



Factory Automation Tour

OT/IT-integration

Who are we...?



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Agenda

Introduction

Challenge 1

Challenge 2

Challenge 3

Big picture

OT/IT-challenges

Connecting OT and IT

Is this secure ?

- Why integrate OT and IT?

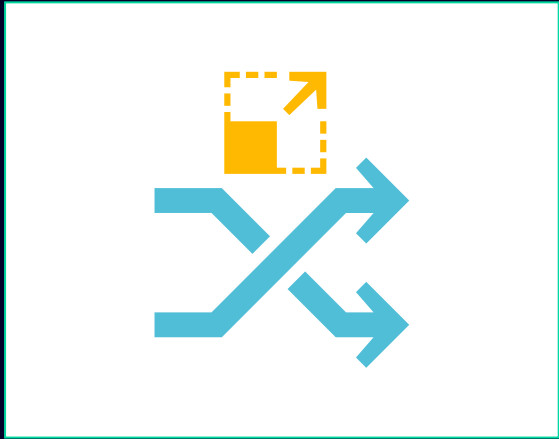
- OT vs IT differences?

- Connecting to production IT
- Connecting to the cloud

- Sign & Encrypt
- Integrated security in TIA

New customer requirements
Changing the manufacturing paradigms

I want it flexible



Optimize the flexibility of
the shop floor

I want it now



Optimize the workload
to achieve a faster
production

I want it cheaper



Optimize the whole
supply chain

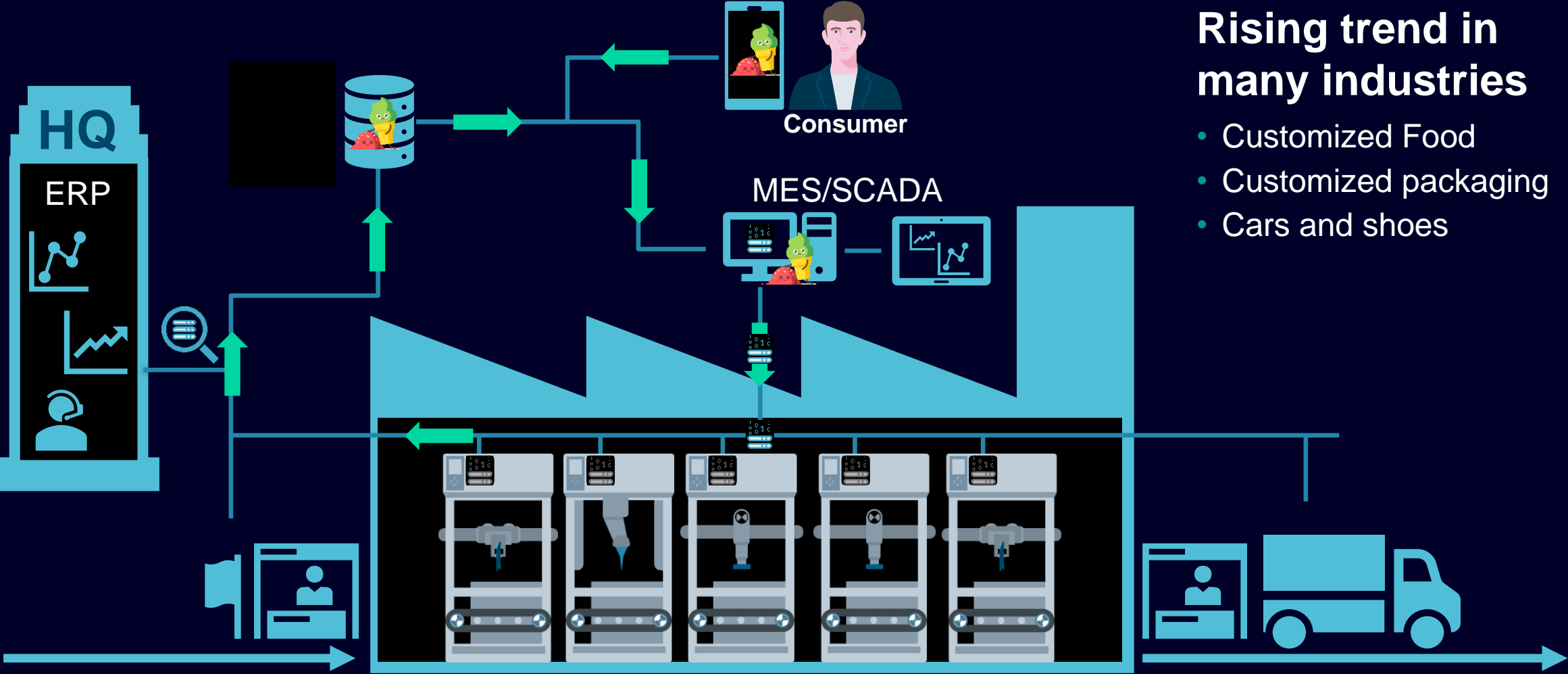
I want traceability



Full record of all
production steps

OT/IT-integration is a key enabler

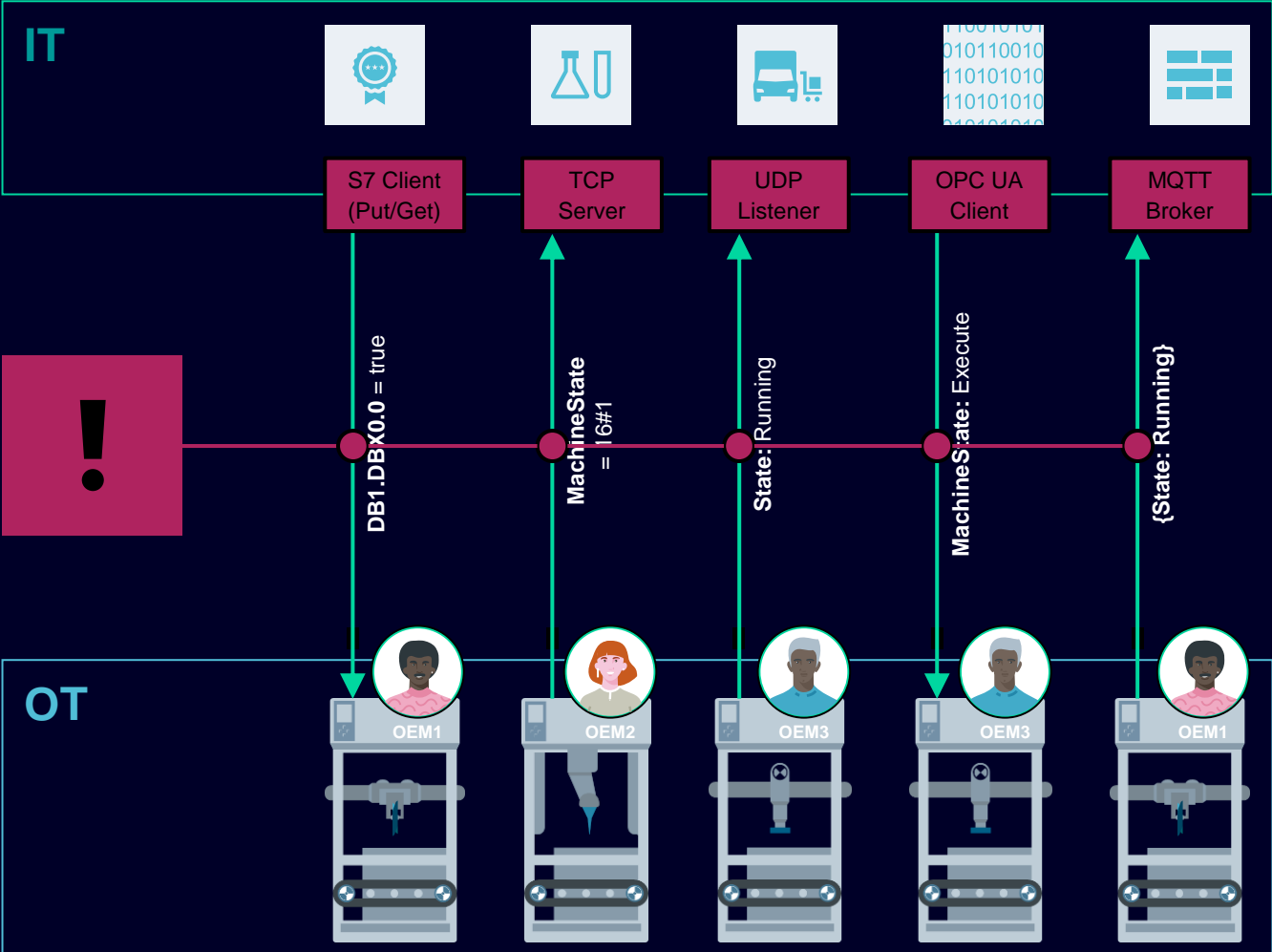
Big picture – Digital Factory



Rising trend in many industries

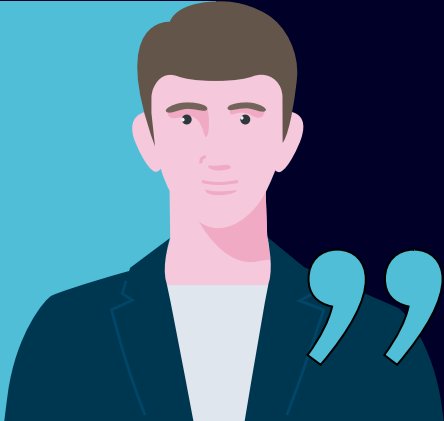
- Customized Food
- Customized packaging
- Cars and shoes

Today's situation – various communication layout



Integrating various machines is always a challenge and thus **expensive!**

Is there a **more efficient** way?



End customer



Siemens

#standardization

Big picture

Modular machine integration and IT-connectivity



Rising trend in many industries

- Standardized communication
- Plug & work
