

**OPC DAY**  
FINLAND 2025  
10.12.2025

# OPC UA FX - Status Update

Peter Lutz, Director FLC, OPC Foundation



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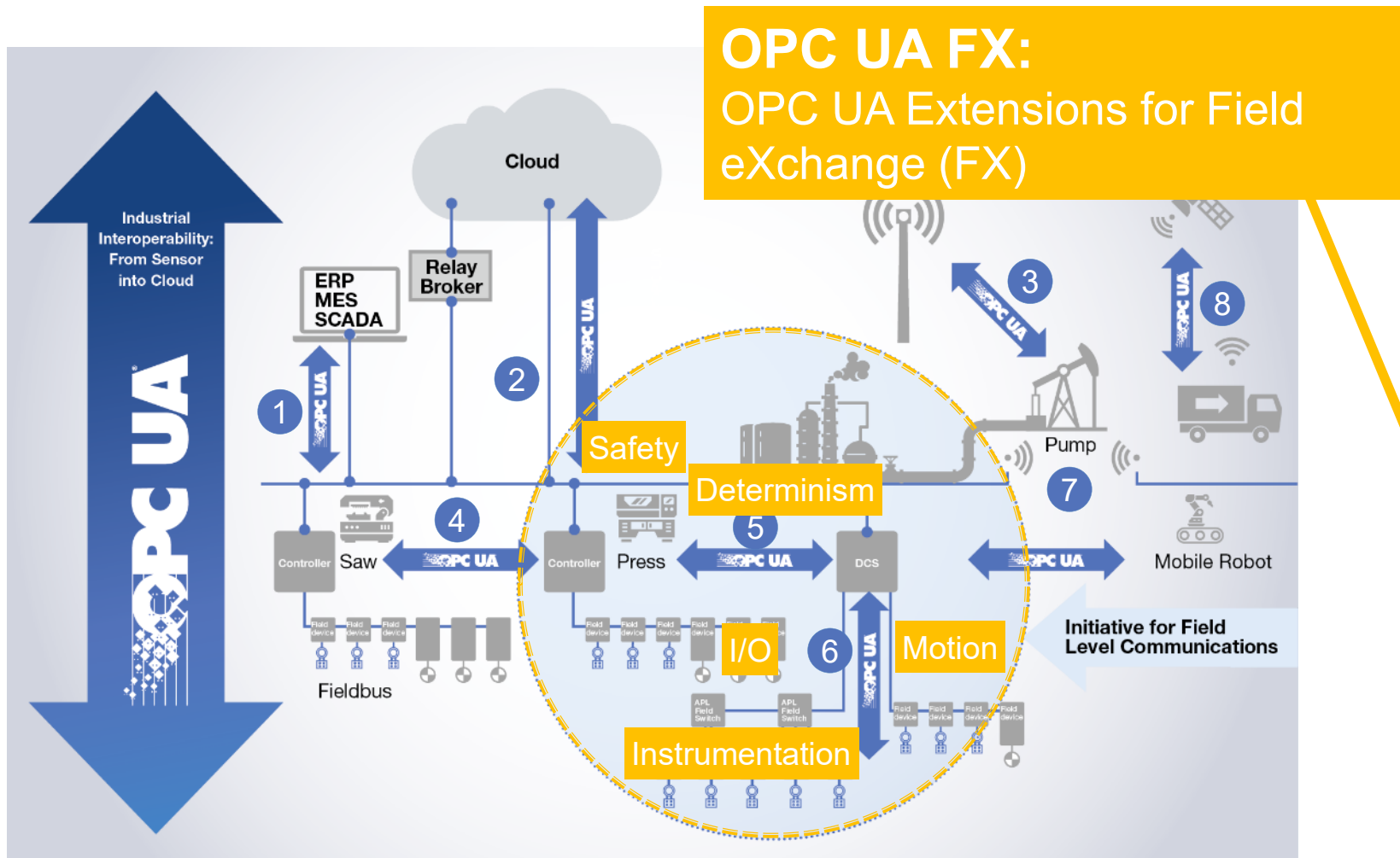


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# OPC UA FX™ - Extending OPC UA to the Field



- 1 IT / OT Communication
- 2 Cloud Integration
- 3 Secure Remote Access
- 4 Local OT Communication
- 5 Controller-to-Controller
- 6 Controller-to-Device incl. Device-to-Device
- 7 Wireless Integration (5G)
- 8 Future Ready

