

OPC DAY
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Defining & Leveraging The Industrial Digital Twin

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Industry 4.0 = Industry 3.0 + Digital Twin

- A digital twin is a **digital representation of a physical asset (e.g. machine)**
 - A 3D wireframe model
 - An Automation ML definition
 - An OPC UA Information Model
 - A digital nameplate
 - A simulation of the behaviour of the asset
 - A collection of PLC function blocks
- Important: It gives the data emitted by the physical asset **meaning**



The Industrial Digital Twin has Many Names

- The Plattform Industrie 4.0 calls it Cyber-Physical System
- The Clean Energy & Smart Manufacturing Innovation Institute calls it Smart Manufacturing Profile
- Industrial Digital Twin Association calls it Asset Administration Shell
- The Digital Twin Consortium calls it Digital Twin
- The OPC Foundation calls it Information Model

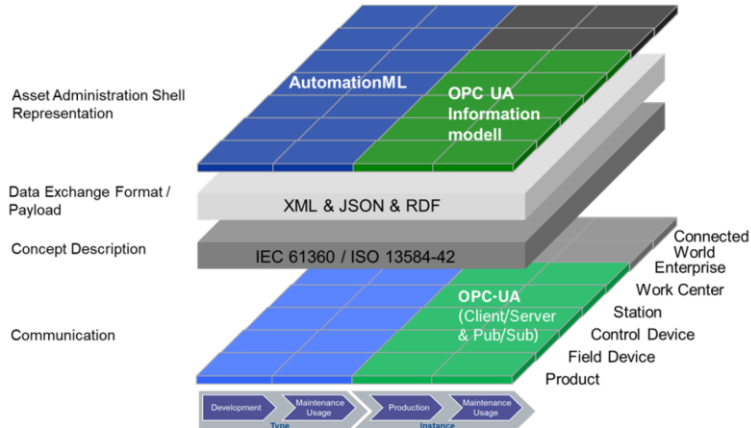


Standardized Industrial Digital Twins?

- So far, only the VDMA has standardized industrial digital twins at scale, and they are **leveraging OPC UA**:
 - Over 450 companies are involved
 - Over 35 working groups
 - Published via the OPC Foundation as OPC UA Companion Specs
 - Nodeset XML representation uploaded to GitHub
 - From next week: Hosted in **UA Cloud Library** by OPC Foundation
 - Searchable
 - Automatic integration into analytics software
 - Automatic integration into simulation software



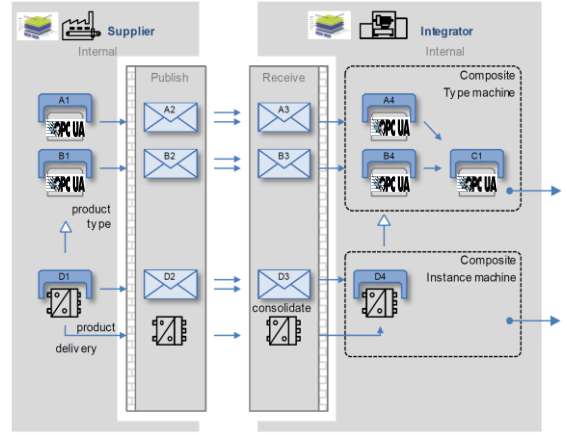
Digital Twins in RAMI4.0 Cube



OPC UA Integration into Asset Admin Shell

A vendor-neutral **Asset Data Sharing Service**

- It's a shell (container)
- Cross-Platform
- Covers full lifecycle of the Asset
- Contains OPC UA Info Model
- Microsoft one of the authors
- Open-Source implementation
- HTTP REST interface by SPS'21
- Uses OpenOfficeXml format

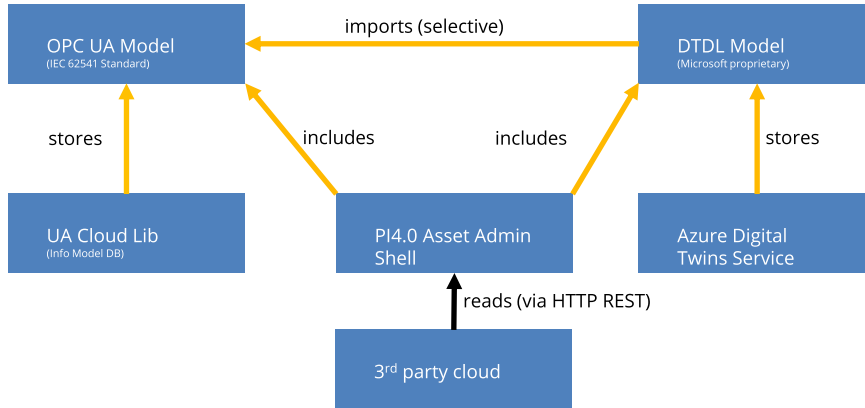




OPC UA Integration with Azure Digital Twins Service

Feature	OPC UA Concept	DTDL Concept
Data item ("tag")	Variable Node	Telemetry
Command & Control	Method	Command
Parent/Child Relationship	Node Parents/Children	Relationship
Folders	Object Node	Interface
References/Links	Link	Relationship
Message Payload Format	Encoding	Schema
Data Model Format	XML	JSON-LD
C-Style Structures	Complex Types	Complex Types (future)

How it all Fits Together



[barnstee/UANodesetWebViewer: An OPC UA information model web viewer \(github.com\)](https://github.com/barnstee/UANodesetWebViewer)

Industrial Digital Twins for Carbon Reporting

Factory

Cloud

Any Location