- IT-connectivity
- Eco system



Machine



Target Group Orientation



End customer OT

I want to reduce downtime and minimize integration cost by using communication standards!



Machine Builder (OEM)

I want to eliminate effort for machine-interface customization and re-use the equipment!



System Integrator

I want to easily integrate machine equipment and to speed up FAT.



End customer IT

I want all data to maximize my IIoT business and I must have secure data from OT.

| Challenge 1

What are the different requirements for OT and IT

OT - whats in it and its requirements



Minimal response times



Guarantee maximum availability



Use in complex environments



Multilevel protection concept

IT and its requirements



Controllable environments



Authentication of all users



Focus on privacy

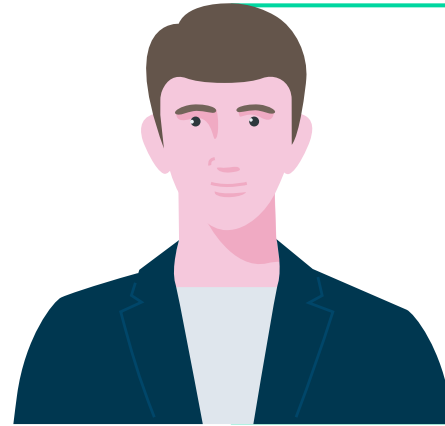
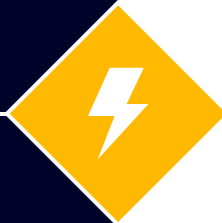


Secure transmission of various data types

| Challenge 2

Connection OT and IT and find the right architecture

Machine integration ?

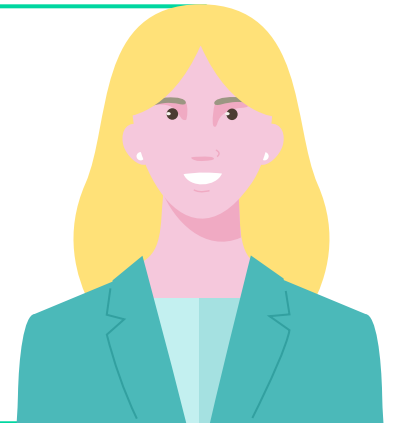


End customer

I would like to make machine integration with my MES/ERP system easier...



I think I can help you?



Siemens

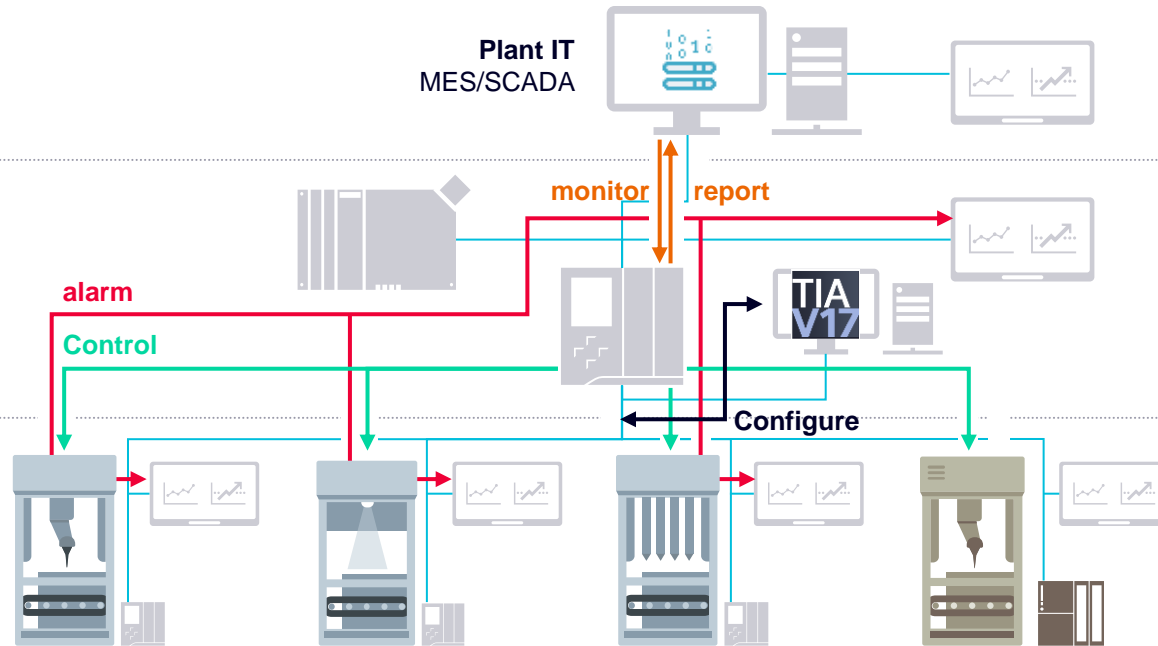
The right architecture and techniques

Different communication scenarios need different approaches

Plant

Line

Machine



Challenge:

