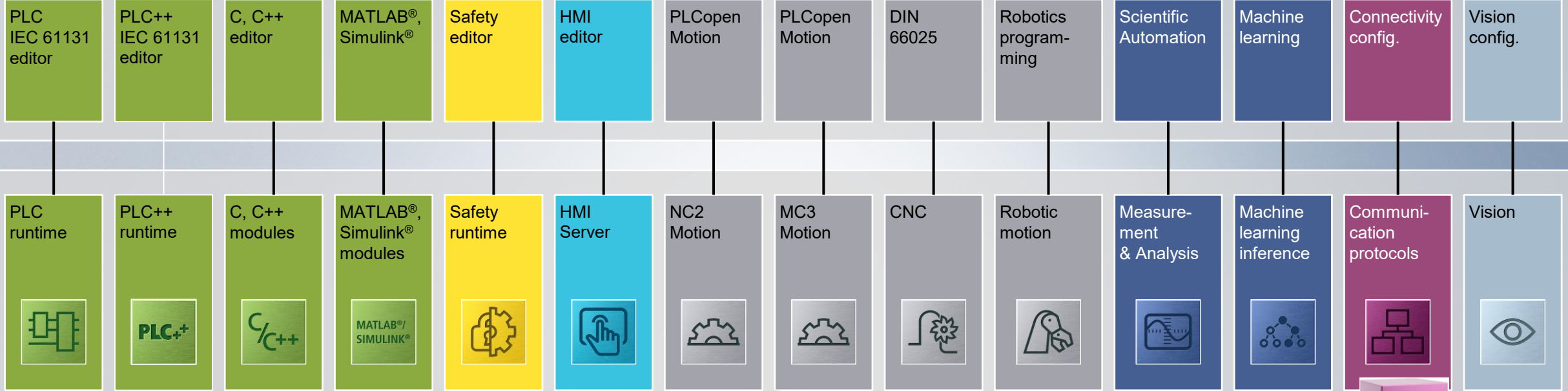


TwinCAT

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TwinCAT Engineering



TwinCAT Runtime



Operating System

Windows

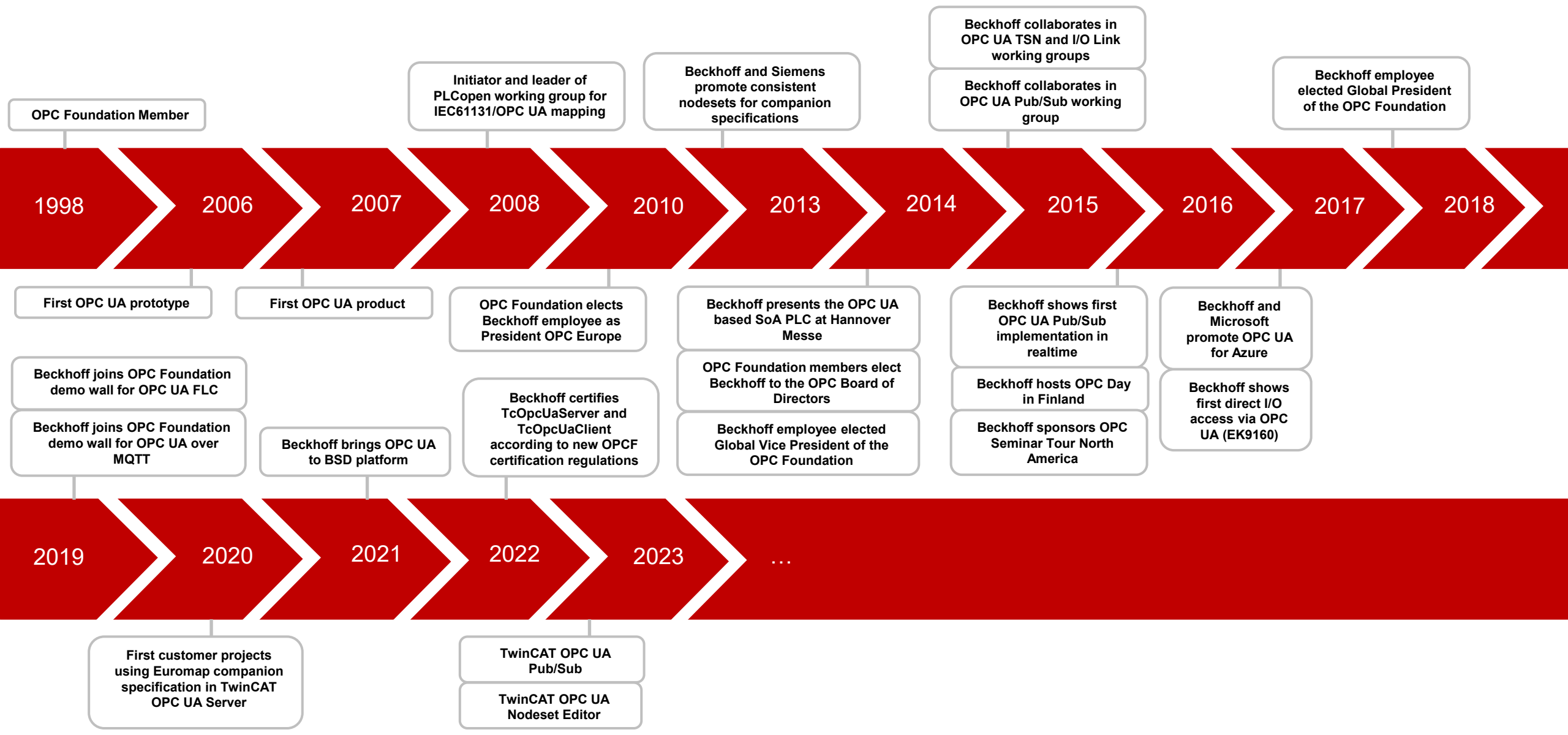
Linux®

TwinCAT/BSD

TwinCAT/RTOS

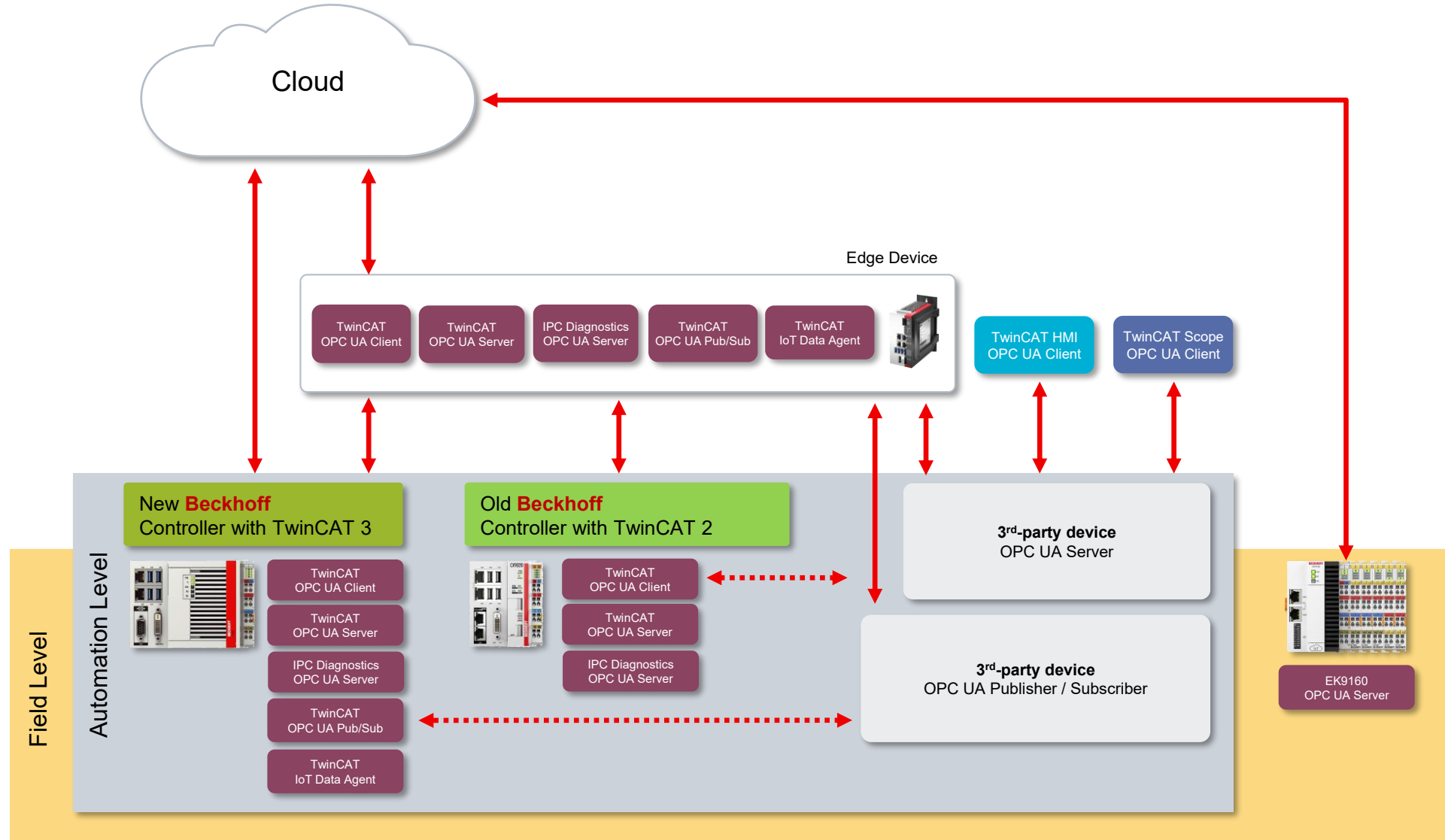
Beckhoff and OPC Foundation history

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OPC UA enabled products for every use case (since 2006)

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CoAgent



Agentic Automation

Democratization of AI through natural language

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- LLMs are the most fundamental democratization process of AI
- Everybody can use LLMs without being an AI expert
- Use cases in Automation
 - Code generation
 - Documentation
 - ...
 - Human-centric interface to software

What is the most natural way for humans to interact with AI?

The most natural way for humans to interact with AI is **through multimodal, context-aware, and adaptive communication**—mimicking how humans naturally engage with each other. Below are key dimensions that define this natural interaction:

1. Natural Language Conversation

- **Text and Voice Interfaces:** Typing or speaking in one's native language is currently the most intuitive way for people to interact with AI, especially when powered by large language models like ChatGPT.
- **Context Retention:** AI systems that remember past interactions and use them to shape current responses create more fluid and meaningful conversations.