# OPC UA FX™ - Extending OPC UA to the Field

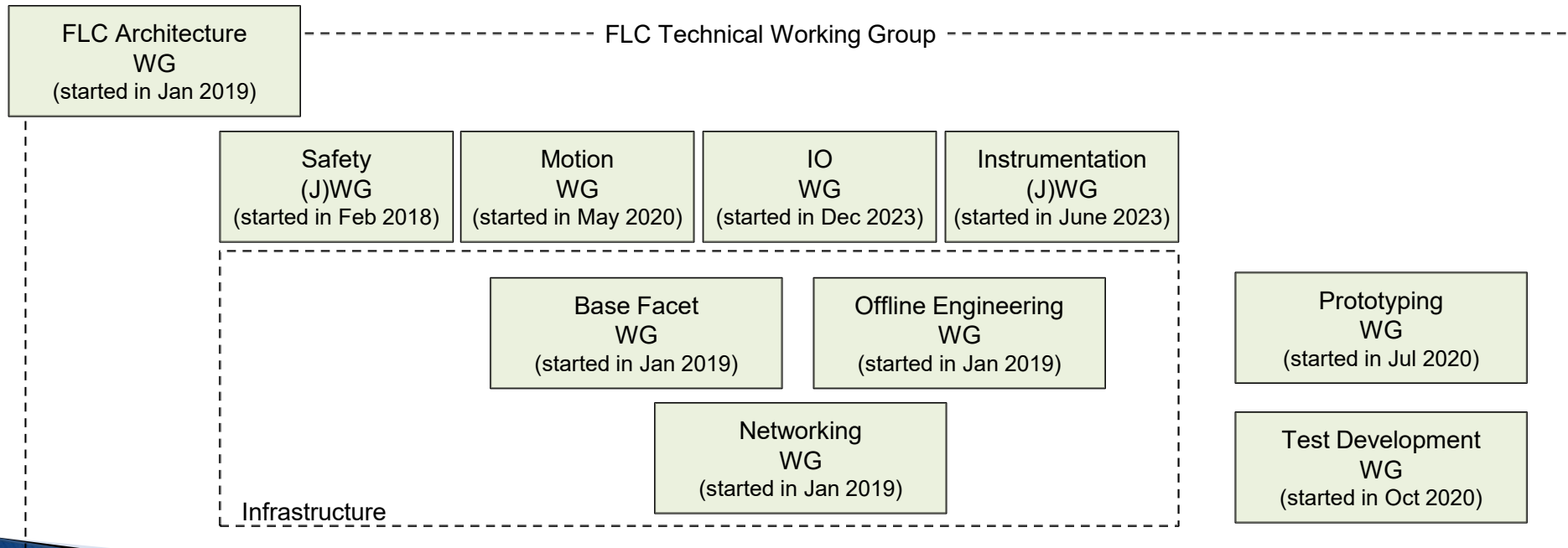
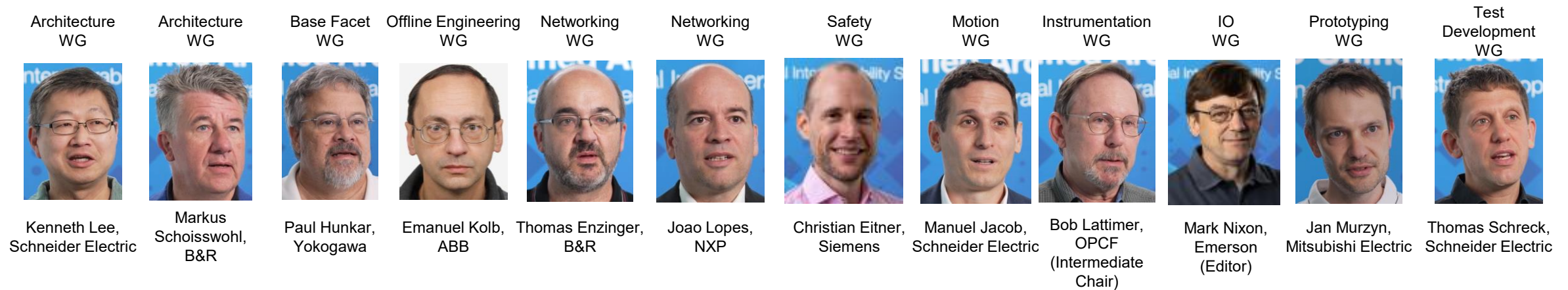
## OPC UA FX: OPC UA Extensions for Field Exchange (FX)

- 1 IT / OT Communication
- 2 Cloud Integration
- 3 Secure Remote Access
- 4 Local OT Communication
- 5 Controller-to-Controller
- 6 Controller-to-Device incl. Device-to-Device
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- 8 Future Ready