Interconnect machines and systems performant and reliable

Easily control machines from a Line Controller

Configure data exchange from the engineering system

Send and display alarms

Report production data to a MES/SCADA system in Plant IT

Use open standards to increase efficiency

Consortia overview – four examples



... have one thing in **common**



Ensures interoperability similar to USB for office connectivity



Defines data models like a printed form



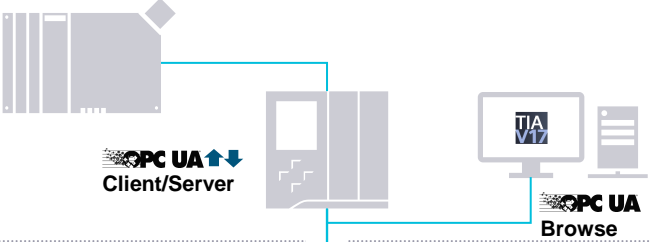
Implements security

Line Concept

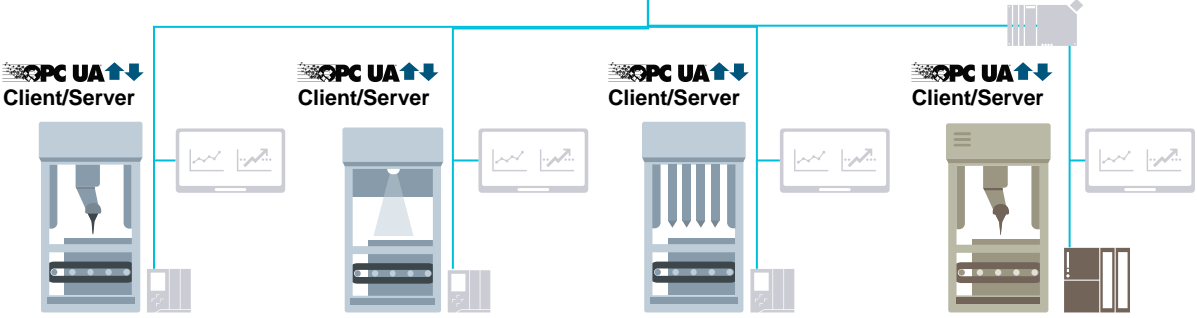
Solution with OPC UA Client/Server

Lets have a look at Client Server with OPC UA

Line



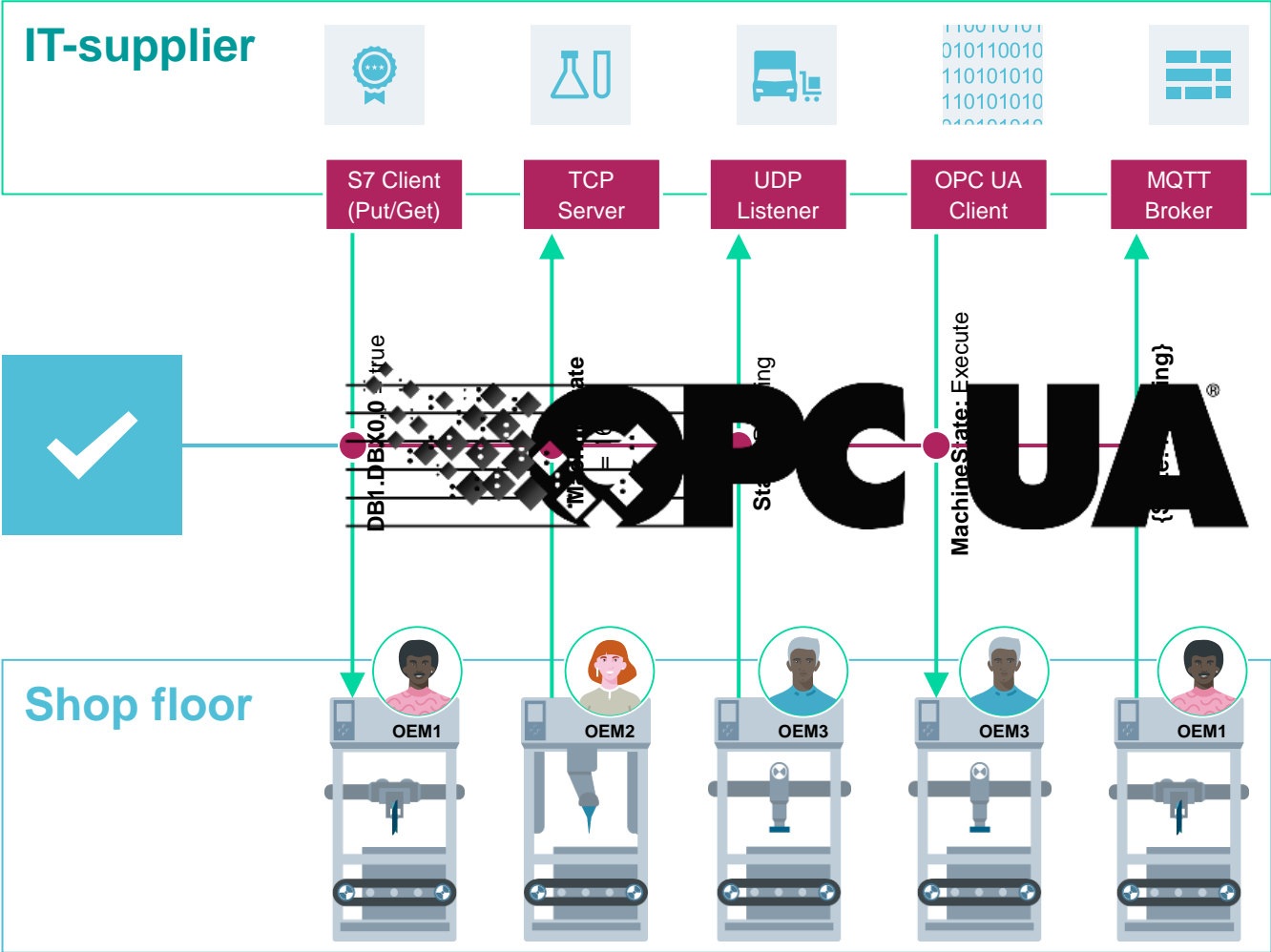
Machine



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Implement OPC UA

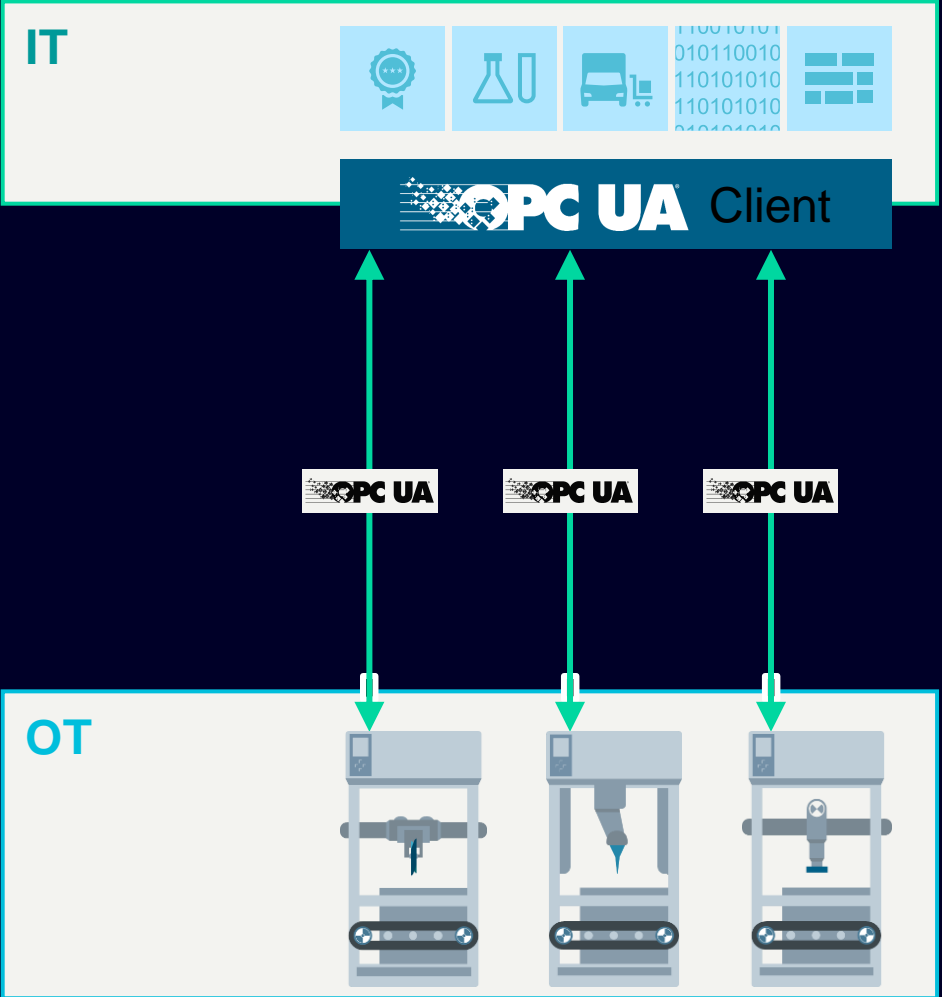


How do I harmonize my machine integration on shop floor level with **OPC UA** ?



End customer

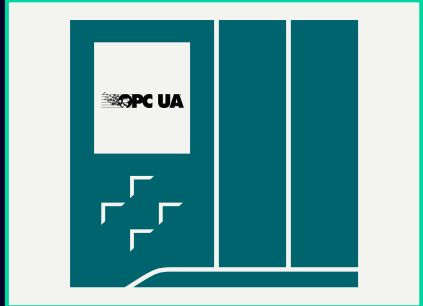
