OPC Foundation and the Trends in Digitalization

Organization – Collaboration – Field & Cloud Initiative – Future

OPC Day Japan, December 11th/12th, 2025

Stefan Hoppe
President & Executive Director OPC Foundation
stefan.hoppe@opcfoundation.org

OPC Foundation: Numbers at a Glance

1022 Members

60% Europe
20% Americas
20% APAC

Budget 2025:

4.300.000 USD

In 2025 additional
1.400.000 USD for FLC

4 Regions
North America, Europe, China, Japan

4 Hubs
France, Singapore, India, Korea

150+ Working Groups

427+ Models free of charge in OPCF Cloud Library (Domain, AAS Catena-X)

350+ Specifications

15 Board Members

0 Employees

11 Contractors

1100+ Volunteers

OPC UA is IEC62541 Standard
China standard GB/T 33863.x)
Local standard in Singapore, Korea, Russia …

17 Open Source Projects by OPCF
1900 Open Source Projects in total

11.000+ Followers on LinkedIn

OPC Foundation Membership Development

850 members - Status Nov 12th, 2021
896 members - Status Nov 8th, 2022 → 46 members within 1 year
963 members - Status Nov 14th, 2023 → 67 members within 1 year
1010 members - Status Nov 13th, 2024 → 47 members within 1 year
1022 members - Status Nov 13th, 2025 → 12 members within 1 year

Quantity: Loosing couple of class D members due to EU economy
Budget: Increasing due to new Claas A members – like BMW Group

OPC Foundation Board of Directors: Election for 2026/2027

Board of Directors 2025

- Microsoft
- Amazon Web Services
- VDMA
- Siemens
- Honeywell
- Yokogawa
- Google Cloud

- SAP
- Beckhoff
- Huawei
- Mitsubishi
- Ascolab
- Rockwell Schneider ABB

2026/2027 election
8 candidates for 7 open seats

CHRISTOPH BERLIN, MICROSOFT .....

STEVE BLACKWELL, AMAZON WEB SERVICES .....

ANDREAS FAATH, VDMA .....

THOMAS HAHN, SIEMENS AG .....

ZIAD KAAKANI, HONEYWELL.....

SHINJI ODA, YOKOGAWA .....

PRAVEEN RAO, GOOGLE CLOUD.....

SHERET ROSS, SEQENT .....

Board of Directors 2026

- Microsoft
- Amazon Web Services
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- Siemens
- Honeywell
- Yokogawa
- Google Cloud

- SAP
- Beckhoff
- Huawei
- Mitsubishi
- Ascolab
- Rockwell Schneider ABB

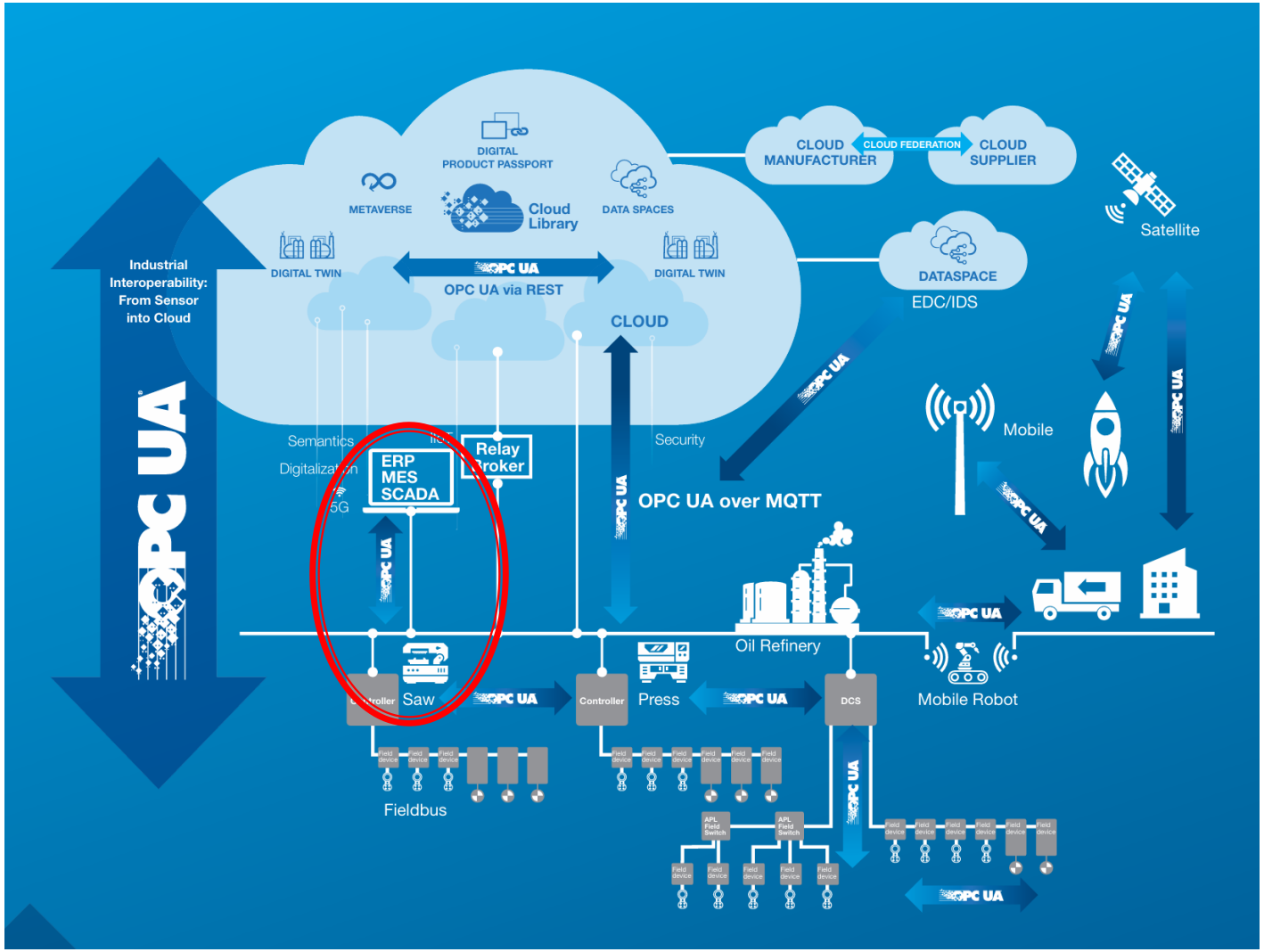
OPC UA
The foundation for secure, semantic interoperability

OPC UA Use Cases: One Solution for field, edge and cloud

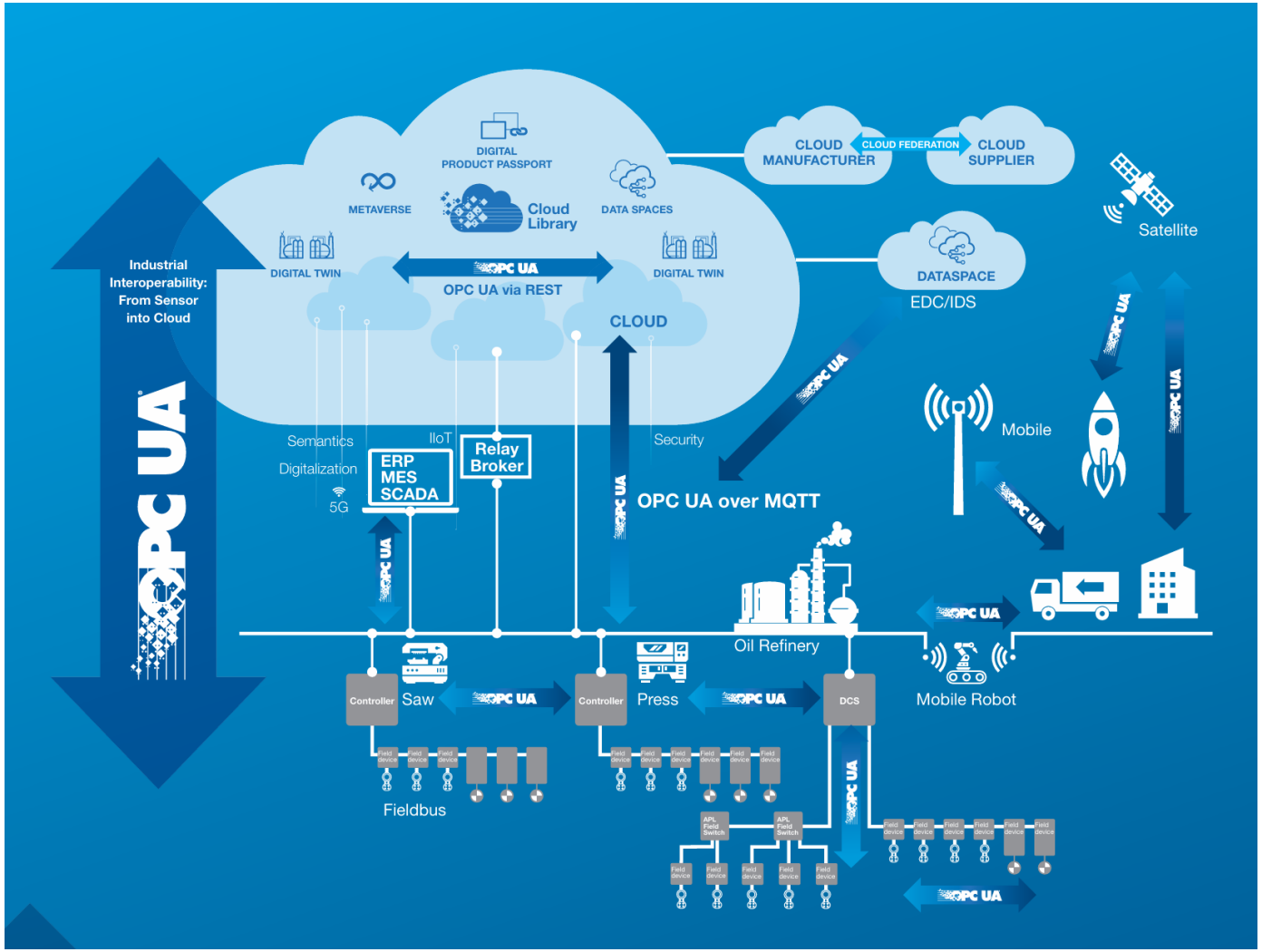
May I provide an update on OPC UA?
No thanks - I know and I use OPC UA !

Are you using OPC UA …

… as a protocol ?
… as meta-modelling language?