Members of the Steering Committee of OPCF's FLC Initiative

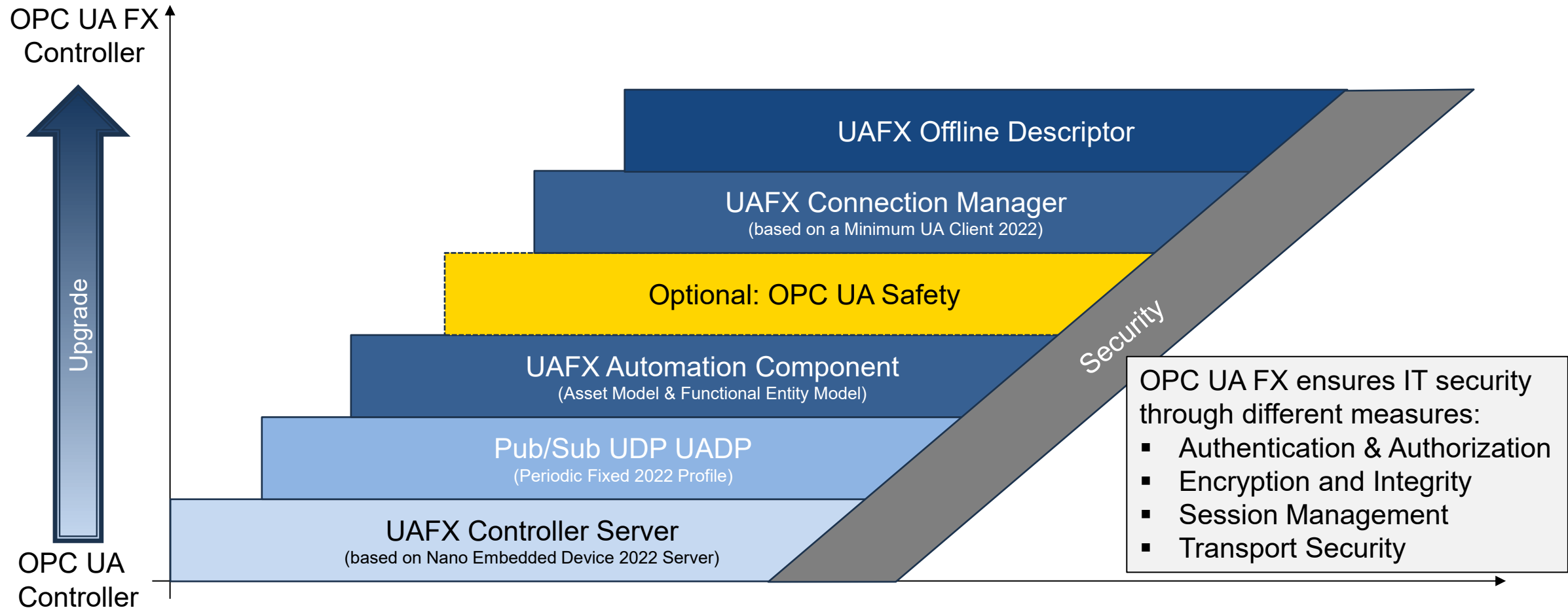
# Technical Working Groups of OPCF's FLC Initiative



Technical Working Groups open to all OPCF members & invited experts

- 10 working groups
- >80 companies
- >270 experts

# Migration from OPC UA to OPC UA FX™



# Solving motion, safety & real-time challenges

## Plant Owner

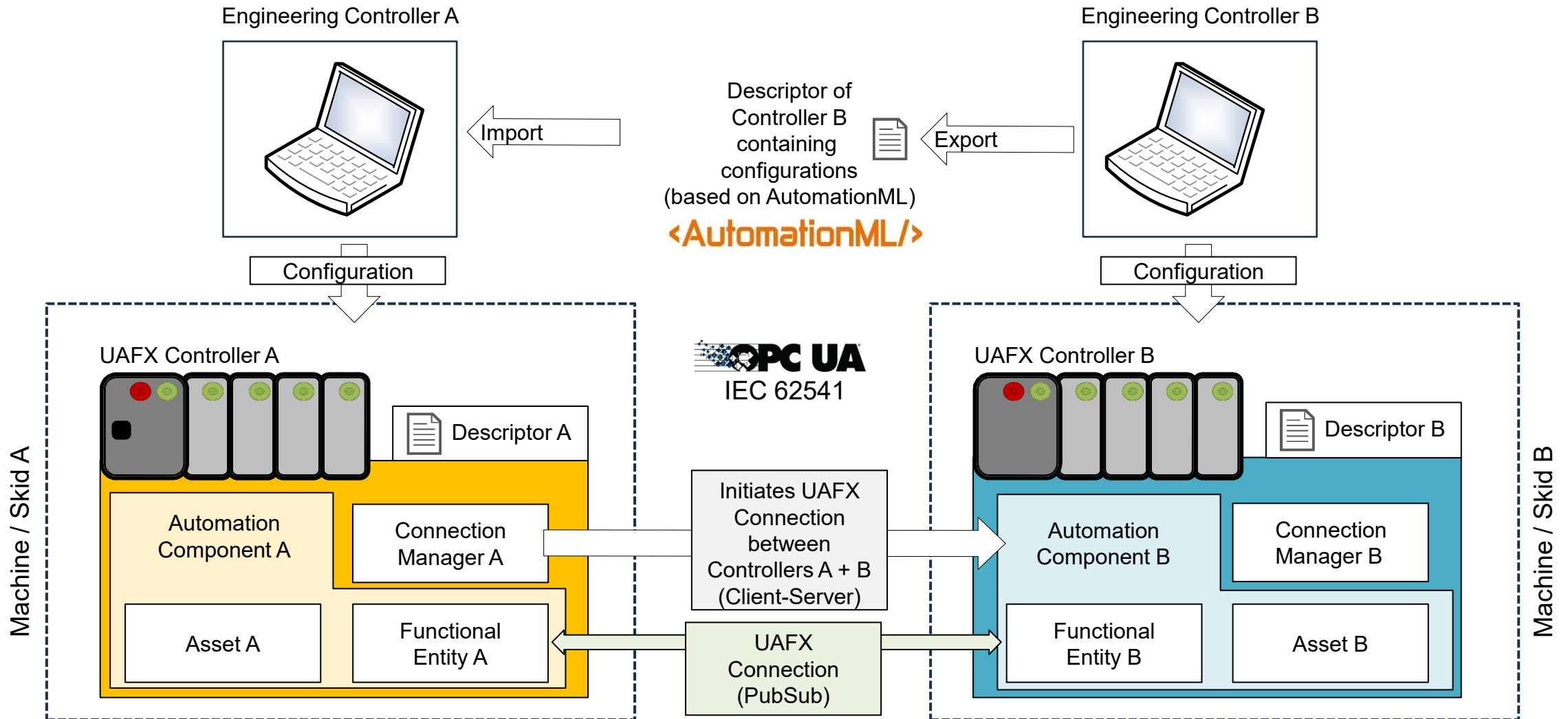
"I want to...