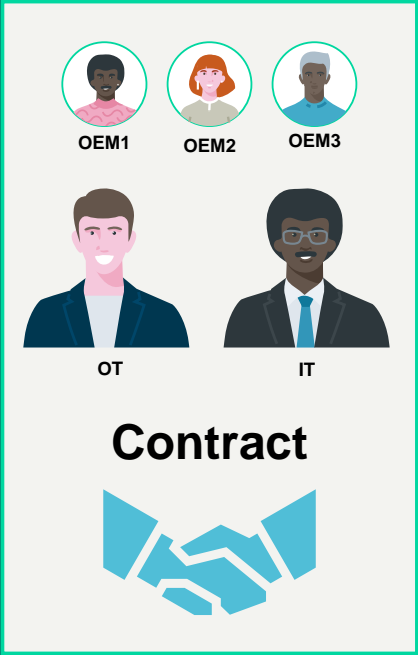
OPC UA Communication layout



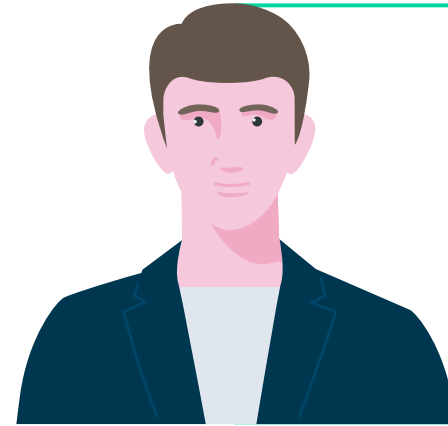
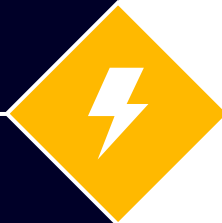
OPC UA

IT	Industries	Process automation	IO level	Factory automation	Energy	Consortia	Engineering
OpenFog DIN INTERNATIONAL DATA eClass	BACnet OPEN-SCS MDS	Open... DEXT NAMUR	EtherCAT ODVA sercos EUA IO-Link POWERLINK	ZVEI VMA CEMAFON EUROMAP OMAC MT GUMARIS	IEC International energetics	LN4.0 W3C INDUSTRIE 4.0	AutomationML PLCopen ISA

Collaboration domain specific information models
 The OPC foundation closely cooperates with organizations and associations from various branches. Specific information models of the standardization organizations are mapped onto OPC UA and thus become portable.



What about The cloud?

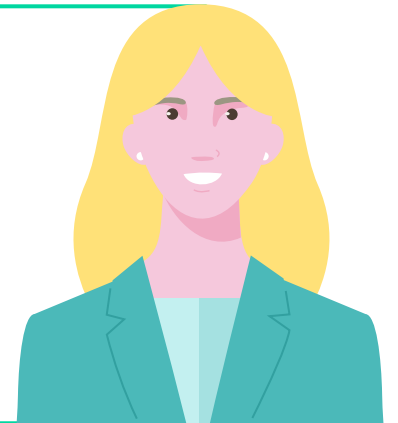


End customer

I would like to provide my data to the cloud to enable a worldwide factory monitoring...



Have you heard about MQTT?