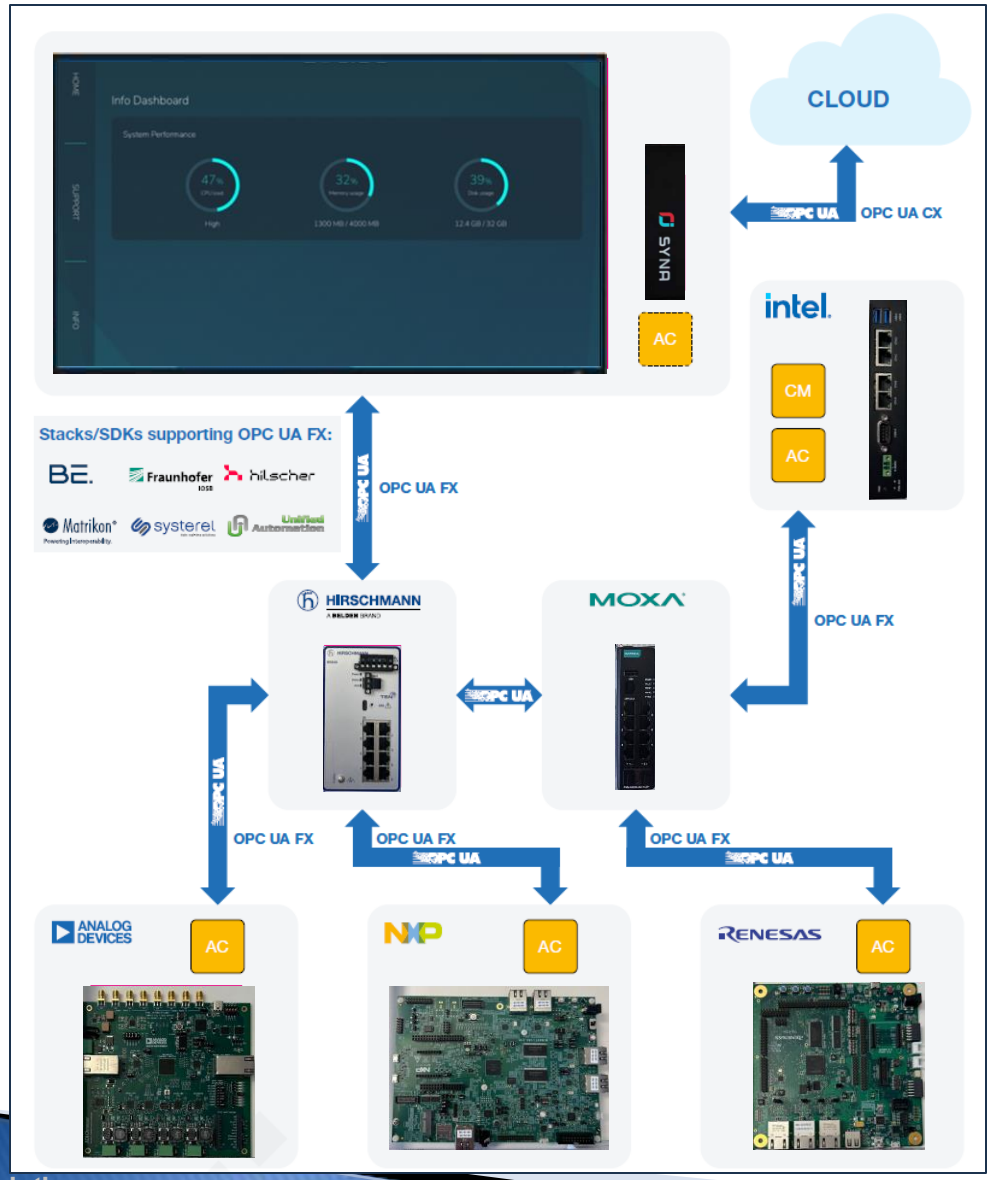
Looking back: OPC Journey of Success



- OPC classic started 1995
  - 1996 OPC DA / 1999 OPC AE / 2001 HDS, Batch, Security
- OPC UA development 2003 - 2006
  - 2006: Client/server
    - From controller to scada
    - Extending to MES (ERP)
  - 2018: PubSub
    - Extending to field level via UDP
    - Extending to IT/cloud exchange via MQTT
- OPC UA growth by collaboration
  - 2020-2023:
    … growing out of core-automation
    vending machines, Medical devices
  - 2024: Extending to interoperability in business
    - UA modeling & AAS/Catena-X semantic
  - 2025: Extending to Data Spaces
    - UA modeling & IDS governance

Extending OPC UA to the field level

Demo from SPS show: Enabling OPC UA FX



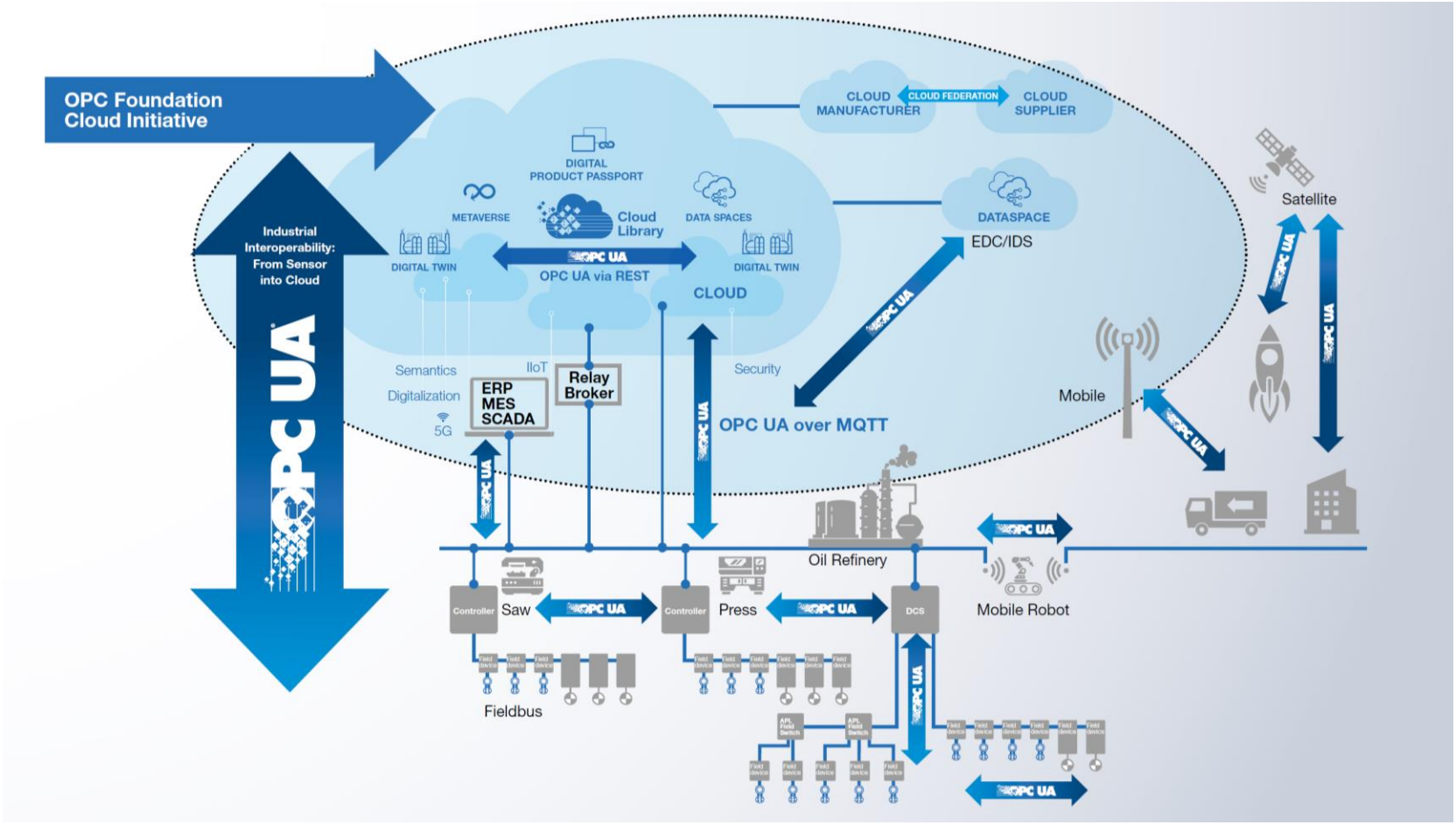
- **Status:**
  OPC UA FX C2C specifications are released, and the OPCF lab is ready. Products are now expected.

- **Eco-Sytem ready**
  - **Different evaluation boards:**
    Analog Devices, Intel, NXP Semiconductors and Renesas
  - **Different operating systems:**
    FreeRTOS, RT-Linux, Zephyr
  - **Different Commercial and Open Source Stacks/SDKs supporting OPC UA FX**

OPC UA from OT to IT/Cloud and inside Cloud

OPC Foundation Cloud Initiative – Started 2024

Vision: Accelerate the interoperability of IT and cloud applications through the OPC UA standard.
Find more information www.opcfoundation.org/cloud



Supporting cloud providers

aws · Google Cloud · HUAWEI · Microsoft · SAP

Supporting end-users

Boehringer Ingelheim · Continental CONTITECH · DANONE · equinor · L'ORÉAL OPERATIONS · Miele · Mondelēz International SNACKING MADE RIGHT · Renault Group · JTI · Tetra Pak PROTECTS WHAT'S GOOD · VOLKSWAGEN

Supporting automation providers

ABB · BECKHOFF · Honeywell · MITSUBISHI ELECTRIC Changes for the Better · Rockwell Automation · Schneider Electric · SIEMENS · YOKOGAWA Co-Innovating tomorrow

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OPC Foundation Cloud Initiative: Major goals

- Accelerate **interoperability of IT and cloud applications** using OPC UA, targeting data analytics using AI, industrial data spaces, digital product passports, industrial metaverse as well as digital twin applications.

- Semantic Data Models in the Cloud: Maintain **OPC UA Information Models** (Companion Specifications) in the cloud to utilize the context of data in cloud services.

- Create a **cloud reference architecture** to provide best practices, increase standardized data sharing and cloud-optimized profiles for the OPC UA standard, in line with global regulations such as the Data Act or the Cyber Resilience Act.

- Establish a new **Protected Identity** for OPC UA Cloud eXchange (UACX) – similar to OPC UA FX. Criteria's for OPC UA CX are defined right now.

- Establish a new **validation and certification program** for OPC UA Cloud interoperability as the leading cloud vendors AWS Cloud, Google Cloud, Huawei, Microsoft and SAP already support OPC UA to some extent, but no rules govern this support in the cloud to date.

OPC Foundation Cloud Reference Architecture 1/2

Call for action: Japanese End-users are welcome!

First time, cloud providers presented a consolidated overview of their commercial offerings

Nr.	Generic Name	aws	Google Cloud	HUAWEI	Microsoft	SAP
1	Machines (building product)			Machines of the Manufacturer		
2	Information Model Viewer			UA Cloud Viewer		
3	Edge Broker	Shopfloor Connectivity running on AWS IoT Greengrass / Amazon EKS Hybrid Nodes Greengrass	Manufacturing Connect	UA Edge Translator	Azure IoT Operations on Azure Local	SAP APM Device Connectivity
4	Industrial Connectivity Software			UA Edge Translator		SAP Production Connector
5	On-premises MES			On-premises MES		
6	Gateway	Shopfloor Connectivity running on AWS IoT Greengrass / Amazon EKS Hybrid Nodes	Manufacturing Connect	IoT Edge	Azure IoT Operations on Azure Local	SAP APM Device Connectivity
7	Dataspace Connector Consumer	Eclipse Dataspace Connector Consumer	Eclipse Dataspace Connector Consumer	EDS	Eclipse Dataspace Connector Consumer	SAP Integration Suite Dataspace Connector
8	Cloud Broker	AWS IoT Core / Amazon Managed Streaming for Apache Kafka	Pub Sub & Data Flow	IIoT	Azure Event Grid/Hubs	SAP Integration Suite – Advanced Event Mesh
9	Edge Management	AWS IoT Device Management / Amazon EKS	Manufacturing Connect (Cloud)	IoT Edge	Azure Arc	SAP Edge Lifecycle Managment
10	ERP Database			ERP Database	Dynamics 365 ERP	SAP S/4HANA
11	Cloud MES Service			Model Based Manufacturing	Dynamics 365 MES	SAP Digital Manufacturing
12	Production Lines Time-Series Database	Amazon TimeStream / Amazon Simple Storage Service (S3)	Cloud Storage & Big Table	GeminiDB	Azure Data Explorer	SAP Business Data Cloud

Supporting end-users

Boehringer Ingelheim, Continental CONTITECH, DANONE, equinor, L'ORÉAL OPERATIONS, Miele, Mondelēz International SNACKING MADE RIGHT, Renault Group, JTI, Tetra Pak PROTECTS WHAT'S GOOD™, VOLKSWAGEN AKTIENGESELLSCHAFT

Supporting automation providers

ABB, BECKHOFF, Honeywell, MITSUBISHI ELECTRIC Changes for the Better, Rockwell Automation, Schneider Electric, SIEMENS, YOKOGAWA Co-Innovating tomorrow™

End users engage to gain insights and validate key concepts

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OPC Foundation Cloud Reference Architecture 2/2

Open-Source offerings for OPC Foundation Cloud Reference Architecture

Nummer	Open Source
2	OPC Foundation UA Cloud Viewer nodeset viewer and uploader.
3	Eclipse Mosquitto MQTT broker.
4	OPC Foundation UA Edge Translator supporting all leading industrial protocols south-bound and an OPC UA Server with WoT-Connectivity north-bound.
6	Umati UA Cloud Publisher OPC UA PubSub publisher and OPC Foundation UA Cloud Commander OPC UA PubSub subscriber supporting both the MQTT and Kafka protocol.
7	Eclipse Dataspace Connector (EDC), in consumer configuration.
8	Eclipse Mosquitto MQTT broker or Apache Kafka broker.
9	SUSE Rancher Kubernetes-based Edge application management.
12	InfluxData InfluxDB production data time-series database.
13	OPC Foundation UA Cloud Library online store of OPC UA Information Models.
14	PostgreSQL product database.
15	Grafana Labs Grafana visualization dashboards.
16	AI-assisted analytics software used to calculate equipment effectiveness, make production forecasts and make predictions about required machine maintenance.
17	Digital Twin Consortium Asset Admin Shell Repository powered by OPC UA.
18	Eclipse Dataspace Connector (EDC), in provider configuration.
19	InfluxData InfluxDB product usage data time-series database.
20	OPC Foundation UA Cloud Action for OPC UA PubSub cloud to edge messaging.
22	Eclipse Dataspace Connector (EDC) from the customer, in consumer configuration.