**easily** and economically  
**integrate** and **connect**  
machines / skids from  
different suppliers."



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# OPC UA FX™ Controller-to-Controller (C2C)



# OPC UA FX™ Testing & Certification

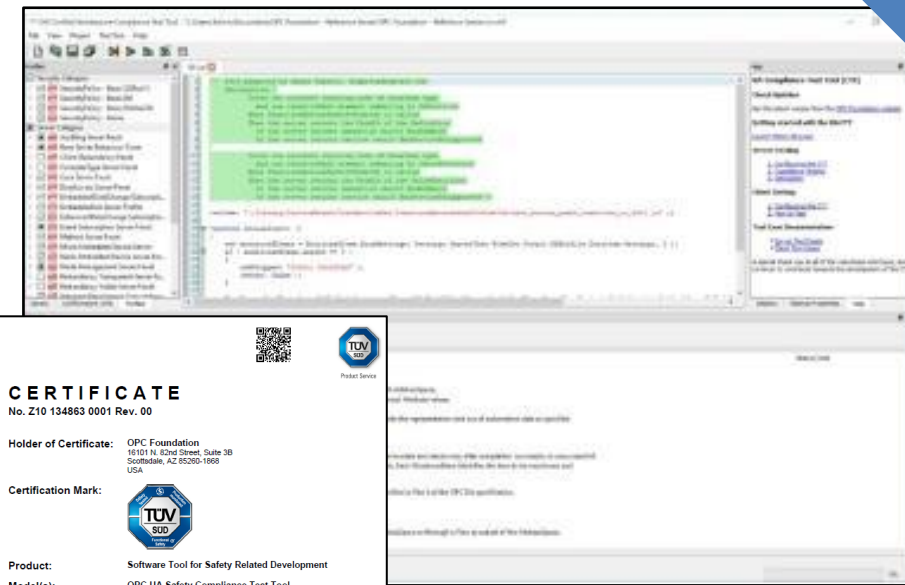
Release Status

**Certification of OPC UA FX™ controllers (and devices) is mandatory**

- ▶ **OPC UA Compliance Test Tool (CTT)** with UAFX extensions for C2C available
- ▶ **Certification Program** for OPC UA FX™ Controllers launched in November 2024
- ▶ **OPC UA FX™ Maintenance Release** covering the full C2C MVS (Minimum-viable System) published in July 2025
- ▶ **OPC UA Safety Compliance Test Tool (UASCTT)** certified by TÜV in November 2025

OPC UA FX™ controller prototypes of several vendors have already proven a high level of interoperability in UAFX plugfests and OPC IOPs, so **first certified OPC UA FX™ controllers** can be expected in 2026.

**OPC UA**  
CERTIFIED



# OPC UA FX™ Multi-Vendor C2C Demo

Live Demo  
OPCF Booth



> 50% of the controllers on this wall already support OPC UA FX features for demonstrating cross-vendor interoperability

# OPC UA FX™ Cable Robot Demo

- ▶ The Cable Robot demo performs dynamic ball-throwing maneuvers managed by two controllers with four axes each, demonstrating seamless OPC UA FX Controller-to-Controller (C2C) communication and synchronization.



# Solving motion, safety & real-time challenges

## Machine / Skid Builder

“I want ...

**one** vendor-independent communication standard

Useable for all kinds of different applications like **motion, safety**, etc.

Additional traffic (e.g. video) **may not impact** machine performance”



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# Solving motion, safety & real-time challenges