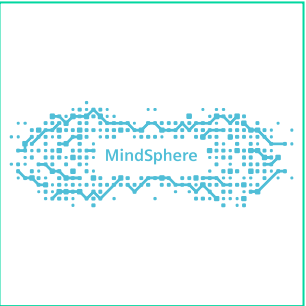


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Today – Cloud connectivity



... have one thing in **common**



Defines IoT transport mechanism



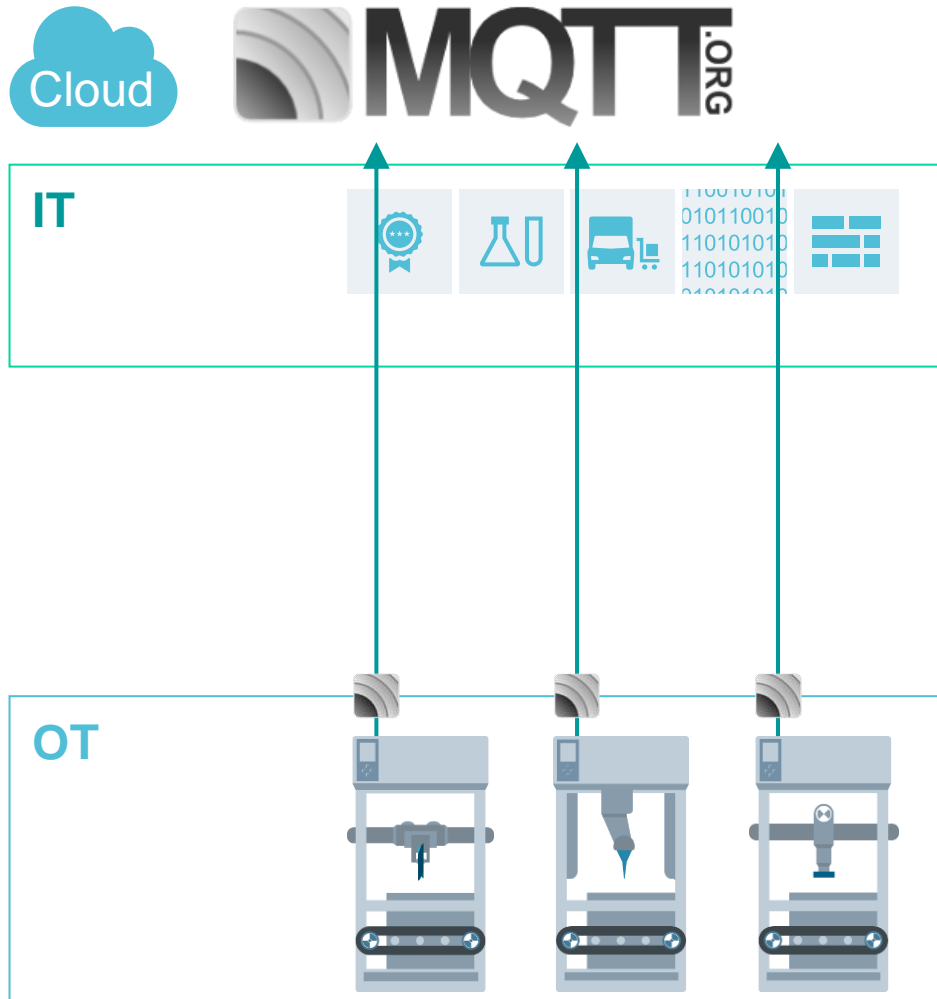
Implements security



Does **not** define data model

Greenfield

Use of MQTT for cloud connectivity



Hardware - benefits

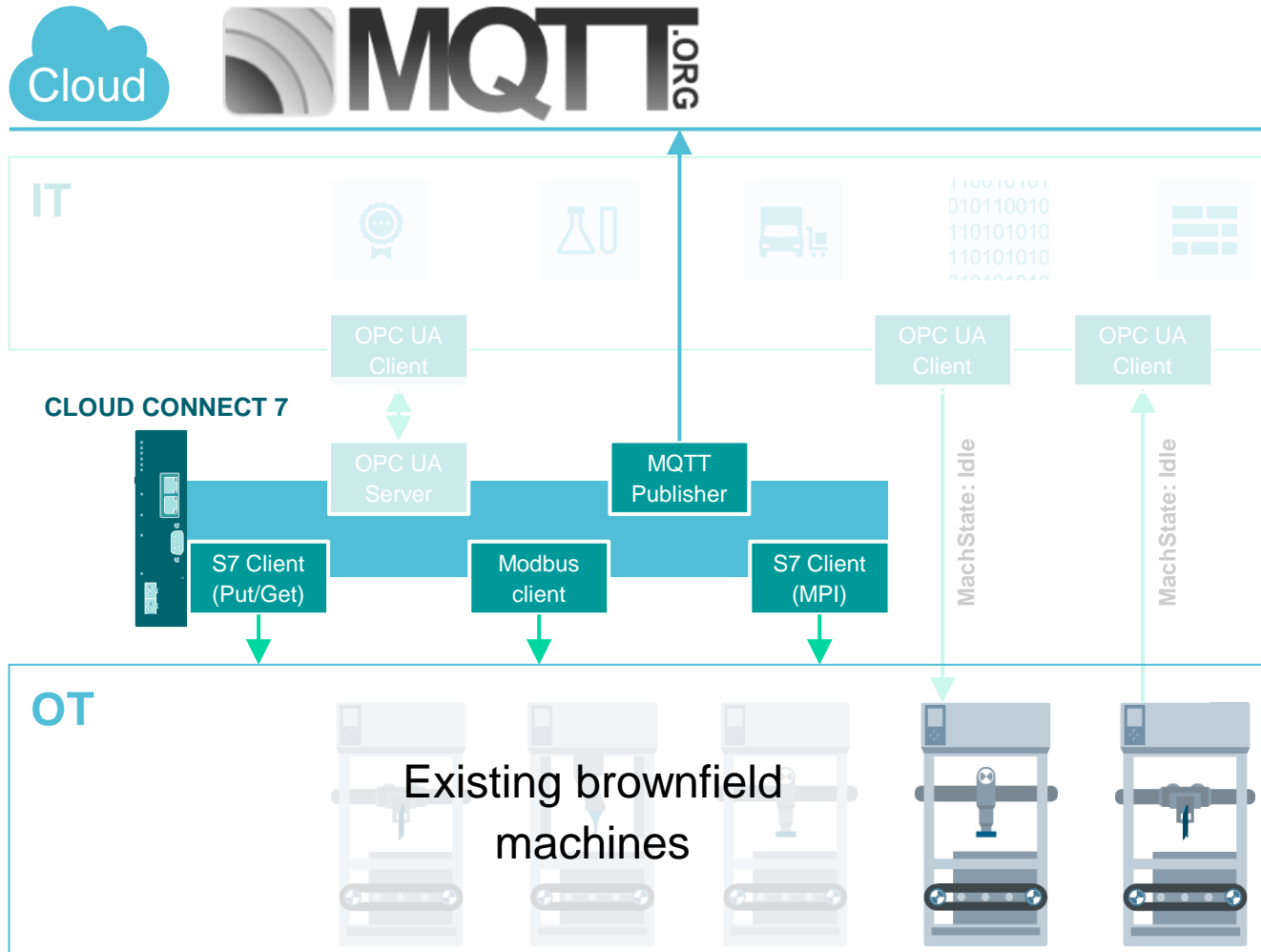
- CP1545-1 configured from TIA Portal
- Out of the box IT and cloud connectivity
- MQTT communication with Mindsphere, JSON & XML format

Software - benefits



- TIA Portal PLC programming
- Ready to Go MQTT library for free
- The 1200 or 1500 PLC can be a MQTT client without any additional hardware