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OPC Foundation Cloud Reference Architecture

HUGE list of commercial offerings from the large OT companies

UA Cloud Initiative Reference Architecture – Commercial offerings ABB

Nummer	Generic name	ABB
1	Machines (building product)	ABB Industrial Equipments, Drives and Systems Machines support connectivity with standard protocols. Both ABB systems and Non-ABB systems are supported through Genix Industrial IoT and AI Platform Suite
2	Information Model Viewer	ABB Ability Information Model & Genix Model Viewer are com-ponents of Genix Industrial DataOps Express
3	Edge Broker	ABB Edgenius Broker is a component of Genix EdgeAI
4	Industrial Connectivity Software	ABB Genix Omni Source Integration Hub provides 200+ pre-built adapters for industrial systems ABB Edgenius Field Information Manager provides Fieldbus level connectivity to hundred plus protocols
5	On-premises MES	ABB Ability MOM
6	PubSub Data Publisher & PubSub Action Processor	Genix Data Publisher & Genix EdgeAI Orchestrator are part of Genix EdgeAI
7	Dataspace Connector Consumer	Genix Industrial DataOps Message Sync brings the functionality of Dataspace Connector Consumer and is a component of Genix Industrial DataOps Express
8	Cloud Broker	Genix IIoT Gateway is a component of Genix IIoT Hub
9	Edge Management	Genix Edge Management Portal is a component of Genix IIoT Hub
11	Cloud MES Service	Genix MES Integration Service
12	Production Lines – Time-Series Database	ABB Ability History. Also, pre integrated and supporting Azure Data Explorer, Timescale and CrateDB out of the box
13	Information Model Library	Genix Information Model Repository is a component of Genix Industrial DataOps Express
14	Product Database	Genix Industry Cognitive Model on any RDBMS
15	Dashboards	Genix Dashboard Manager is a component of Genix Analytics App Studio
16	AI-Assisted Analytics	Genix AI Express for Analytical Genix CoPilot for Generative AI
17	Asset Admin Shell Library	Genix Digital Twin Hub provides asset templates and digital twin modeler and runtime. DTC AAS Repository used for asset information registry
18	Dataspace Connector Provider	Genix Knowledge Services Hub
19	Connected Product Time-Series Database	ABB Ability History. Also, pre integrated and supporting Azure Data Explorer, Timescale and CrateDB out of the box
20	Cloud to Edge Messaging App	Genix Industrial DataOps Message Sync is a component of Genix Industrial DataOps Express

UA Cloud Initiative Reference Architecture – Commercial offerings BECKHOFF

Nummer	Generic name	BECKHOFF
1	Machines	TF6100 TwinCAT 3 OPC UA offers Client/Server and OPC UA PubSub
6	PubSub Data Publisher & PubSub Action Processor	TF6720 TwinCAT 3 IoT Data Agent offer OPC UA Client to OPC UA over MQTT

UA Cloud Initiative Reference Architecture – Commercial offerings Mitsubishi-Electric

Nummer	Generic name	MITSUBISHI ELECTRIC
1	Machines (building product)	GENESIS64 RD81OPC96 MELSEC iQ-R Series OPC UA server module FX5-OPC MELSEC iQ-F Series OPC UA server module

UA Cloud Initiative Reference Architecture – Commercial offerings Schneider Electric

Nummer	Generic name	Schneider Electric
1	Machines (building product)	Modicon series controllers and OPC UA compatible modules : 1. Modicon M580 dPAC with BMENUA0100 OPC UA Embedded Module. 2. Modicon M262 Logic/Motion controller 3. PacDrive LMC Pro motion controllers 4. Modicon M241 & M251 Micro Controller 5. ATV dPAC 6. Modicon Edge IO NTS 7. BMEECN0100H (Edge Compute Node module for M580 PLCs) with embedded uDC Server (OPC UA Server by Prosyst by Schneider)
2	Information Model Viewer	Prosyst by Schneider OPC UA Modeler (based on UML modelers) to create and export information models
4	Industrial Connectivity Software	1. uDC Server (Unified Data Collector) by Prosyst by Schneider: OPC UA server exposing OT Data regardless of the OT Controller protocol in OPC UA 2. uDC aggregation server used to collect OT Data from several OPC UA servers. 3. Ecostruxure OPC UA server expert - for connection throuhg Modican controllers
5	On-premises MES	AVEVA MES system
6	PubSub Data Publisher & PubSub Action Processor	uDC Data Provider supporting OPC UA PubSub over MQTT and MQTTS communication - Prosyst by Schneider
9	Edge Management	1. uDC Plant Manager and Enterprise Monitor for remote monitoring, diagnosis and management of uDC servers deployed on premise - Prosyst by Schneider. 2. Margo - Edge interoperability for industrial automation ecosystems.

UA Cloud Initiative Reference Architecture – Commercial offerings Honeywell

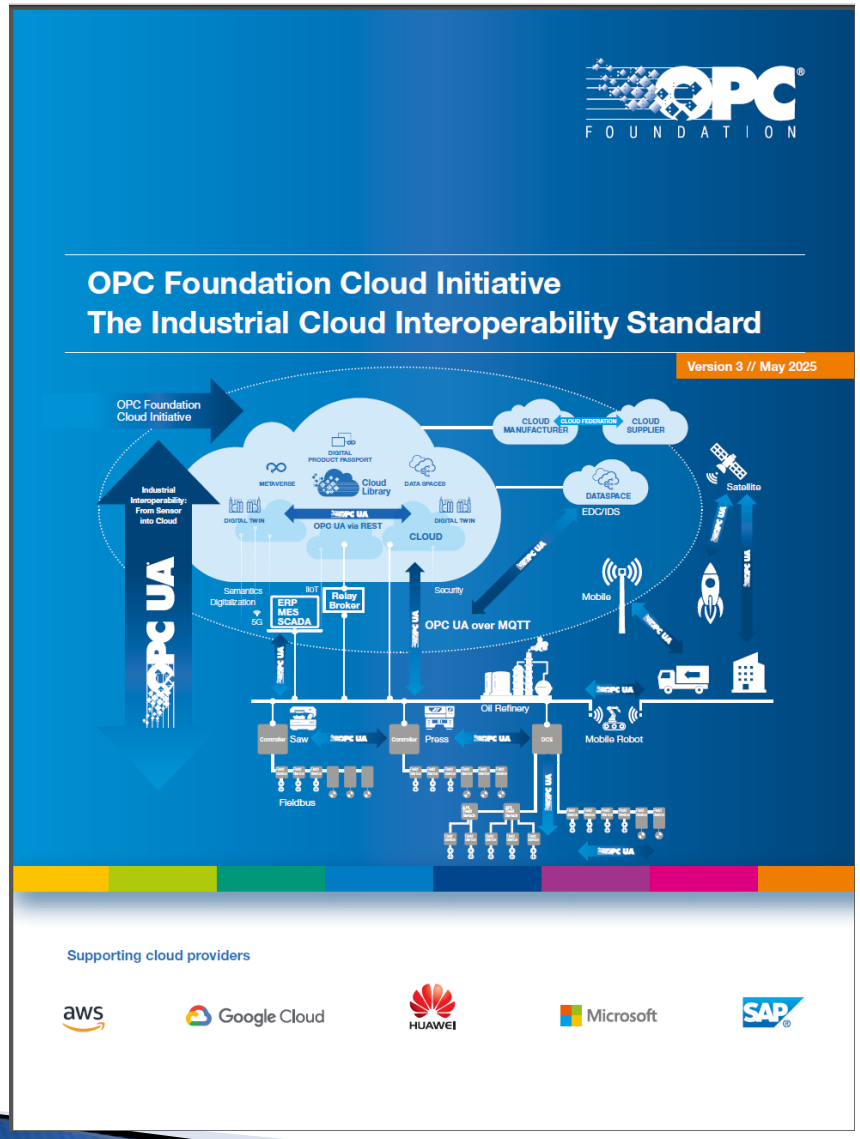
Nummer	Generic name	Honeywell
1	Machines (building product)	ControlEdge PLC ControlEdge UOC
6	PubSub Data Publisher & PubSub Action Processor	Honeywell Enabled Services Matrikon Data Broker (MQTT Publisher)

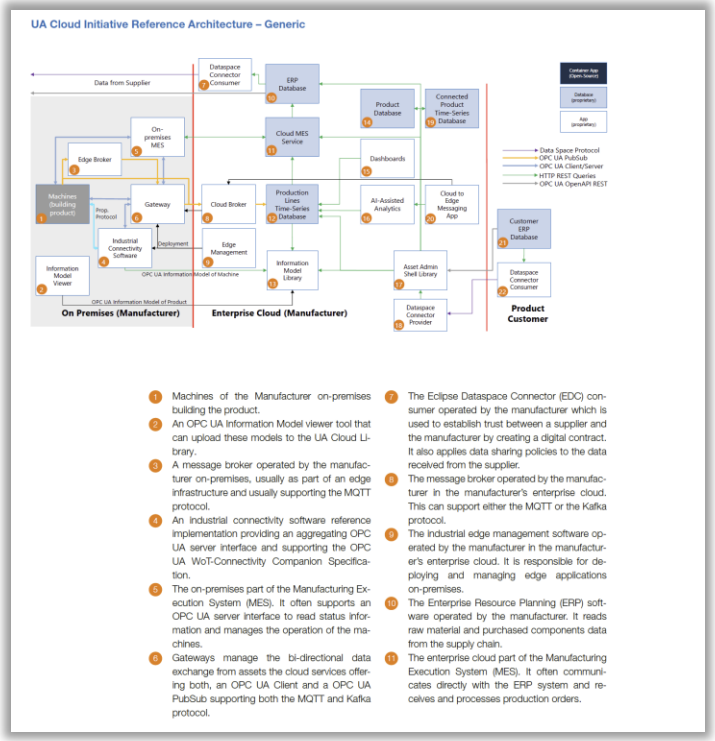
UA Cloud Initiative Reference Architecture – Commercial offerings Rockwell Automation

Nummer	Generic name	Rockwell Automation
1	Machines (building product)	PLC Programmable Controllers | Allen-Bradley | US
4	Industrial Connectivity Software	FactoryTalk Linx Gateway Software | FactoryTalk | US
5	On-premises MES	MES Automation and Orchestration | Plex FactoryTalk ProductionCentre | FactoryTalk | US
6	Gateway	FactoryTalk Optix | FactoryTalk | US
9	Edge Management	Margo - Edge interoperability for industrial automation ecosystems
11	Cloud MES Service	MES Systems: Manufacturing Execution System Software | Plex
12	Production Lines Time-Series Database	FactoryTalk DataMosaix: Industrial DataOps Solution | FactoryTalk | US
15	Dashboards	FactoryTalk DataMosaix: Industrial DataOps Solution | FactoryTalk | US