## Data Scientist

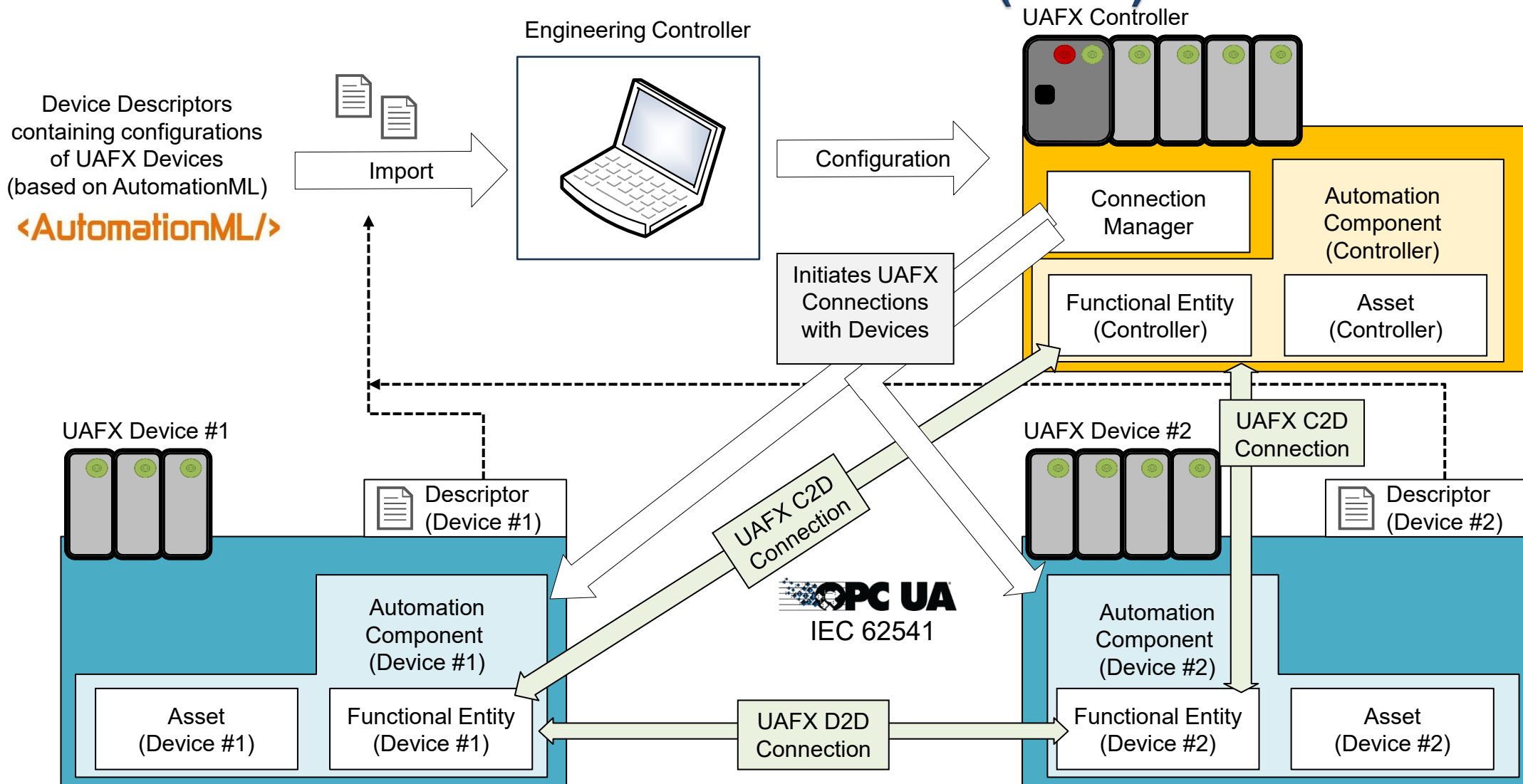
"I want to...

be able to **securely read data** from any controller and any device to identify opportunities for **optimization** of the production process.