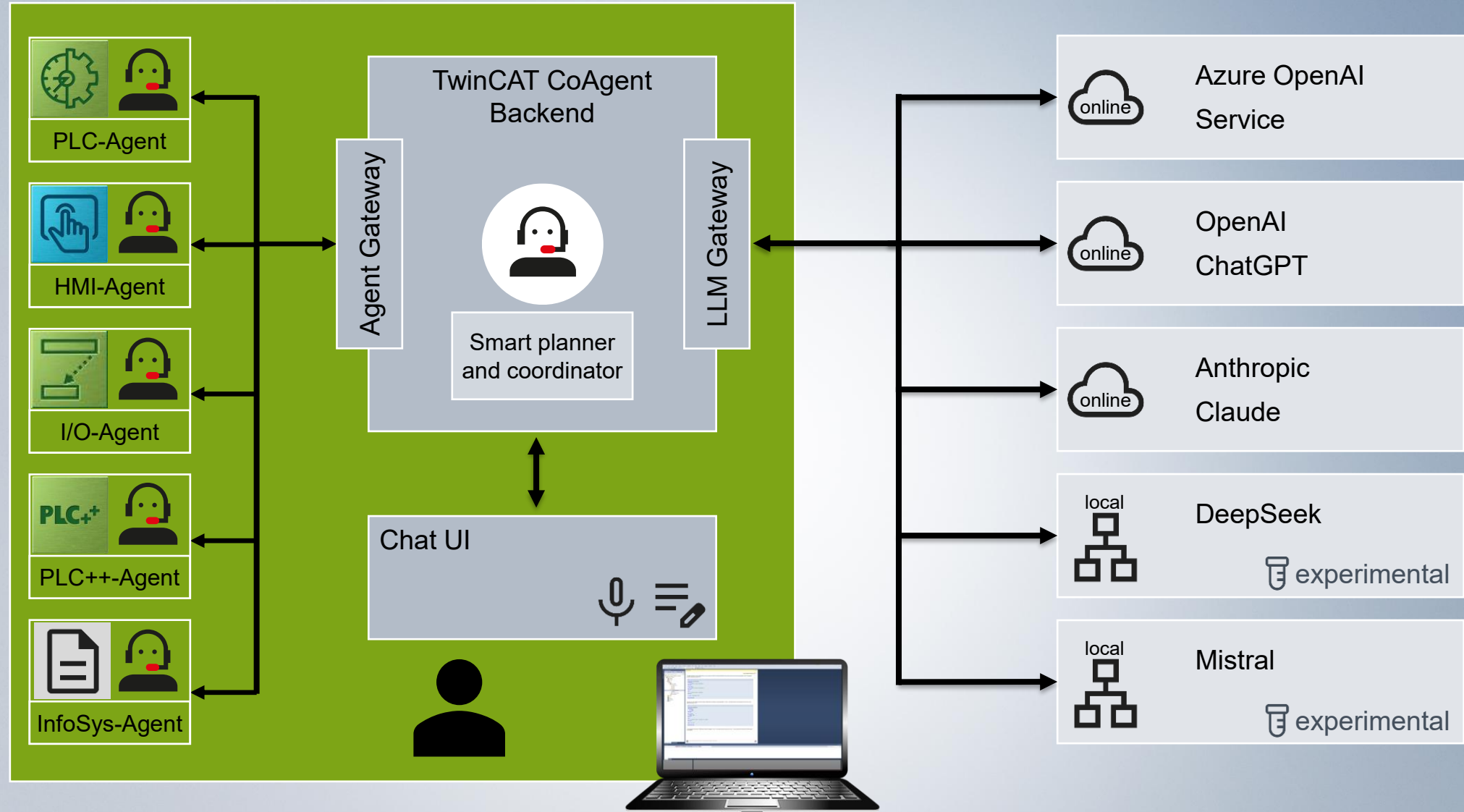
2. Multimodal Interaction

- **Speech + Vision + Gesture:** Combining spoken language with visual recognition (e.g., pointing, facial expressions, eye tracking) allows more human-like interaction.
- **Examples:**
 - A person asks an AI assistant to "move that box," while pointing.
 - AR/VR interfaces where users speak and gesture to interact with virtual objects.

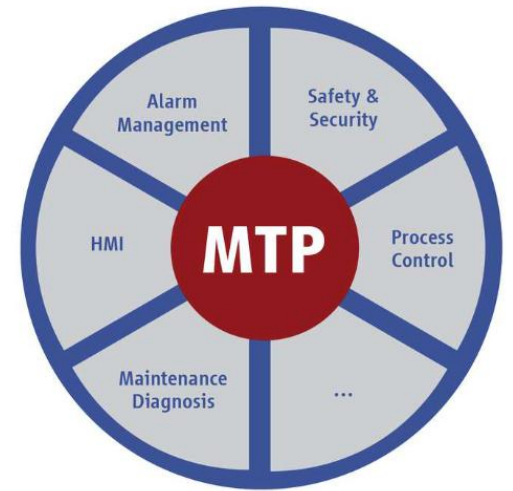
TwinCAT CoAgent

Smart Agents for Automation Engineering

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- A modularization concept for development of a modular plants
 - Addressing primarily the segment of process industry
 - Standardization initially in VDI/VDE/NAMUR 2658 (since 2014)
 - Ongoing development of the international standard IEC 63280 (MTP 2.0 specification, soon to be published)
 - Current standardization is driven by PROFIBUS User Organization (PNO) part of PI
-
- Enables vendor-independent integration and control of plant functional modules
 - Standardized interfaces and communication from a higher-level control system (DCS, SCADA)