Nummer	Generic name	SIEMENS
1	Machines (building product)	SIMATIC S7-1500 and ET 200SP CPU with integrated OPC UA Client/Server and OPC UA PubSub via library. SINUMERIK OPC UA Server for tool machine controllers
2	Information Model Viewer	Siemens OPC UA Modeling Editor (SiOME) – free of charge
3	Edge Broker	Siemens Industrial Edge
4	Industrial Connectivity Software	Connectivity Software for brown-/greenfield data integration – integrated into multiple products for different industries & applications – SIMATIC WinCC SCADA Systems – Industrial Information Hub: Edge-based Shopfloor integration platform – MindConnect: Insights Hub Gateway – Opcenter Connect: MES/ERP Gateway – CMS1200
5	On-premises MES	Opcenter
6	Gateway	Hardware and Software Gateways tailored to different industries and application scenarios: SIMATIC WinCC SCADA Systems, Industrial Information Hub, Opcenter Connect, IOT Gateways, SIMATIC CloudConnect 7, SIMATIC CN 4100
7	Dataspace Connector Consumer	Insights Hubs' Cross-Tenancy, Policy Based Access Control
8	Cloud Broker	Insights Hub with MindConnect MQTT and full PubSub support, Opcenter X NATS Broker with Pub/Sub and Request/Response support
9	Edge Management	Siemens Industrial Edge Management System
11	Cloud MES Service	Opcenter X
12	Production Lines – Time-Series Database	SIMATIC WinCC SCADA Systems, Insights Hub TimeSeries Services, SIMATIC Process Historian
13	Information Model Library	Asset Library in Asset Manager in sync with on-prem located Industrial Information Hub and compliant to the OPC UA PubSub model
14	Product Database	Teamcenter X
15	Dashboards	Dashboard Designer, Business Intelligence. Turn key apps for Energy-, Performance- and DriveTrain Analytics available.
16	AI-Assisted Analytics	Range from Production Copilot, custom Agents and their Skills to out of the box AI industry solutions like Quality Prediction, Senseye for maintenance, Energy Optimizer to custom AI model development and management in Predictive Learning (via Python), SiePA, gPROMS, SIMATIC easSie, Drivetrain Analyzer (DTA) X-Tools
17	Asset Admin Shell Library	Translation Service from Asset Management to AAS
18	Dataspace Connector Provider	Policy Based Access Control and cross-tenancy sharing via contracts allows to share data
19	Connected Product – Time-Series Database	Insights Hub – Timeseries Services (raw & aggregated) and Event Services based on machine data model. Including Remote Service option to securely connect to the machine for updates
20	Cloud to Edge Messaging App	MindConnect MQTT and OPC UA for messaging from the cloud to the edge via MQTT or RestAPI Opcenter Connect supports bi-direction cloud to edge communication
22	Dataspace Connector Consumer	via provided RestAPI Services Opcenter Connect, Active integration Gateway

OPC Foundation Cloud Initiative - Brochure





Download brochure here
[OPCF-Cloud-Initiative-Brochure.pdf]

Contains:

- The vision of the initiative
- The reference architecture
- Commercial offerings from

  Cloud suppliers like aws, Google, Huawei, Microsoft, SAP

  OT suppliers like ABB, Beckhoff, Honeywell, Mitsubishi, Rockwell, Schneider, Siemens, Yokogawa

Collaborations & Activities

Collaborations – Overview "Publications"

- https://opcfoundation.org/news/technology-news

- 28 **Publications** in 2025 (Jan 1st till Oct 1st, 2025)
  Compare: 24 Publications in 2024 (Jan 1st till Oct 1st, 2024)

- 13 Call for **reviews** in 2025 (Jan 1st till Oct 1st, 2025)
  Compare: 12 Call for reviews in 2024 (Jan 1st till Oct 1st, 2024)

- 3 Call for **participations** in 2025 (Jan 1st till Oct 1st, 2025)
  Compare: 5 Calls for participation in 2024)

Collaboration: LADS & AFO/ASM – powered by OPC UA

Breakthrough in Smarter Labs: Spectaris LADS Showcases Integration of OPC UA with Allotrope Standards

Now, communications and information data in the analytical lab are seamlessly interoperable

May 14th, 2025 – Berlin, Germany; Scottsdale, AZ; Washington, D.C.

Spectaris, Allotrope Foundation and the OPC Foundation are proud to announce a major milestone in smarter labs by advancing semantic interoperability and structured data standards in laboratory environments: At the most recent, and now 8th hackathon, which took place on April 11, 2025 in Germany and once again featured various companies, from device manufacturers, software providers to even laboratory operators, a successful demonstration showcased the integration of Allotrope Foundation Ontologies (AFO) and the Allotrope Simple Model (ASM) into the OPC UA (Unified Architecture) framework.

CONGRATS AND RESPECT TO

Dr. Matthias Arnold, AixEngineers

Heiko Fessenmayr, Agilent Technologies

NEW

OPC UA for Battery Solutions — Working Group Initiative

- **Why It Matters:**
  - From 2027, the **EU Battery Passport** becomes mandatory.
  - Requires **traceable, standardized data** across lifecycle: materials → production → usage → recycling.
  - OPC UA bridges **IT & OT systems**, ensuring interoperability of diverse solutions.

- **Key Deliverables:**
  - Alignment of existing OPC UA Companion Specification for Battery Cell up to Battery Passport parameters
  - Extension of UA Cloud Reference Architecture with open-source reference implementation for battery passport

- **Reference architecture & open-source implementation** (UA Cloud + Catena-X mapping).
  - Alignment with **BatteryPass EU** and **BatteryPass-Ready** initiatives.

- **Team**
  - Initiated an lead **by Fraunhofer FFB Münster**
    supported by associations Catena-X, IDSA, IDTA, OPC Foundation, VDA, VDMA and companies Huawei & Microsoft

- **Outcome:**
  - A unified, trusted interoperability layer connecting data, systems, and standards — powering the **digital and sustainable battery ecosystem** of the future.

OPC FOUNDATION

Data Spaces – powered by OPC UA

INTERNATIONAL DATA SPACES ASSOCIATION

- A **data space** is a trusted digital environment where multiple organizations share and exchange data securely.
- It ensures participants **keep control over their data (sovereignty)** while enabling interoperability.
- Common standards and governance rules define how data is accessed and used.
- Data spaces are key enablers for building collaborative ecosystems across industries.

INTERNATIONAL DATA SPACES ASSOCIATION

OPC FOUNDATION

OPC UA connects assets to International Data Spaces

OPC Foundation and International Data Spaces Association are collaborating to connect the largest ecosystem for industrial interoperability to international data spaces

Scottsdale, AZ – March 26th, 2025 - The OPC Foundation, a global organization committed to advancing the development and adoption of industrial communication standards, is pleased to announce an expanded collaboration with the International Data Space Association (IDSA) aiming to enhance interoperability and data governance in the automation industry. The OPC Foundation connects the largest ecosystem for semantic interoperability in the automation world through OPC UA including over 150 semantic domain standards. This extensive framework ensures seamless communication and integration across various automation systems, fostering a more connected and efficient industrial

OPC FOUNDATION

Catena-X – powered by OPC UA

Core areas of collaboration:

- **Semantic Integration:** Combine the OPC UA information modelling and Catena-X semantic templates – results in automated DPP generation from production data.
- **Open-Source Reference Implementations:** Jointly develop and provide open-source reference implementations for key dataspace and interoperability components, enabling straightforward integration of OPC UA-based systems into the Catena-X data ecosystem.
- **Reference Architecture Alignment:** Align the OPC Foundation's Cloud Initiative reference architecture with Catena-X's dataspace architecture to enable streamlined deployment from the shopfloor to the supply chain.
- **Industrial Ecosystem Enablement:** Empower companies to leverage their existing OPC UA tools and infrastructure to meet emerging regulatory requirements, particularly the DPP, while reducing integration costs and accelerating time-to-compliance.

Catena-X
Your Automotive Network

Catena-X and OPC Foundation Join Forces to Enable Seamless Industrial Data Exchange for the Digital Product Passport

The Partnership aligns OPC UA Standardization and Cross-Industry Data Interoperability to Comply with Regional Regulations like the EU Digital Product Passport

Scottsdale (AZ), USA / Berlin, Germany, August 19th, 2025 – The Catena-X Automotive Network e. V.

OPC Founda
OPC Day Ja

Link PR including whitepaper and joint webinar on Oct 15th, 2025

Webinar Material (Slides & recording)

- Material available for download
- Slides
  https://opcfoundation.org/developer-tools/marketing-communication-presentations/opc-and-opc-ua-presentations/
- Recordings
- https://www.youtube.com/watch?v=7BQSOr4NF_A
- Whitepaper
- https://shorturl.at/VsClo

YouTube

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Collaboration IDTA & OPCF

- **Unifying AAS and OPC UA: Common Information Model and Common Communication**
- **Proof of Concept (PoC) by Siemens / IDTA / OPCF:**

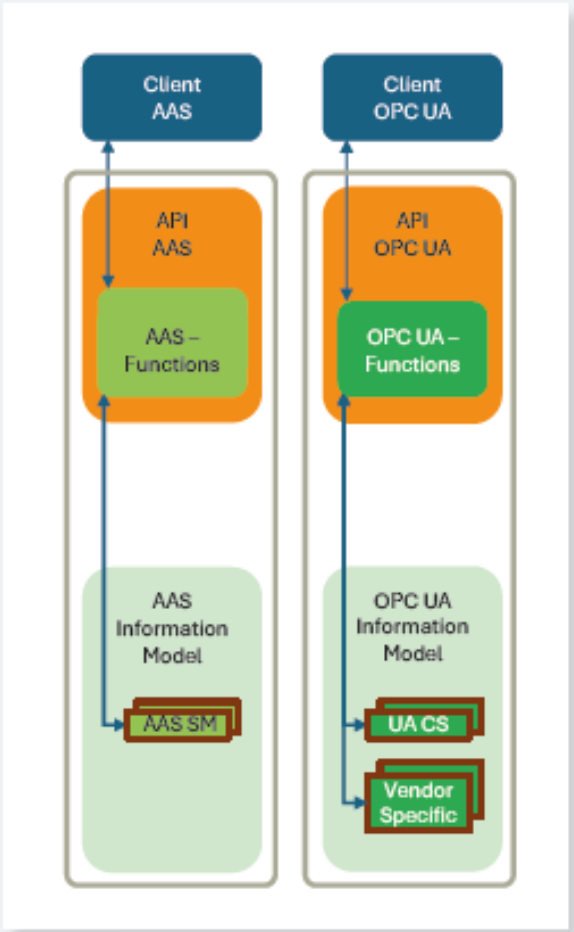
- The PoC introduces:
  - A common information model combining AAS submodels/templates and OPC UA specifications, based on the OPC UA Meta Information Model
  - A common communication layer using AAS REST API and OPC UA REST API, enriched with REST, OpenAPI, and optional WebSockets for higher performance

- Initiated by Siemens and developed with IDTA and OPC Foundation, the PoC feeds directly into upcoming standardization work.
  Results are about:
  - How AAS and OPC UA are being unified in a single software stack
  - The role of common information and communication models in interoperability
  - How REST, OpenAPI, and WebSockets enable modern, high-performance integration
  - How this proof of concept influences future standardization by IDTA & OPC Foundation