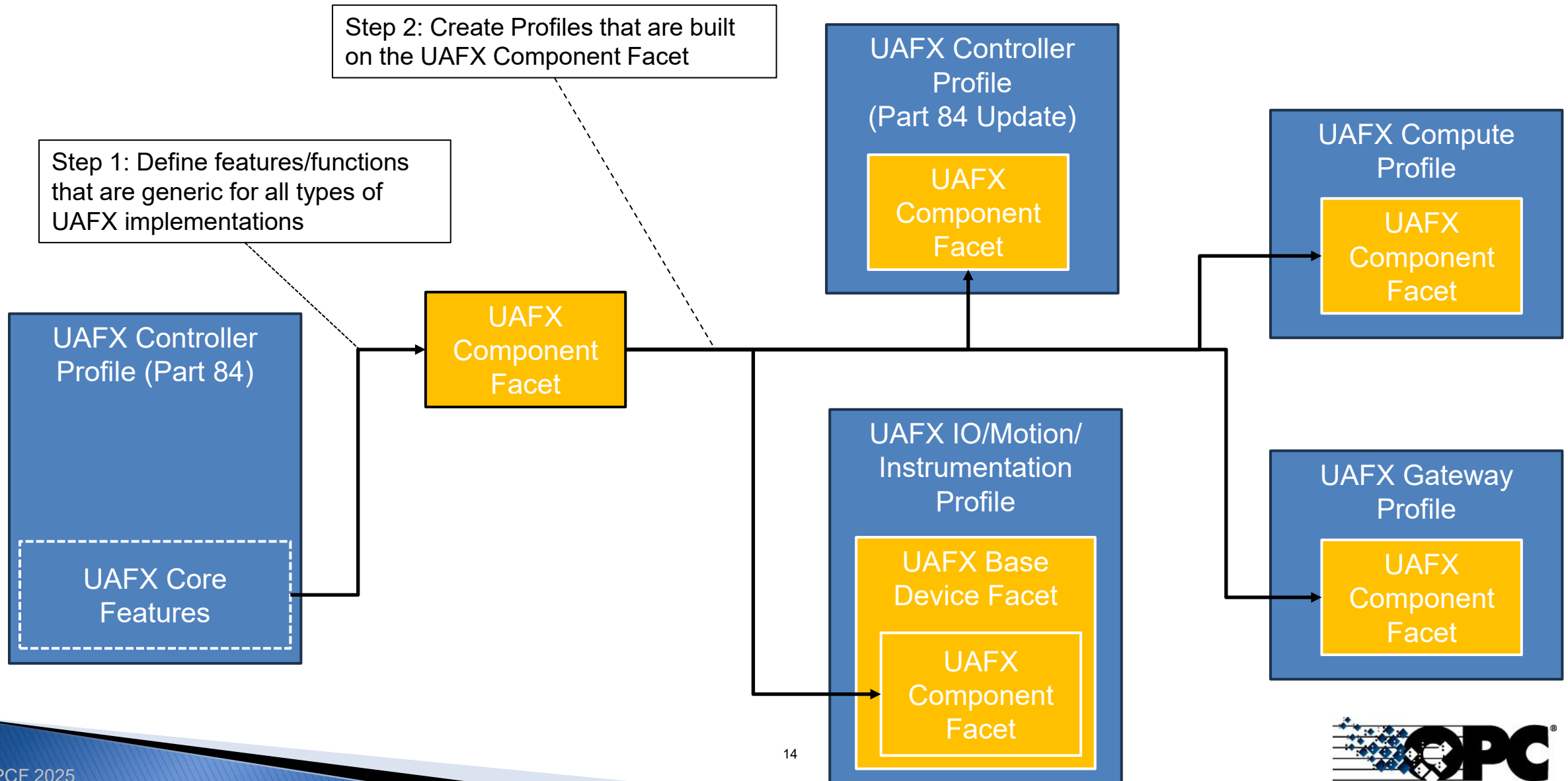
be able to **adapt the data** set to my needs without support of the designer of the original equipment."



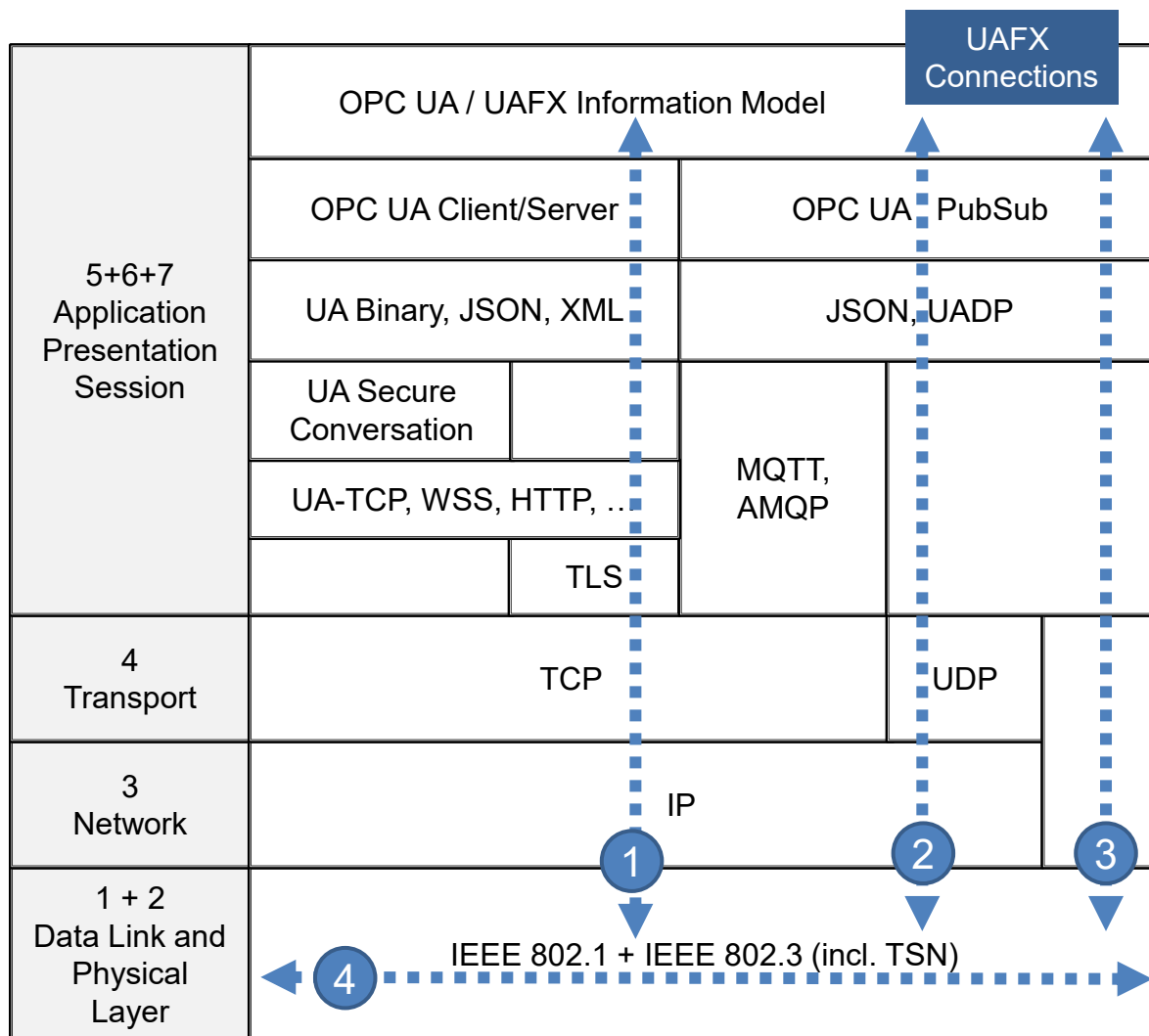
# OPC UA FX™ Controller-to-Device (C2D)