Brownfield Integration by CloudConnect 7



Target groups

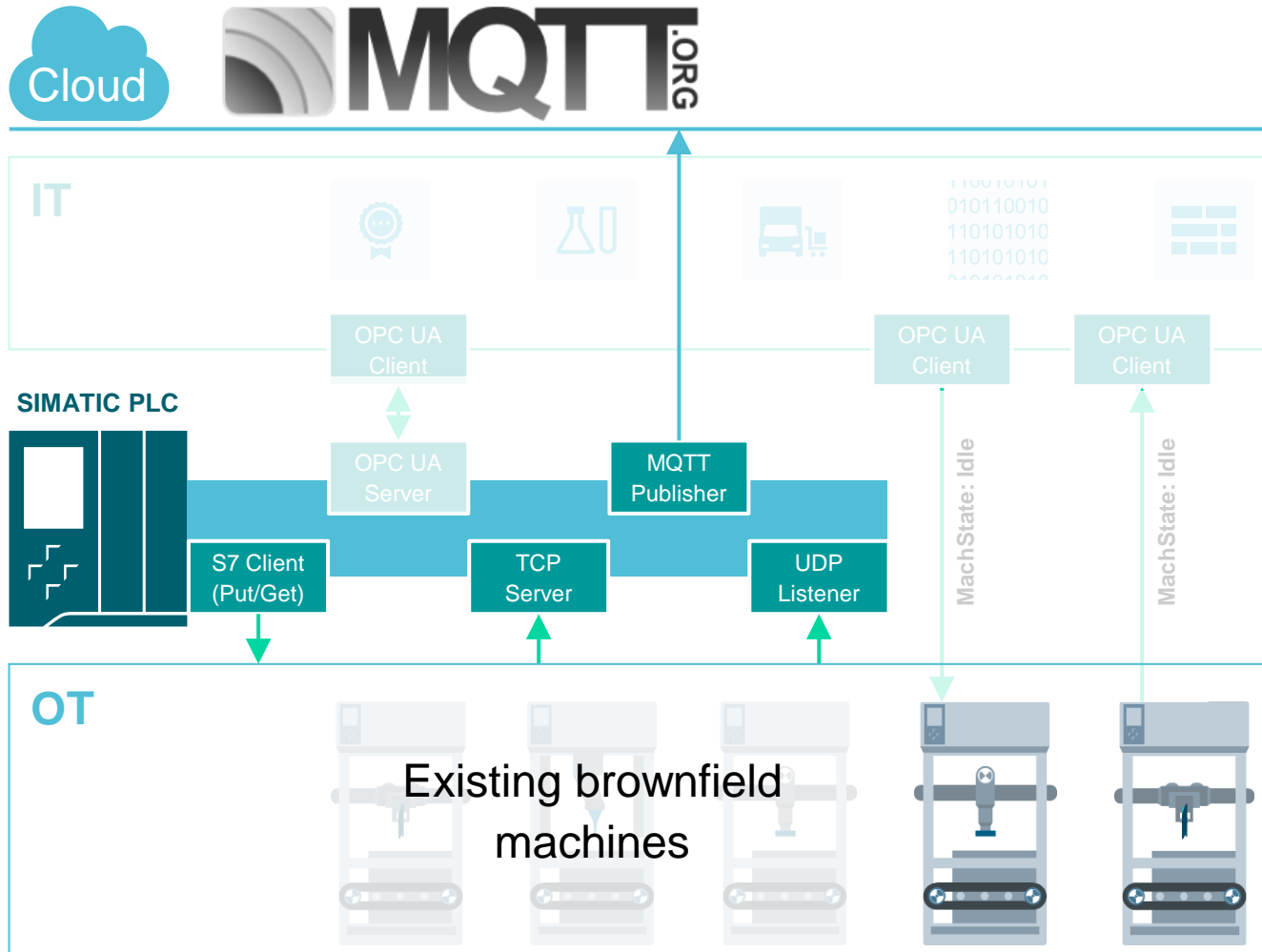
Customers looking for a “ready to use” solution

Benefits

- Web-based configuration
- Rugged industrial hardware design
- Wide range of communication drivers (S7, MPI Modbus)
- Out of the box IT and cloud connectivity

Brownfield Integration

Integration by SIMATIC PLC Gateway



Target groups

Automation-minded customers which are familiar with TIA Portal PLC programming

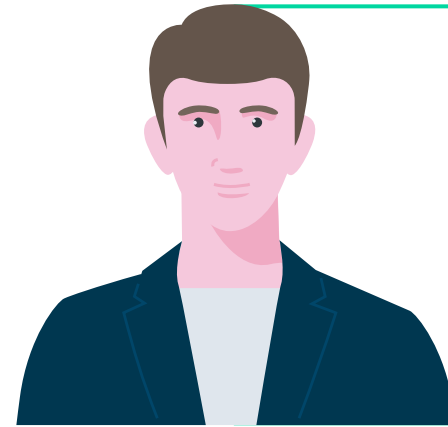
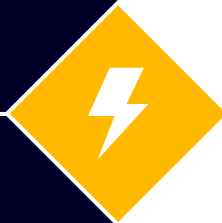
Benefits

- Solution is implemented within the TIA Portal
- Support of many protocols and different third party devices
- Scalable solution (S7-1200, S7-1500, ET200SP CPU)
- Same platform as automation technology
- Ready to Go MQTT Library

| Challenge 3

Is this secure?

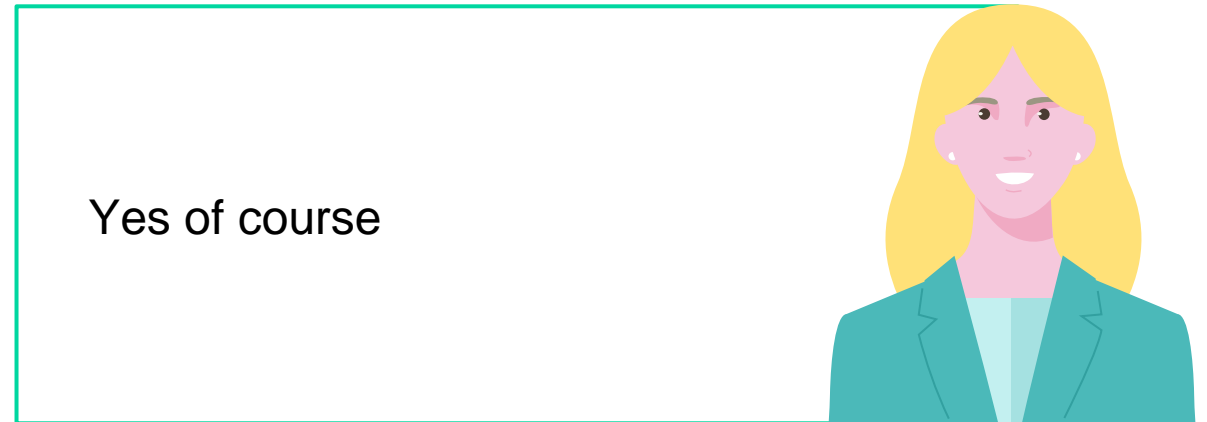
What about security ?



Is all this secure?