Architecture and components

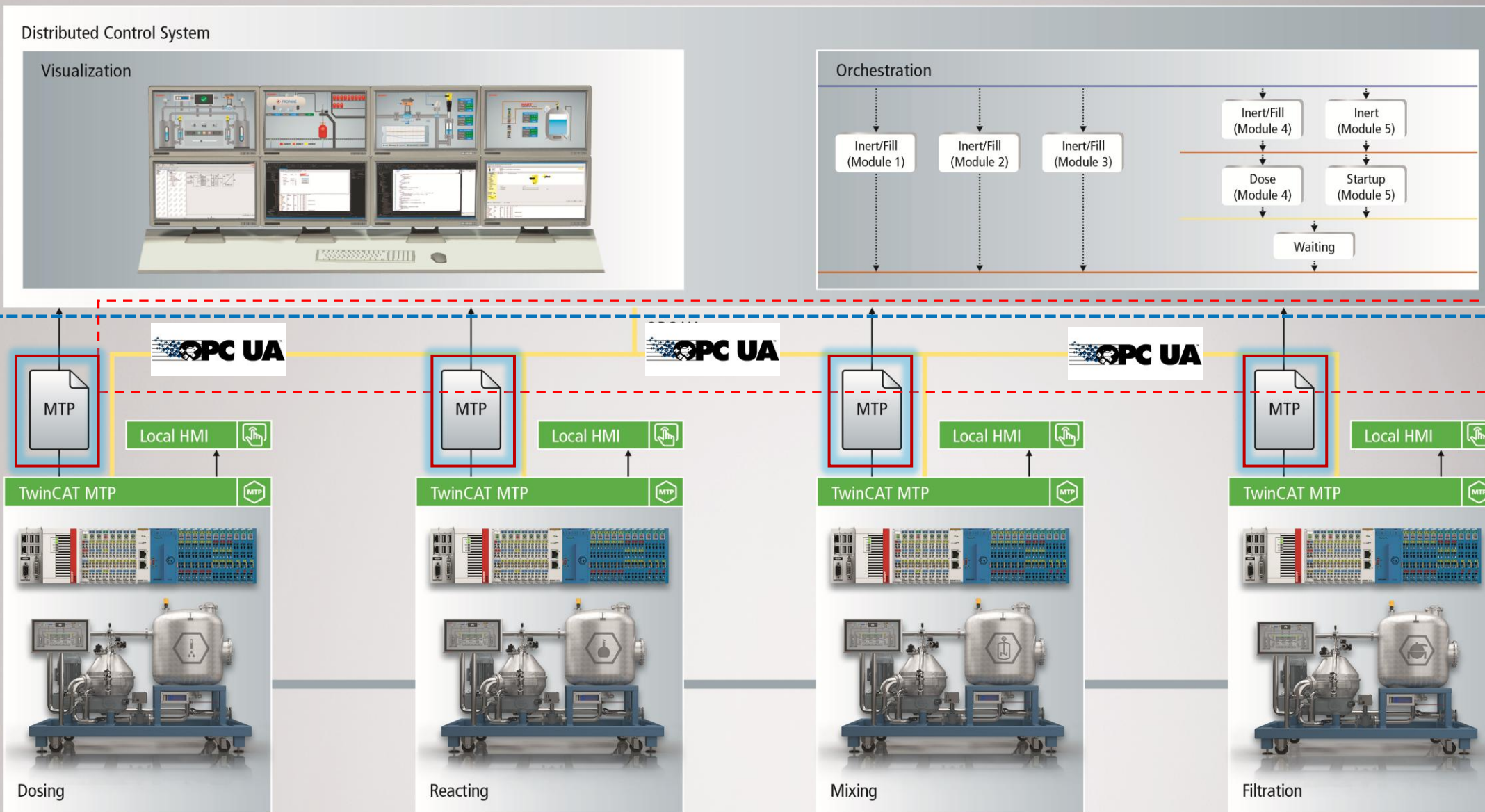
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Process Orchestration Layer (POL)

Plant Engineering

Process Equipment Assembly (PEA)