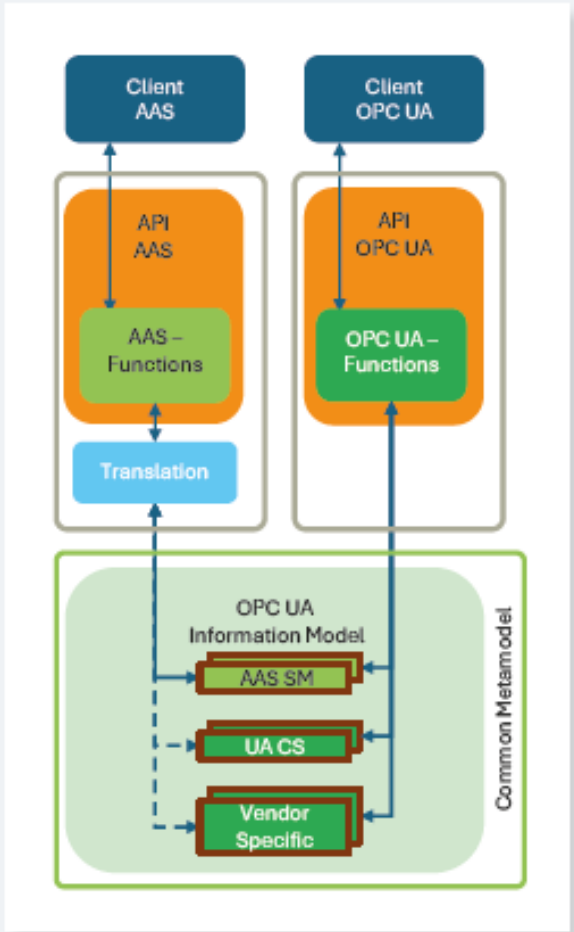
Collaboration IDTA & OPCF

- **Journey from different Models and different API's to a Common Model and Common API**

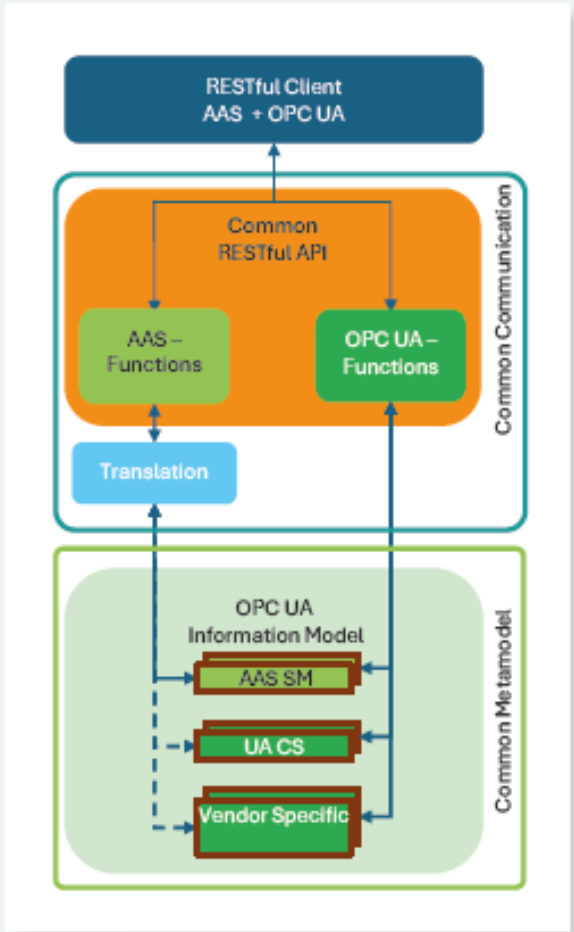
OPC UA-Clients access **different** Models via **different** APIs.



OPC-UA-Clients access a **common** Model via **different** APIs.



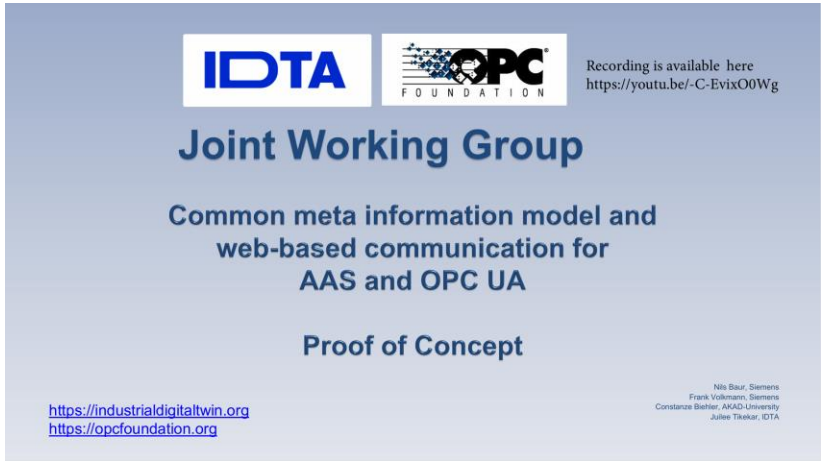
Clients access a **common** Model via a **common** API.



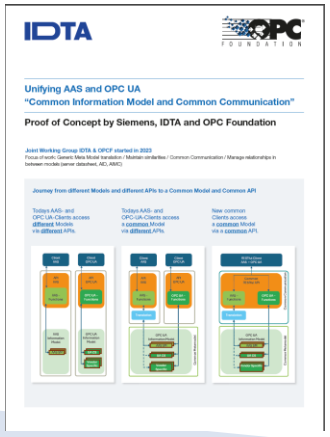
Download flyer

Webinar Material (Slides & recording)

- Material available for download
- Slides
  https://opcfoundation.org/developer-tools/marketing-communication-presentations/opc-and-opc-ua-presentations/
- Recordings
  https://www.youtube.com/watch?v=-C-EvixO0Wg
- Flyer
  Flyer-Unify-AAS-OPC-UA-technologies_SPS_2025_lay04.indd



YouTube



OPC FOUNDATION

OPC UA for AI Working Group

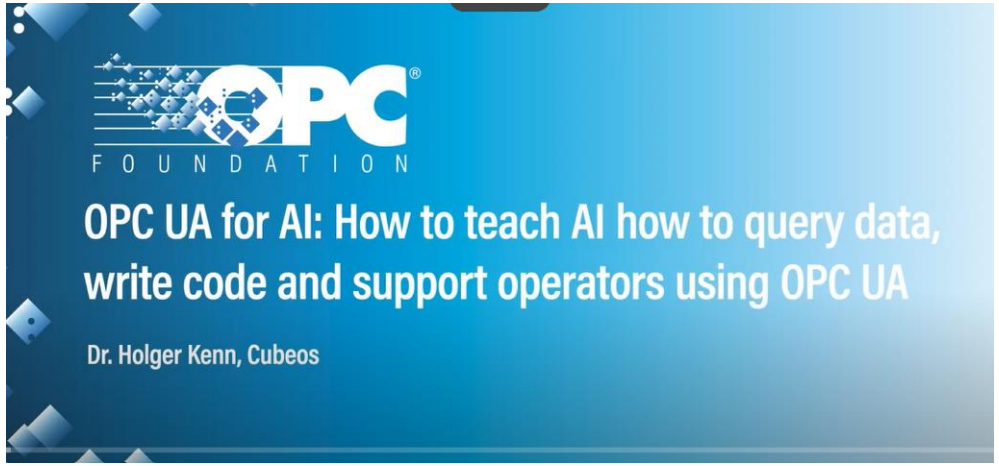
- Three initial goals
  - Support programming with OPC UA
  - Support data analysis coming from OPC UA
  - Support next generation OPC UA devices using GenAI as interactive interfaces
- Additional new goal
  - Support specification activities
    e.g. create OPC UA companion specs using GenAI

- Prerequisites to enable GenAI
  - Provide OPC UA specifications and related information in a format that can *easily* be processed by Gen AI Models
  - Provide best practice examples to connect OPC UA and Gen AI tools and applications
  - Standardize interaction between OPC UA and Gen AI using industry-adopted tools and specifications (e.g. MCP)
  - Create tests and examples for Gen AI providers to test and train their ability to interact with OPC UA

OPC UA for AI

Key use cases:

- Data analysis
- Next-generation User Interfaces
- Code generation and documentation

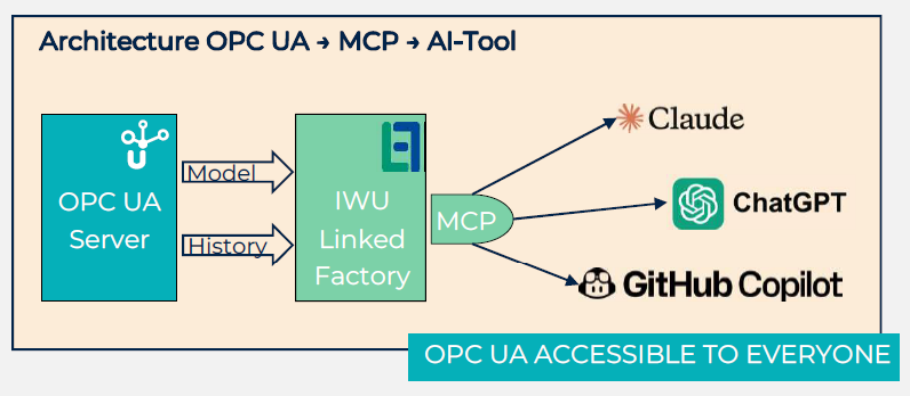


https://youtu.be/F4kUZGIEOaQ

Success Story from domain Tobacco Industry
Philip Morris International (PMI)

- **End-user driven**
- **Joint activity with suppliers**
- **Tobacco Companion Spec**
- **Mandatory standard**

- **PMI is describing**
  - **challenges of integration**
  - **Success factors**
  - **OPC UA as base for AI**



Join the OPC Foundation "OPC UA for AI" group!

Collaborations – Completely new Landing pages

Update of the OPCF Web [Markets & Collaboration - OPC Foundation]

List of partners

List of working groups

Organizations - OPC Foundation

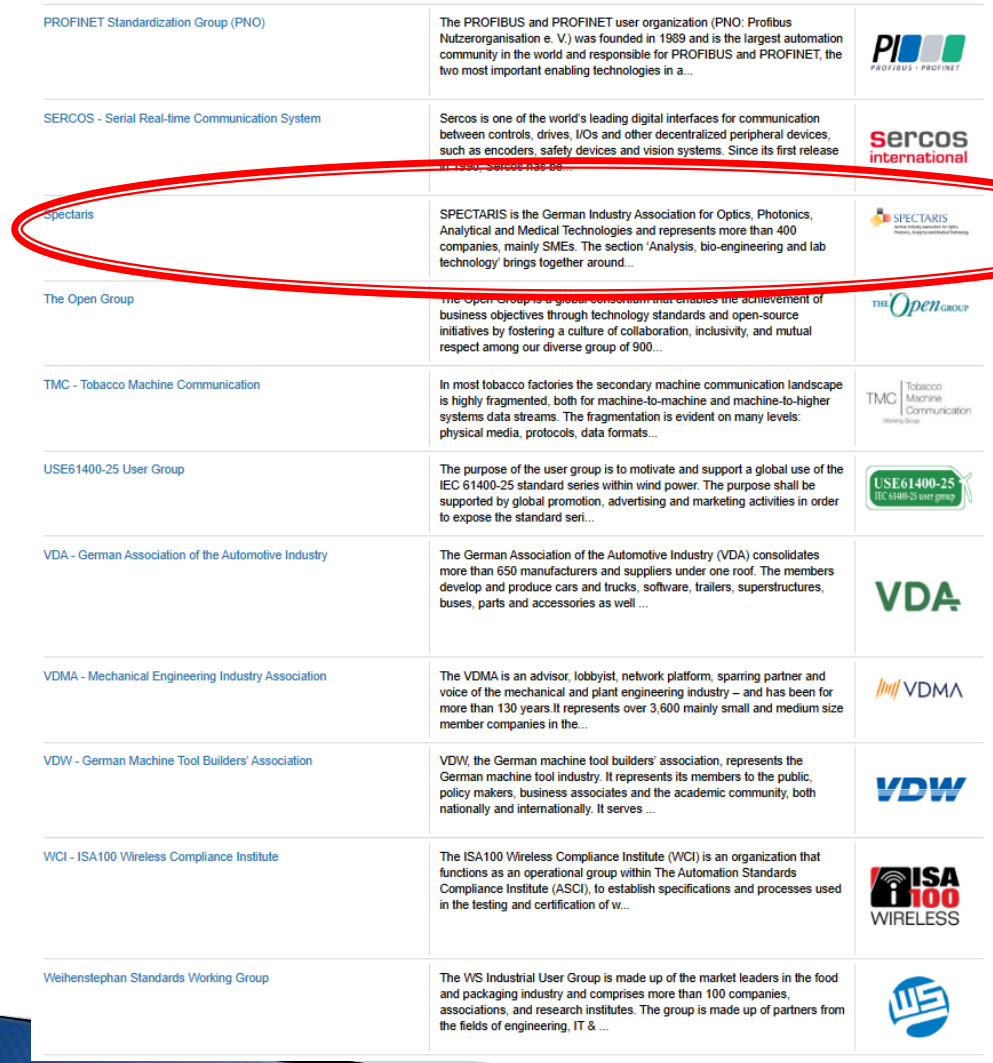
NAME	ABSTRACT	LOGO
AIM – Association for Automatic Data Capture	AIM-D e.V. (AIM for short), is the leading industry association for automatic identification (AutoID), data capture and mobile IT systems. The association promotes the use and standardization of AutoID technologies and procedures. Technologies such a...	
AutomationML e.V.	AutomationML e.V. promotes and further developes AutomationML to standardise data exchange in the engineering process of production systems. Therefore, AutomationML e.V. develops and maintains an open, neutral, XML based, and free industry data repre...	
BACnet Interest Group Europe e.v. (BIG-EU)	The main focus of BIG-EU is to promote BACnet in the European markets. BIG-EU consists of two working groups, WG-M (Marketing) and WG-T (Technique). Some members of BIG-EU are members of the SSPC-135 as well (Standing Standard Project Committee) with...	
Catena-X	Catena-X is the first end-to-end, muti-tier collaborative and open data ecosystem for the automotive industry, connecting all players along the value chain. The Catena-X association acts as a neutral governance to enable standardized, interoperable, ...	
CC-Link Partner Association - CLPA	CC-Link IE supports Industry 4.0 applications with unmatched bandwidth for real time "big data" manufacturing. It offers full gigabit operation from field devices to IT systems, and allows control, safety, motion and production data all on the sa...	
CEMAFON - European Foundry Equipment Suppliers Association	CEMAFON, The European Foundry Equipment Suppliers Association, is the respected voice and lobby organization of the European manufacturers of foundry machinery and plants, furnaces and products for the foundry industry. It incorporates about all rele...	
CESMII - Collaborative Ecosystems for Smart Manufacturing Innovation Institute	CESMII – the Smart Manufacturing Institute – has a total current investment commitment of $201M from Department of Energy funding and public/private partnership contributions, with a mandate to create a more competitive manufacturing environment ...	