End customer



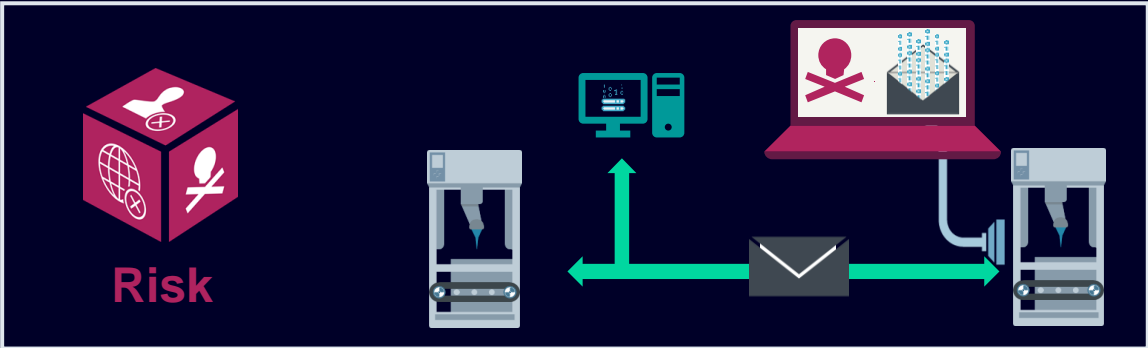
Yes of course

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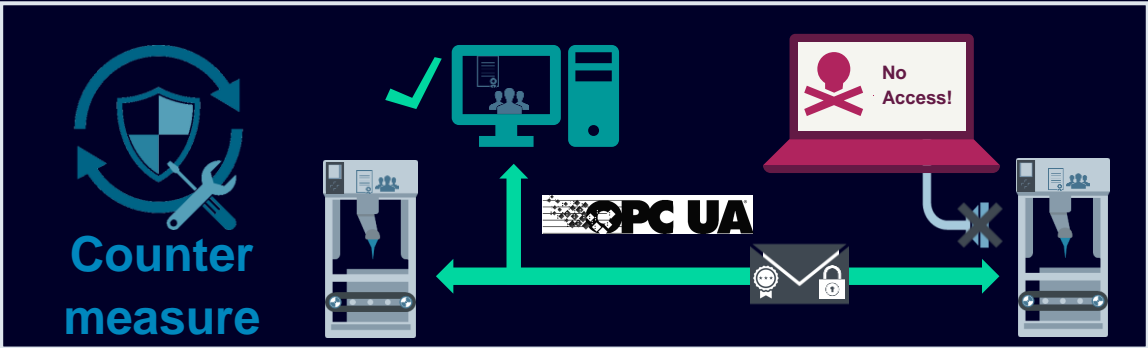
Security challenges

Authentication and Encryption

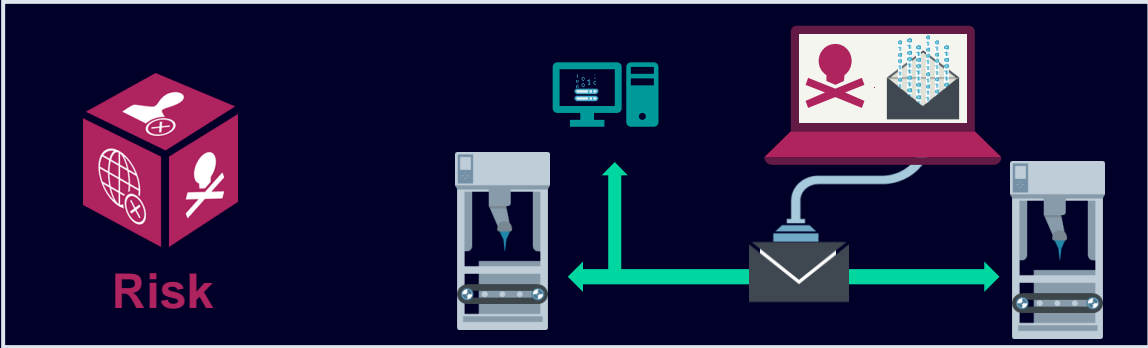
Challenge a: Everyone can connect!



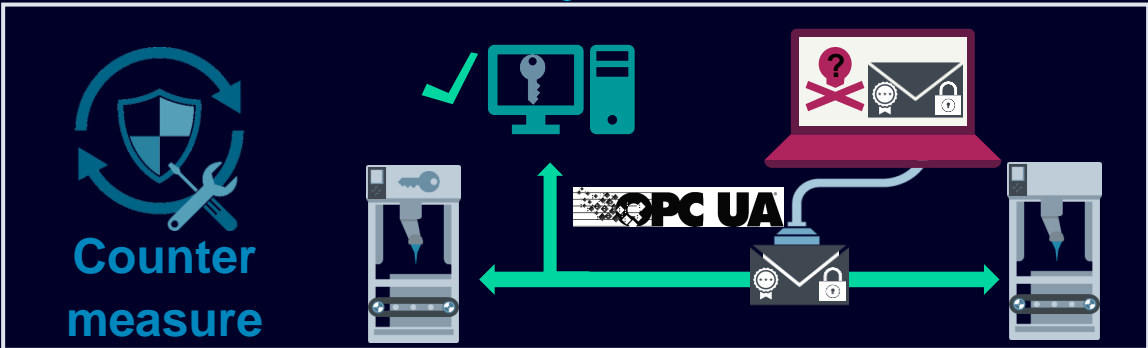
 **Authentication**



Challenge b: Data may be recorded or modified!