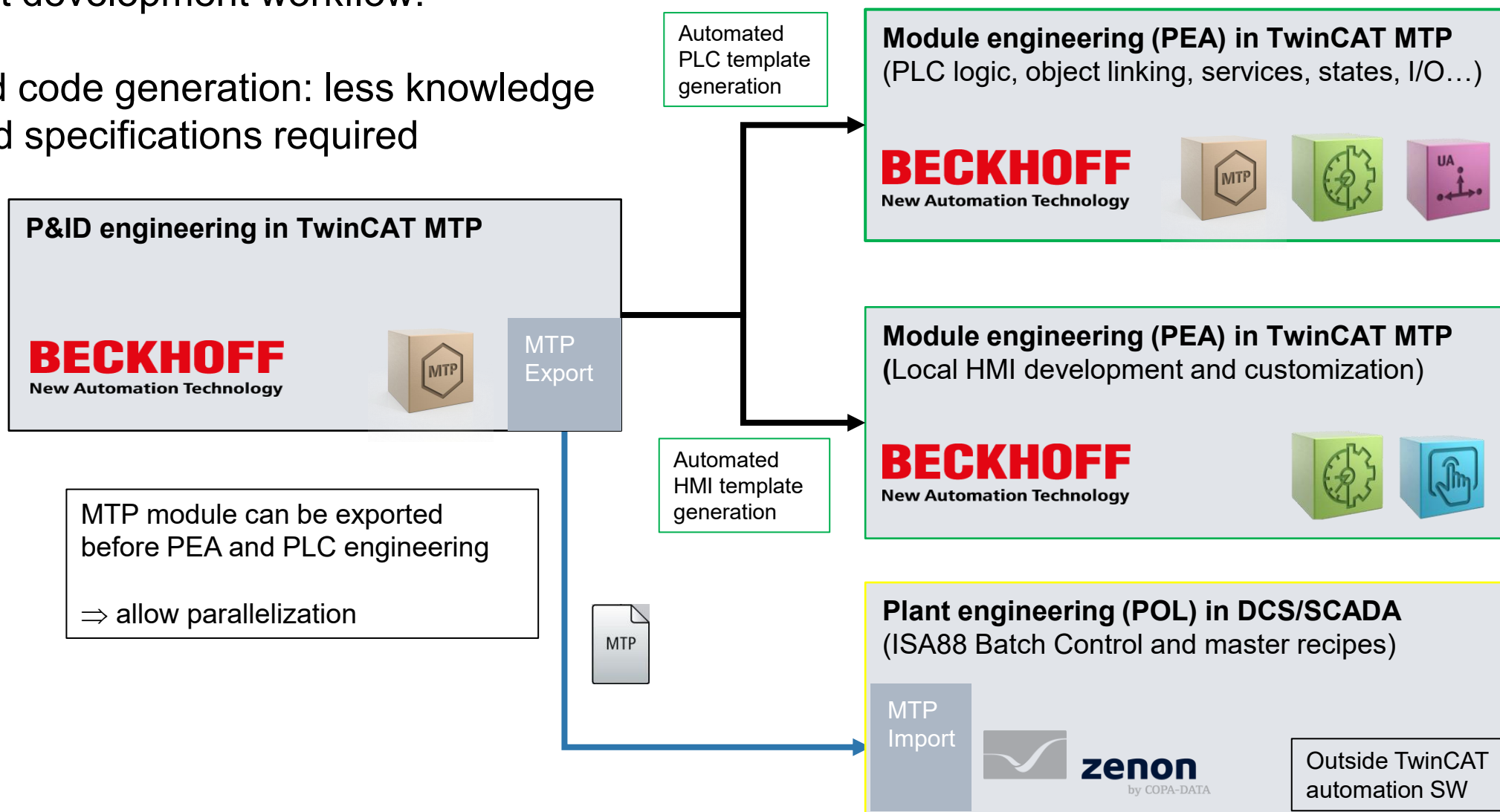
Module Engineering



Development phases

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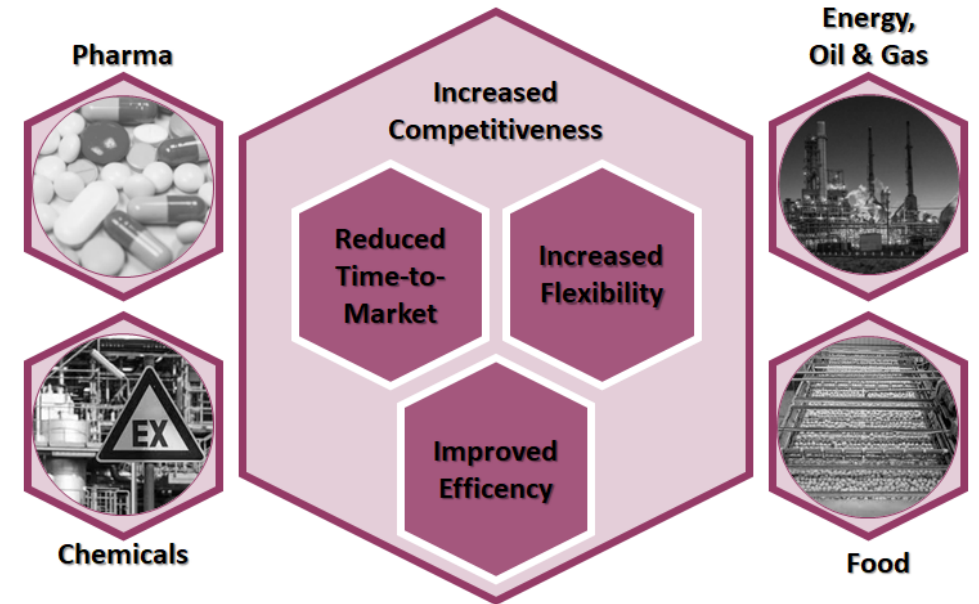
- An efficient development workflow!
- Automated code generation: less knowledge of standard specifications required