# UAFX Profiling – Methodical Approach



# UAFX Transport Architecture



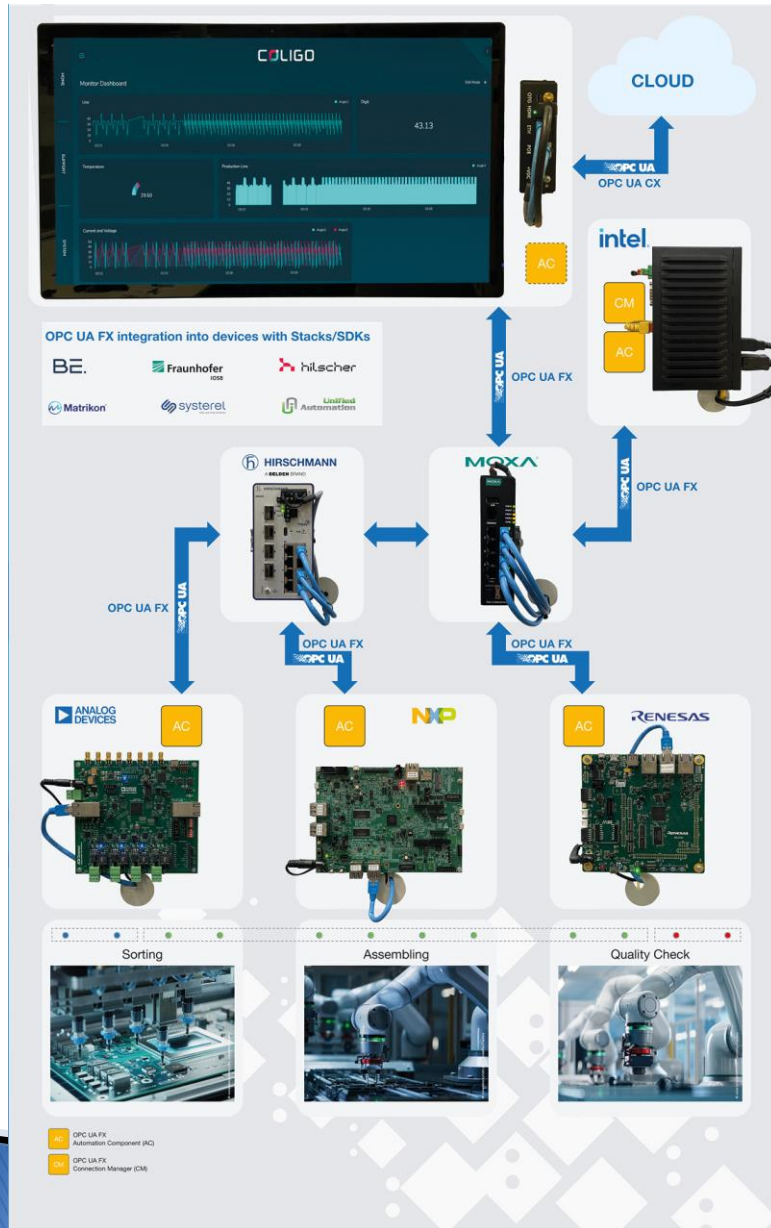
Focus of OPC UA FX Prototyping so far

- 1** **OPC UA Client/Server** is using TCP/IP. For small data sizes, this is very inefficient because significant protocol overhead is added. And TCP/IP is not real-time! **UAFX uses C/S for setting up UAFX connections.**
- 2** Mandatory for UAFX connections is OPC UA **PubSub over UDP/IP** which is real-time capable -> UDP UADP
- 3** The most efficient way is to insert data **directly into Ethernet** frames. No additional protocol overhead is added (optional for UAFX connections). -> ETH UADP
- 4** For an enhanced Quality-of-Service (QoS), features according IEEE 802.1 can be added
  - a) UAFX Base (VLAN, Remote Management)
  - b) UAFX Advanced (TSN) = Base + Preemption + TimeSync
  - c) UAFX Full (TSN) = Advanced + Scheduling (Qbv / TAS)