Working Groups - OPC Foundation

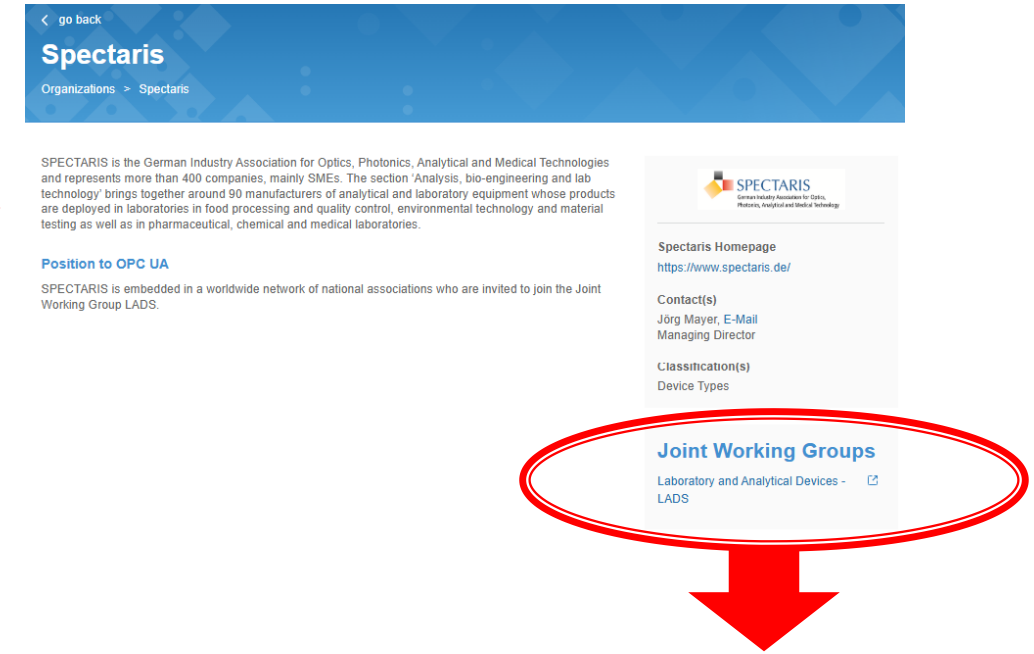
NAME	ABSTRACT	PARTNER ORG	CHAIR
AAS Subgroup for SMT - OPC UA Server Datasheet	Scope / Goals This is a subgroup of the Joint Working Group for Asset Administration Shell between IDTA and OPC Foundation. It will discuss the use cases for the corresponding purpose. This includes the content, format and extent of the to be provide...	IDTA - Industrial Digital Twin Association e.V.	
Additive Manufacturing	Scope / Goals The working group develops OPC UA Information Models for the industrial process chain of additive manufacturing ("AM") so that AM systems and other systems directly involved in the additive manufacturing process can be easily connec...	VDMA - Mechanical Engineering Industry Association	Martin Gehringer
Analyzer Devices - ADI	Scope / Goals Develop specifications for analyzers irrespective of the underlying device protocols. Analyzer devices are comprised of one or more analyzer channels with a single address space which has its own configuration, status and control. Examp...		Claude Lafond
Application Hierarchies	Scope / Goals The aim of the sub-group of the Harmonization Working Group is to create and maintain a living document (whitepaper) on OPC UA application hierarchies. OPC UA allows a variety of system architectures, including different options where O...	OPC Foundation	Wolfgang Mahnke
Artificial Intelligence	Scope / Goals Generative AI models such as language models based on the transformer architecture have shown the capability to generate text, specifications and source code. Using techniques such as prompt engineering and retrieval-augmented generatio...		Holger Kenn
Automatic Identification Devices - AutoID	Scope / Goals Develop specifications for identificaton devices executing a scan, read or write process. Comprises barcode, OCR, 2D code, RFID, NFC, RTLS, sensors and mobile computing. Within the last ten years OPC Foundation and AIM-D e.V. created th...	AIM – Association for Automatic Data Capture	Bernd Wieseler
AutomationML model	Scope / Goals Develop an OPC UA specification for AutomationML and an XML schema to describe OPC UA Servers and their communication parameters in an AutomationML file and to integrate UANodeSet address space XML files into AutomationML. Overview Prod...	AutomationML e.V.	Miriam Schleipen

Collaborations – New Landing pages

Example: Spectaris - https://opcfoundation.org/about/organizations/view/5



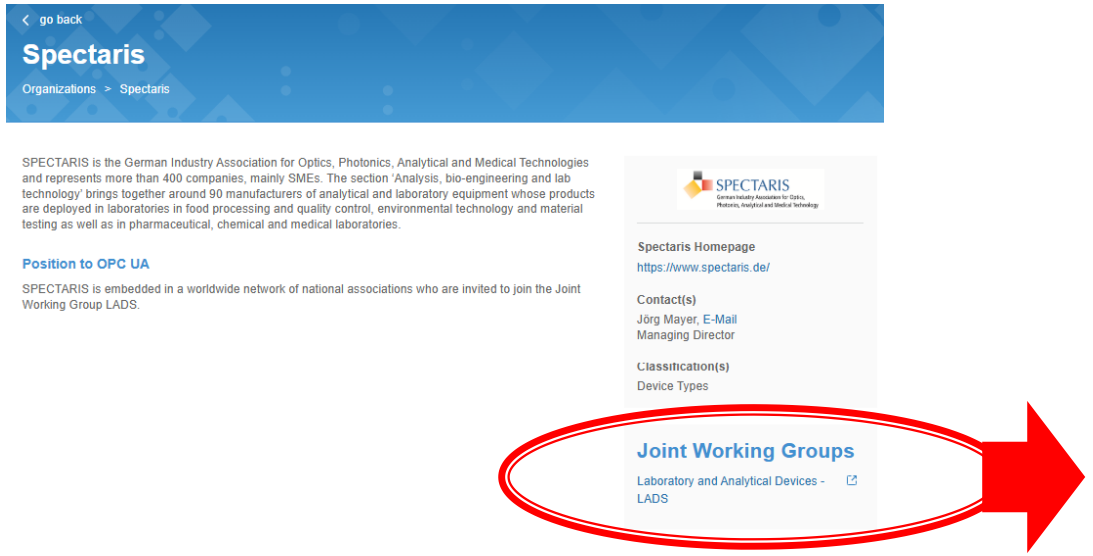
PROFINET Standardization Group (PNO)	The PROFIBUS and PROFINET user organization (PNO: Profibus Nutzerorganisation e. V.) was founded in 1989 and is the largest automation community in the world and responsible for PROFIBUS and PROFINET, the two most important enabling technologies in a...
SERCOS - Serial Real-time Communication System	Sercos is one of the world's leading digital interfaces for communication between controls, drives, I/Os and other decentralized peripheral devices, such as encoders, safety devices and vision systems. Since its first release in 1991, Sercos has be...
Spectaris	SPECTARIS is the German Industry Association for Optics, Photonics, Analytical and Medical Technologies and represents more than 400 companies, mainly SMEs. The section 'Analysis, bio-engineering and lab technology' brings together around...
The Open Group	The Open Group is a global consortium that enables the achievement of business objectives through technology standards and open-source initiatives by fostering a culture of collaboration, inclusivity, and mutual respect among our diverse group of 900...
TMC - Tobacco Machine Communication	In most tobacco factories the secondary machine communication landscape is highly fragmented, both for machine-to-machine and machine-to-higher systems data streams. The fragmentation is evident on many levels: physical media, protocols, data formats...
USE61400-25 User Group	The purpose of the user group is to motivate and support a global use of the IEC 61400-25 standard series within wind power. The purpose shall be supported by global promotion, advertising and marketing activities in order to expose the standard seri...
VDA - German Association of the Automotive Industry	The German Association of the Automotive Industry (VDA) consolidates more than 650 manufacturers and suppliers under one roof. The members develop and produce cars and trucks, software, trailers, superstructures, buses, parts and accessories as well ...
VDMA - Mechanical Engineering Industry Association	The VDMA is an advisor, lobbyist, network platform, sparring partner and voice of the mechanical and plant engineering industry – and has been for more than 130 years.It represents over 3,600 mainly small and medium size member companies in the...
VDW - German Machine Tool Builders' Association	VDW, the German machine tool builders' association, represents the German machine tool industry. It represents its members to the public, policy makers, business associates and the academic community, both nationally and internationally. It serves ...
WCI - ISA100 Wireless Compliance Institute	The ISA100 Wireless Compliance Institute (WCI) is an organization that functions as an operational group within The Automation Standards Compliance Institute (ASCI), to establish specifications and processes used in the testing and certification of w...
Weihenstephan Standards Working Group	The WS Industrial User Group is made up of the market leaders in the food and packaging industry and comprises more than 100 companies, associations, and research institutes. The group is made up of partners from the fields of engineering, IT & ...