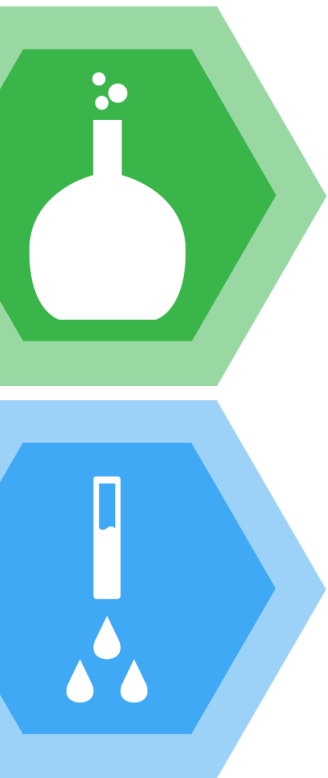
What are the benefits of MTP?

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- Shorter Time-to-Market (50% reduction)
- Reduced engineering effort by 70%
- Increased flexibility by 80%
- Modularization also improves:
 - Module expandability and reusability
=> Improved support for small batch production (e.g. pharmaceutical industry)
 - Maintenance (e.g. faster time-to-repair)



=> Overall, higher development efficiency and lower production costs!



**So with TwinCAT MTP and
with the help of OPC UA,
we can quickly get from ...**



P&ID model and engineering

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MTP_MTV1 - TcXaeShell

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

Release TwinCAT RT (x64) Firefox ii

Build 4024.59 (Loaded) TwinCAT Project MTP <Local> MotorTankValve 1

Solution Explorer

Search Solution Explorer (Ctrl+[~])

- MTP_MTV1
 - MotorTankValve
 - DataObjects
 - P01
 - V01
 - P01_Active_Interlock
 - T01
 - L01
 - L02
 - Services
 - Fill
 - Default_Fill
 - Level_Fill
 - Level_ProcParam_Fill
 - ProcessValues
 - TankLevelProcValueOut
 - TextLists
 - HMI
 - Picture
 - Fill
 - L01
 - L02
 - P01
 - T01
 - V01
 - Source
 - Sink
 - FunctionLine
 - MeasurementLine
 - MeasurementLine_1
 - Pipe
 - Pipe_1
 - Pipe_2
 - Pipe_3
- TwinCAT HMI Project MTP1

HMI - Picture

Properties

MotorTankValve TwinCAT.MTP.VSIX.Properties.MTPProjectNodePropri

Basic

Module Name	MotorTankValve
Device Class	
Device Manual	
Manufacturer	Beckhoff Automation
Manufacturer Uri	
Product Code	
Product Instance Uri	
Serial Number	
Version	0.0.2
Device Revision	1.0.0
Software Revision	1.0.0
Hardware Revision	1.0.0
Revision Counter	0
Web Server Uri	
OPC UA Namespace	urn:BeckhoffAutomation:Ua:PLC1
OPC UA Port	4841
OPC UA Maximum Sessions	10
IPV4 Address	127.0.0.1

Advanced

Enable Standard Server Profile	False
IPV4 Subnet Mask	255.255.255.0
NTP URIs	String[] Array
Enable Extended Server Profile	False
Use DHCPV4	False
Component Name	
Device Health	255