Focus of OPC UA FX Prototyping in 2026

# New Demo at SPS show: Enabling OPC UA FX™

Live Demo  
OPCF Booth



## Enabling OPC UA FX

Market-ready, Scalable, Embedded, Vendor-agnostic  
Field Device Connectivity

- ▶ **Different evaluation boards:**  
Analog Devices, Intel, NXP Semiconductors and Renesas
- ▶ **Different operating systems:**  
FreeRTOS, RT-Linux, Zephyr
- ▶ **Different Stacks/SDKs supporting OPC UA FX**  
Commercial Offers and Open Source
- ▶ **Planned for 2026:**  
OPC UA FX C2D Prototyping and Multi-Vendor demo with field device prototypes (to be displayed at SPS 2026)

<b>ANALOG DEVICES</b> www.analog.com Hall 5 / 110	<b>Matrikon</b> www.matrikon.com Hall 5 / 140
<b>BE.</b> www.be-services.com Hall 6 / 458	<b>NXP</b> www.nxp.com Hall 5 / 129
<b>Fraunhofer IOSB</b> www.iosb.fraunhofer.de Hall 6 / 128	<b>RENESAS</b> www.renesas.com
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<b>intel.</b> www.intel.com	<b>Unified Automation</b> www.unified-automation.com Hall 5 / 140
<b>utthunga</b> Engineering Transformation www.utthunga.com	

# FLC WG Chairs & Experts Testimonials

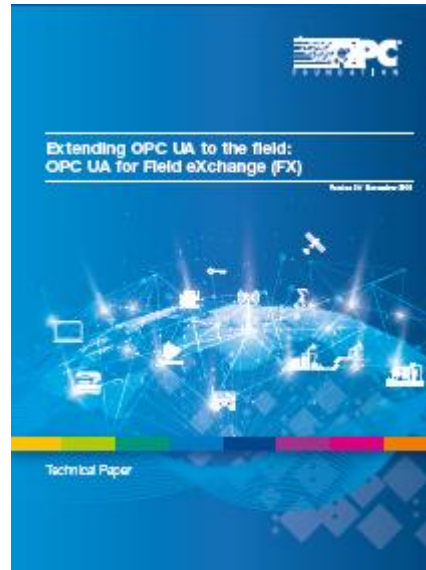
- Moving from C2C to C2D – <https://www.youtube.com/watch?v=1ssb6ZPANz8>



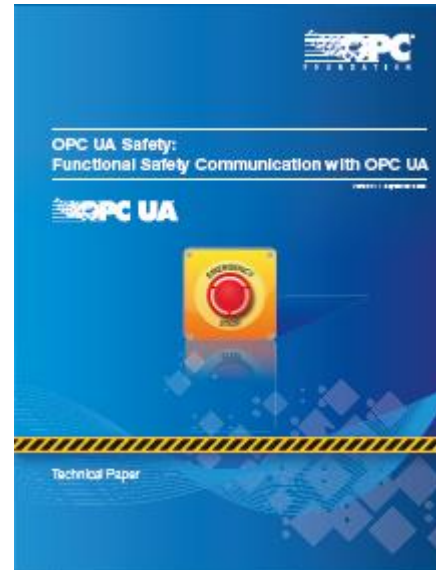
# OPC UA FX™ Brochures & White Papers



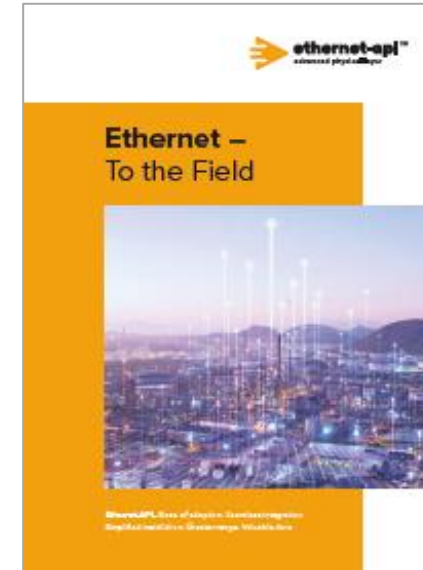
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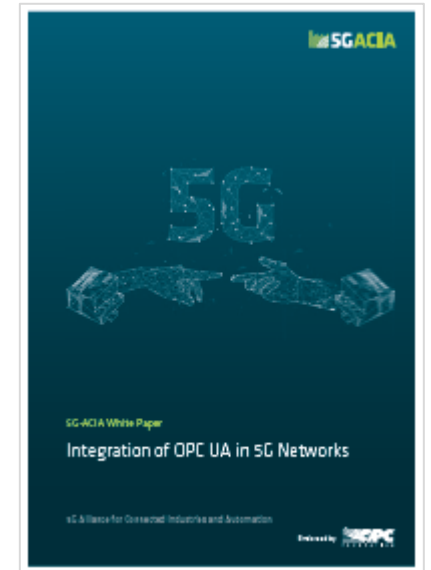
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# Further Information



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OPC Foundation

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Looking for more information?  
Brochures, Recordings, Slides, ...

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<https://opcfoundation.org/flc>  
<https://opcfoundation.org/apl>