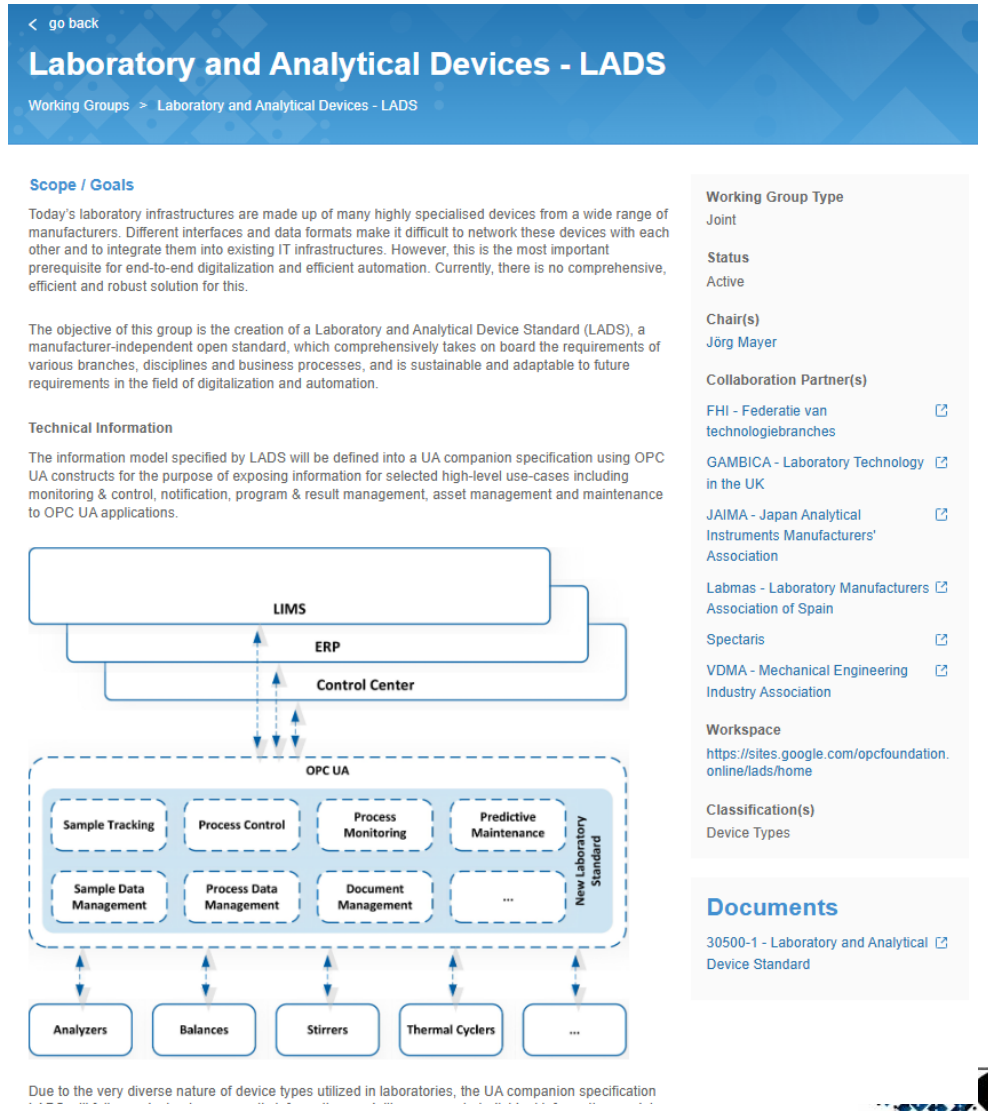


List of all
- activities
- working groups
- contact persons,
- results,
- Marketing...

Collaborations – New Landing pages

Example: Spectaris - https://opcfoundation.org/about/organizations/view/5





List of
- Status of the group
- Chairperson
- Collaboration partners
- Link to Workspace
- Link to documents
- Marketing..

Offerings & Information

History of the OPC Success Journey

Updated!

Call for action: Please contact us and add your important milestones of OPC UA history!
Link https://opcfoundation.org/about/opc-foundation/history/

History – News for 2025

2025

The OPC Foundation supports over 1019 members worldwide.

For the first time, 5 representatives of IT companies (AWS, Google, Huawei, Microsoft and SAP) are represented the board of the OPC Foundation

New Board of Director Members:
- Steve Blackwell – Amazon Web Services
- Matthias Hollenders – SAP
- Dr. Jingyi Hu – Huawei
- Praveen Roa, Google Cloud

OPC Foundation Certification program
- Launched OPC UA FX(TM) Certification Program for OPC UA FX(TM) Controllers
- OPC UA Safety Compliance Test Tool (UASCTT) for Client/Server certified by TÜV Süd
- Launched Ethernet-APL Certification

2025

OPC UA v1.05.05 released
This specification version includes:
- New Part 25 for Object Serialization
- New Part 26 for LogObject Model
- Added file-based ServerConfiguration

OPC UA v.105.06 released
This specification version includes:
- Added IEC CDD mapping
- Added Kafka transport mapping
- Updated JSON encoding
- Updated security use cases and examples
- Enhancing Auditing events
- Updated JWT Issued User Identity Tokens

2025

- **Procter & Gamble, Microsoft**
  OPC UA delivers data for 115 brands of your daily life

Learn more!

- **Kunying Digital Technology**
  OPC UA enhanced production efficiency, product quality, and adaptability – driving digital transformation in China's machining industry.

Learn more!

- **ASFINAG, evon**
  OPC UA offers a highly scalable solution for tunnel monitoring systems in Austria including millions of data points connected and centrally managed with OPC UA

Learn more!

2025

Releases:
- OPC 40082-3 PlasticsRubber – Peripheral devices
- LSR Dosing Systems – V 1.02
- OPC 40444 Textile Testing Devices
- OPC 40210 Geometric Measuring Systems – V 1.00.1
- OPC 40570 Wire Harness Manufacturing
- OPC 40740 Process Air Extraction and Filtration Systems – V 1.0.1
- OPC 40200 Weighing Technology – V 2.00.0
- OPC 40001-1 Machinery Basic Building Blocks – V 1.04.0
- OPC 40001-101 Machinery Result Transfer – V 1.01
- OPC 21011 Quality Process and Life Cycle Management of Testing Tools
- OPC 10100-1 WOT Connectivity – API Definition – V 1.01
- OPC 40560 Mining – General – V 1.01
- OPC 40010-1 Robotics – Vertical Integration – V 1.02
- OPC 40505 Wireless Machine Tool Peripherals
- OPC 30080 FDI Specification – All Parts – V 1.4
- OPC 40001-4 Machinery Energy Mgmt
- OPC 40450-1 Joining Systems Base – V 1.01
- OPC 40451-1 Tightening Systems General – V 2.00.1
- OPC 10000-211 Global Positioning

New Working Groups:
- Battery Solution

Call for action: Please contact us and add your important milestones of OPC UA history!
Link https://opcfoundation.org/about/opc-foundation/history/

OPC UA Success Journey 2003 – 2025

2003

Start of OPC UA

OPC Unified Architecture (OPC UA), comprising of 13 separate parts, is created by the OPC Foundation.
The first OPC UA working group meeting was held on November 3-7, 2003.
The original OPC specification is now referred to as "Classic OPC" or "OPC Classic".

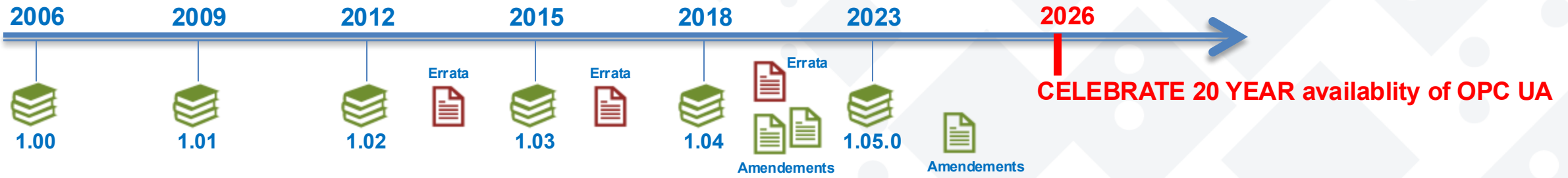
2025

The OPC Foundation supports over 1019 members worldwide.

For the first time, 5 representatives of IT companies (AWS, Google, Huawei, Microsoft and SAP) are represented the board of the OPC Foundation

New Board of Director Members:
– Steve Blackwell – Amazon Web Services
– Matthias Hollenders – SAP
– Dr. Jingyi Hu – Huawei
– Praveen Roa, Google Cloud

OPC UA availability 2006 – 2029: 19 years of stability and backward compatibility



Success Stories 2025

- Call for action: Who delivers the next success story?

- https://opcfoundation.org/resources/case-studies/

2025

– **Procter & Gamble, Microsoft**
OPC UA delivers data for 115 brands of your daily life

Learn more!

– **Kunying Digital Technology**
OPC UA enhanced production efficiency, product quality, and adaptability – driving digital transformation in China's machining industry.

Learn more!

– **ASFINAG, evon**
OPC UA offers a highly scalable solution for tunnel monitoring systems in Austria including millions of data points connected and centrally managed with OPC UA

Learn more!

Information: Update brochure “OPC UA”

Find more information https://opcfoundation.org/resources/brochures/

Integrate MxD from USA, reflect BoD changes, higher focus on China, and new collaborations

8 OPC UA IN THE WORLD

MANUFACTURING USA INNOVATION INSTITUTES

Under the auspices of The National Institute of Standards and Technology (NIST), manufacturing innovation institutes (MIIs) have been formed and funded by Federal agencies, including the U.S. Department of Energy and U.S. Department of Defense. Both CESMII and MxD, two such innovation institutes, are utilizing OPC UA technologies throughout their services and programming.

CESMII IS LEVERAGING OPC UA

In an effort to identify common data in machines, CESMII is leveraging OPC UA as an industry standard interface. Through repeatable use of OPC information models or, as CESMII calls them, “Smart Manufacturing Profiles,” these semantic models become reliable, scalable interfaces for developers, rather than starting from scratch with individual data extraction. These data profiles will remain an open standard from which the entire industry can benefit, thus, accelerating innovation, research, and development projects supported through the Institute.

CESMII’s program and administrative home is with the University of California Los Angeles (UCLA), in partnership with the U.S. Department of Energy’s Advanced Manufacturing Office.

MXD – AN INCUBATOR FOR OPC UA RESEARCH AND DEMONSTRATION

Positioned in the heartland of US manufacturing, MxD boasts a vast facility in Chicago, Illinois, dedicated to research and innovation through the hosting of various experiments and test-beds in its fully outfitted demonstration center. Industry partners leverage MxD resources for implementations ranging from Proof-of-Concept (PoC) to advanced research and testing of industrial automation applications. MxD is dedicated to solve critical manufacturing challenges by accelerating digital adoption, empowering a skilled workforce, and modernizing supply chains.

MxD, as designated by the U.S. Department of Defense is also the National Center for Cybersecurity in Manufacturing.

DIGITAL TWIN CONSORTIUM (DTC) THE AUTHORITY IN DIGITAL TWIN™

Digital Twin Consortium drives awareness, adoption, interoperability, and development of digital twin technology, through a collaborative partnership with industry, academia, and government expertise. The Consortium is dedicated to the overall development of digital twins and they accelerate this market by propelling innovation and guiding outcomes for technology end users.

DTC IS MAKING OPC UA MODELS MORE ACCESSIBLE

The DTC is maintaining the popular UA Nodeset Web Viewer on their open-source GitHub repository. It allows upload of OPC UA information models to the UA Cloud Library.

https://github.com/digitaltwinconsortium

Source: www.iiconsortium.org

One the major goals of the “Industrial Internet Consortium” (IIC) is the creation of industry use cases and testbeds for real-world applications. The testbeds create recommendations for the reference architecture and frameworks necessary for interoperability. OPC UA is the enabling technology for SoA interoperability and thus part of the IIC Connectivity Framework published in February 2017.