Settings

Default Language	en-US
Enable Templates	False

Module Name

Name of the Module

Properties Toolbox

Module engineering (PEA): Local HMI

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The screenshot displays the Beckhoff TwinCAT HMI Project MTP1 interface. The main workspace shows a schematic diagram of a motor tank valve system. A green circle labeled P01 represents the motor, connected to a tank labeled T01. The tank has a fill level indicator showing +20.00%. Below the tank, a valve labeled V01 is shown in a 'CLOSED' state. The system is connected to a sink. The interface includes a 'Fill' button, an 'OFFLINE' button, a 'No Procedure' button, and an 'IDLE' button. The 'P01' and 'V01' components have their own control panels with buttons for 'Request Offline', 'Request Operator', 'Request Auto', 'Forward', 'Stop', 'Reverse', 'Request Internal', and 'Request Manual'. The 'P01' panel also shows 'Manual RPM' and 'Feedback RPM' sliders, both set to 20%. The 'V01' panel shows 'Open' and 'Close' buttons. The 'Properties' panel on the right lists project information, including creation date, product version, creator, deployment settings, and general information.

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P01

Operate | Chart | Events

Request Offline | Request Operator | Request Auto | Forward | Stop | Reverse

State: OPERATOR

Manual RPM: [0, 100] 20 %

Feedback RPM: 20 %

Source: MANUAL

Active Lock: NONE | Status: NORMAL

V01

Operate | Chart | Events

Request Offline | Request Operator | Request Auto | Open | Close

State: OPERATOR | CLOSED

Active Lock: NONE | Status: NORMAL

Properties

TwinCAT HMI Project MTP1 Project Properties

Build Information

Creation	11.11.2024 16:22
Product Version	1.12.762.46

Creator

Default Viewport Height	800
Default Viewport Width	1024

Deployment

Binding Symbol Error Handling	Ignore
Interval [ms]	200
PostProcessing	True
Subscription Mode	Change
Theme Name	Base
Timeout [ms]	20000
Timeout [ms] (System)	60000
Title	MTP MotorTankValve demo
Verbose Level	ErrorsWarnings
Version	1.0.0.0

General

Company Name	Beckhoff Automation
Company's Website	
LoginPage	Default
Scale Mode	ScaleToFit
Startup View	Desktop.view

Misc

Pin version	True (Version 1.12.762.46)
Project File	TwinCAT HMI Project MTP1.hmiproj
Project Folder	C:\TCprojects\MTP0818_projects\MTP1
System Popups	Beckhoff.TcHmiPopups

Region and Language

Default Language	(Use Browser Default)
Localization Fallback	--
Time Format Locale	(Use Browser Default)

Binding Symbol Error Handling

Determines how a binding will handle symbol related errors.
Possible values:- Reset: Forward the default toggle switch (null) to forc...

Properties | Toolbox

Plant engineering (POL) and orchestration

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Overview

Batch Control

Services Control

Audit Trail

Alarms

Analyze

Reports

Dashboard

Toolbox

HMI Overview

MotorTankValv
e_v2 Picture

Show current
executed recipe

MotorTankValve_v2

P01

20.00 %

Man

T01

41.86 %

L02

OFF

OK

L01

ON

OK

V01

MotorTankValve_v2

P01

Errors

✓ Trip

Locks

✓ Interlock

Operation

SP Speed Manual

20.00 %

Int

Man

Manual on-site operation only! (OSLevel=0)

Batch Name

Batch Start

Start

Recipe Name

Status

Class

Time received

Text

Variable name

+

📄

🗑️

📶

⬇️

📝

📁

🕒

✓

Service Procedures (control strategies)

ID	Name	Description
2	Level_Fill	Self-completing? = true
1	Default_Fill	Self-completing? = false

Apply procedure

Master recipe: Master_Recipe_Fill (v1) (Edit mode)

Master_Recip... X

Recipe_Functi...
Initialisation

Level_Fill
MotorTankValve
Fill

Recipe_Functi...
End

MTP_PROJECT_MOTOR1_2

Use

Administrator

Services

11.6.2025 12.08.40

Thank you for your attention!

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- TwinCAT MTP beta available for TwinCAT 3.1 Build 4026 and support MTP 2.0 standard specification
- Other beta versions and further information also available: processindustry@beckhoff.com