IIC TESTBEDS USING OPC UA

1. Smart manufacturing connectivity for brownfield sensors
2. Time sensitive networking (TSN) testbed
3. Smart factory web testbed

»Manufacturing thrives on scalable connectivity and intelligence to drive automation, flexibility, and productivity on the shop floor. With OPC UA as a key enabler — from sensor-level communication to cloud integration — SAP is committed to supporting the standard and contributing to its continuous evolution.«

Matthias Hollenders, VP Product Management Manufacturing SAP SE, OPCF Board

»The OPC UA standard serves as a cornerstone and enabler of industrial digital transformation. It revolutionizes data exchange in industrial systems by providing a unified, secure, and semantically rich communication framework. We believe that choosing OPC UA-compliant devices and technologies ensures our customers remain compatible with emerging technologies for the long term, thereby protecting their investments.«

Charles Ben, CEO, Beijing Mestime Information Technology Co., Ltd. – OPCF China China Board Member

»OPC UA established a robust, standardized foundation for secure interoperability across industrial systems. By adding IDSA’s rules and framework for describing the governance and sovereignty of the exchanged data in cross-company, cross-domain, and cross-border scenarios, companies gain the confidence to exchange and leverage data without boundaries. This collaboration unlocks the potential for new business models, driving innovation and scalability across industries.«

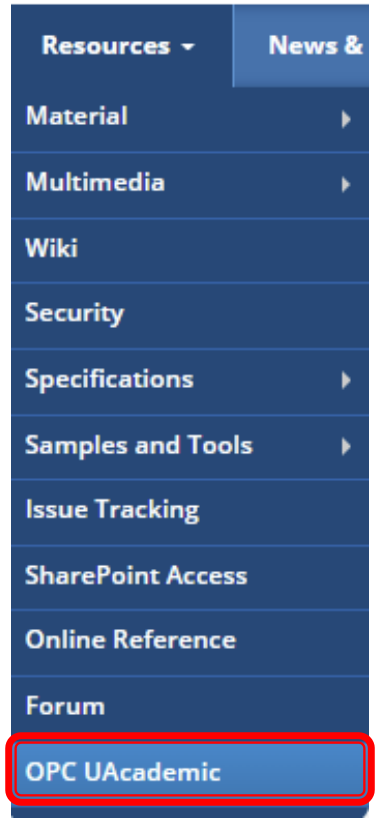
Lars Nagel, SCEO, International Data Spaces Association

»Since the OPC Foundation launched its new OPC UA technology and standards system, industrial digitalization has undergone tremendous change—encompassing early Industry 4.0 innovations like the Industrial Internet of Things (IIoT) and digital twins, as well as more recent trends such as industrial AI and industrial ontologies. Yet no matter what new trends, technologies, or concepts emerge, OPC UA can adapt quickly, thanks to its flexible technical architecture and scalable standards.«

Yan Ding, System Designer and R&D Director, Hollysys Research Institute

Call for action: Include more Japanese Content!

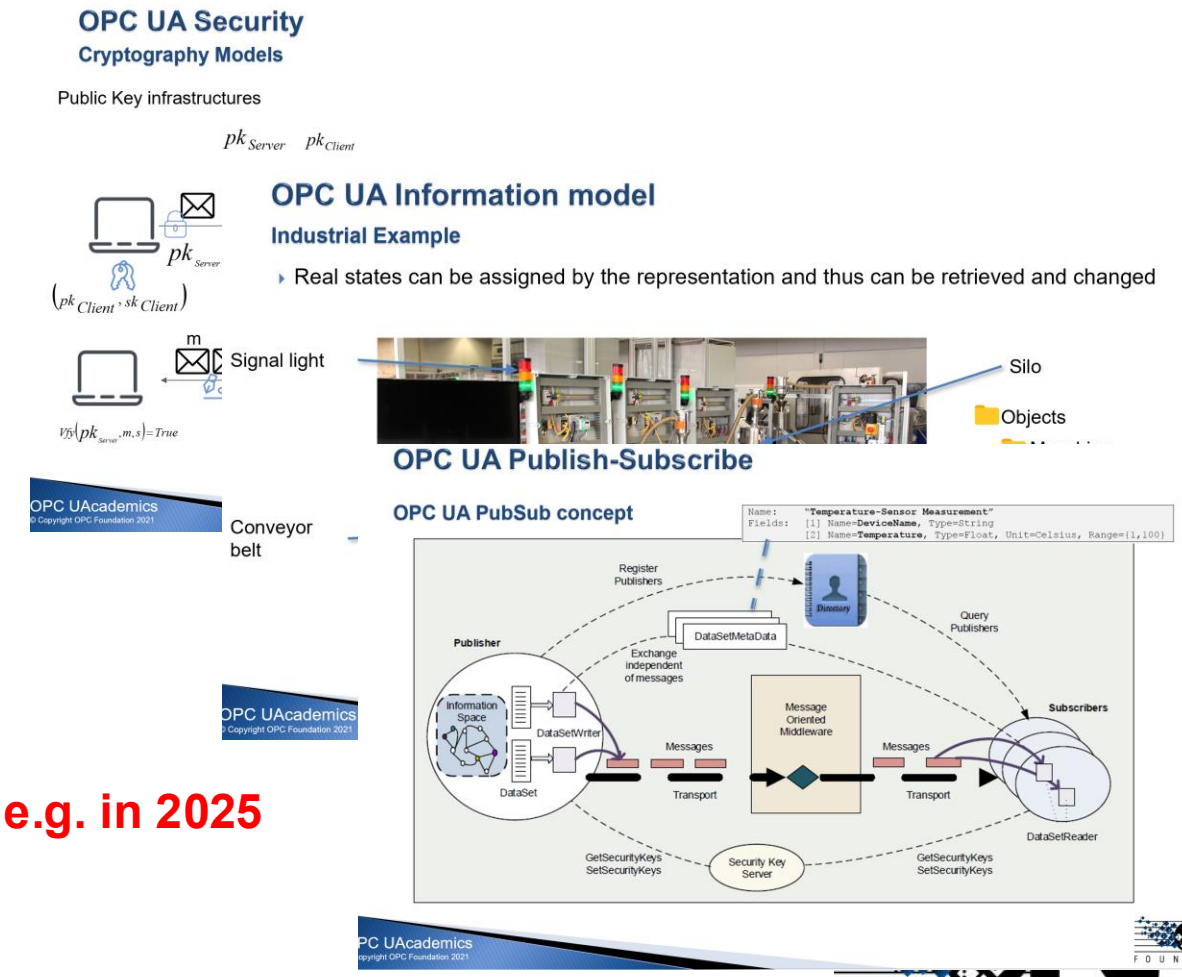
OPC UAcademic: free of charge



Content available in 6 languages:

- Introduction to OPC UA
- The History of OPC and OPC UA
- The Specifications
- OPC UA Communication
- Security in OPC UA
- OPC UA Address Space Model
- OPC UA Services
- OPC UA Information Models
- OPC FLC Initiative
- OPC UA Service mappings
- OPC UA Profiles
- OPC UA Aggregation & Discovery
- OPC UA Pub/Sub
- Companion Specifications
- Implementation of OPC UA
- Tools and frameworks
- Use cases
- Architectures
- Introduction to practical exercies

Registration form on OPC Foundation website:
https://opcfoundation.org/resources/opcuacademic/

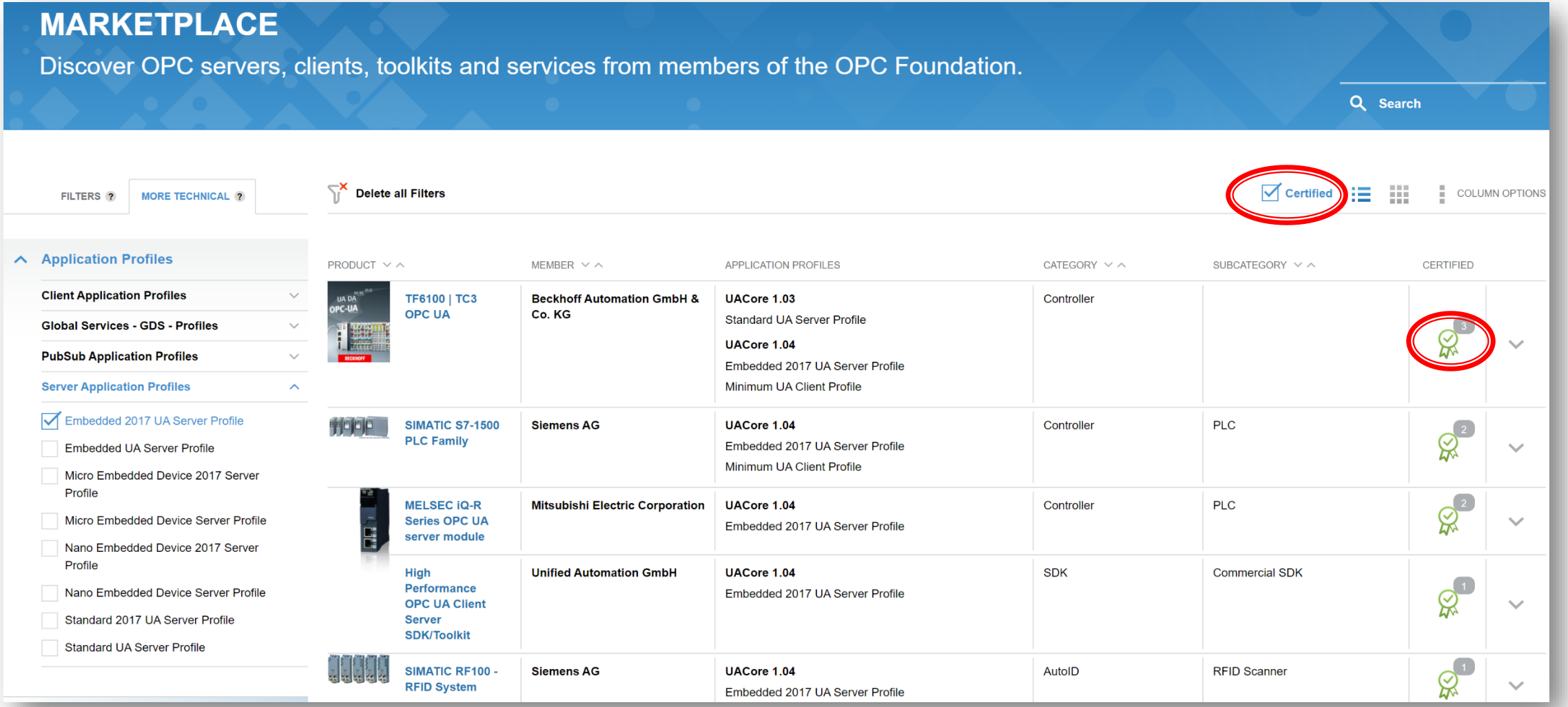


Continously improvement e.g. in 2025

- **Pub Sub over MQTT**
- **File Transfer**

OPC Marketplace

https://opcfoundation.org/products/



Statistics – Traffic (clicks!) OPCF Web (from 01.01 – 29.10.2025)

Results of matomo tracking - Interpretation of ranking

(1) Developer tools are most important → 21%
UACTT, Samples, specifications, ..

(2) About → 12%
What is OPC UA?

(3) Forum (11%)

(4) Products (5%)
Marketplace 5% → 46.276 unique clicks in 10 month → 4.627 clicks per month !

Most used filters
(1) Certified products 3.514 clicks per month !
(2) SDKs
(3) Gateways

Summary

Looking into the future:

- **IT & AI need Semantic Data**
  - Growing demand for **semantic, machine-understandable data**
  - Increasing recognition of **OPC UA's rich semantic models** and **standardized interfaces**
  - **Largest pool of standardized domain models** (427+), including **AAS** and **Catena-X**
  - **19 years of stability** (since 2006) with **no compatibility breaks**
  - Strong **ecosystem**: commercial solutions, open source, education
  - Robust **legal protection framework**

- **OPC UA – The De Facto Standard**
  - **OPC UA Modeling** is the de facto modeling language of the automation world
  - **OPC UA REST** is the de facto standard for easy IT/cloud access to standardized field information

- **Next Steps for OPCF**
  - Deliver **Starter Kits** (with partners) for e.g. AAS, DPP
  - and other emerging initiatives

Call for Action:

- Please help to loop in Japanese End-Users into the OPCF Cloud Initiative End-User counsel

- Working Groups
  - Interest to join OPCF “Battery Solution” JWG?
  - Interest to join OPCF “OPC UA for AI” WG?

- Marketing
  - Include a Japanese End-User into the OPC brochure
  - Find a Japanese OPC UA Success Story
  - Help translating the new OPC UAcademic content
  - Help to optimize Japanese OPC Web

OPC Foundation: The United Nations for Industrial Automation

Thank you! - Questions?

Stefan Hoppe
President & Executive Director OPC Foundation
Stefan.hoppe@opcfoundation.org

Please subscribe for our newsletter
https://opcfoundation.org/