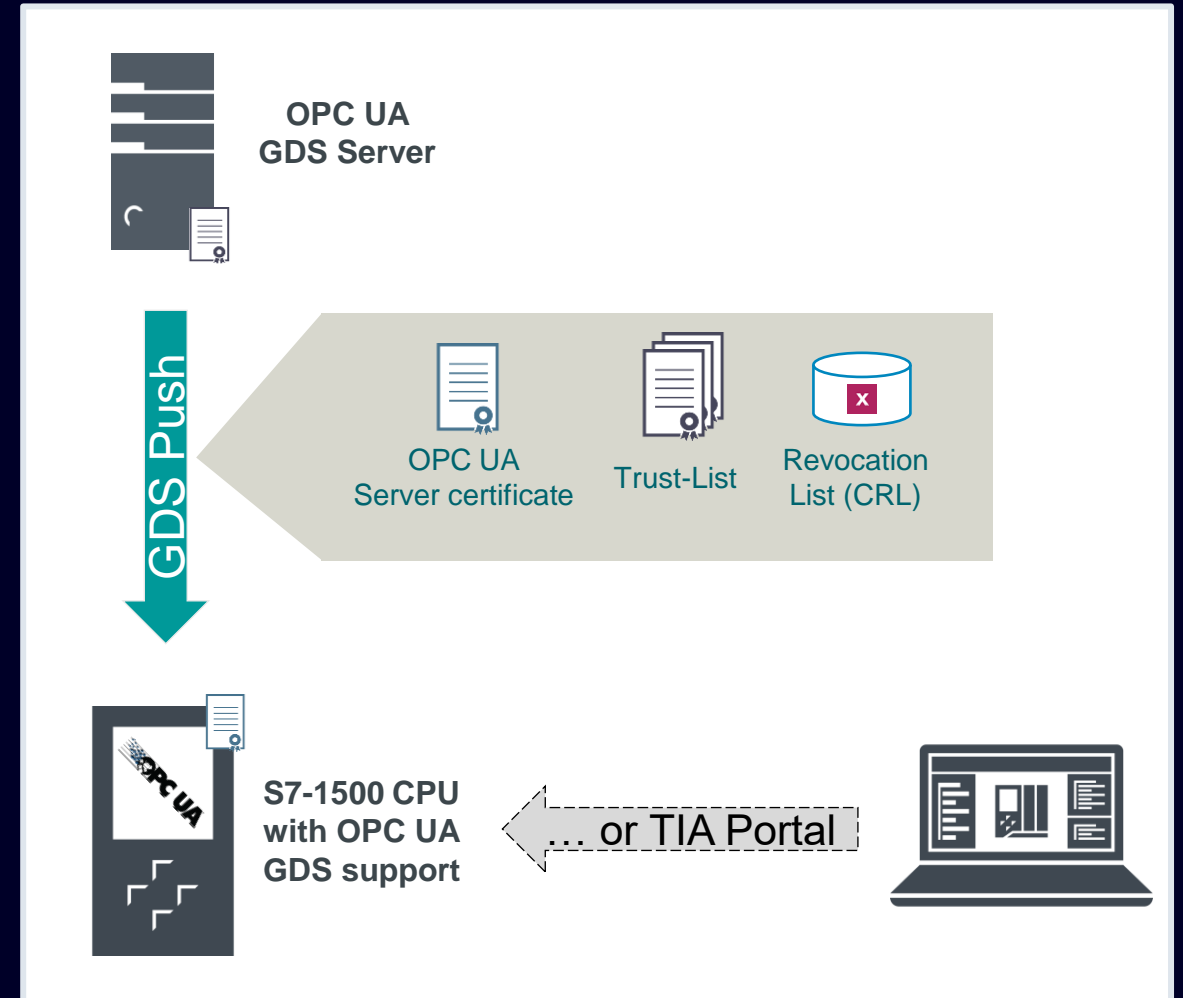
 **Sign & Encrypt**



GDS Support for OPC UA

Certificate management is now

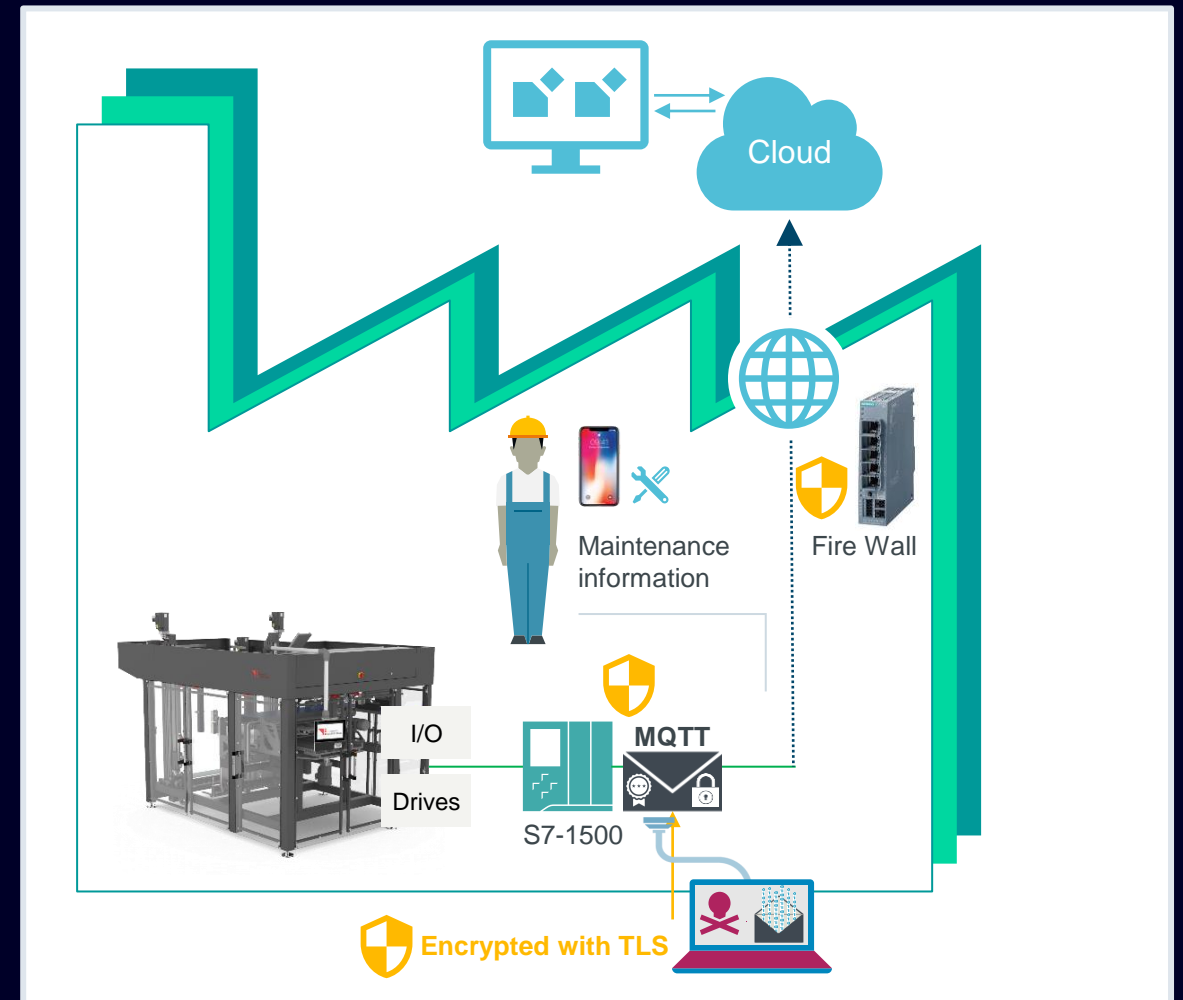
- Certificate update at **runtime**
- Support of Certificate Revocation Lists - **CRLs**
- Access protection for certificate management



Security Solution for MQTT

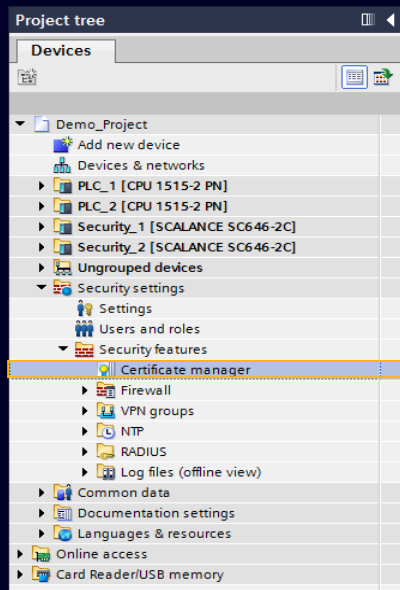
Necessary actions

- Using encrypted communication e.g. TLS
- Using password protection on the PLC
- Using Firewall

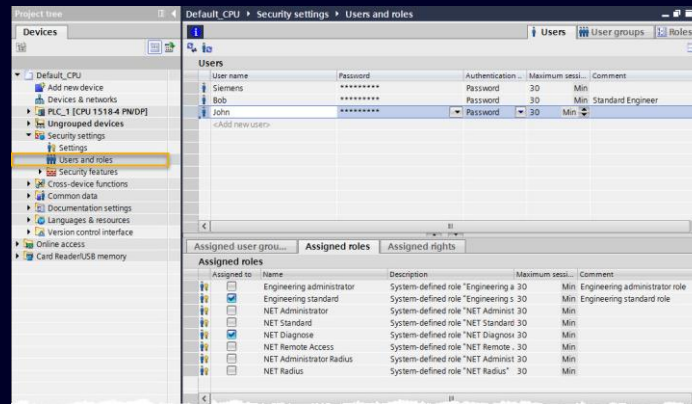


Integrated Security in TIA Portal

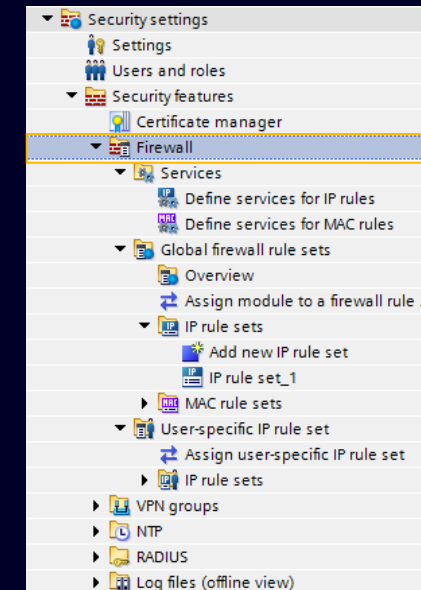
Encrypted communication with certificates



User management and Access Control UMAC



Firewall and VPN settings



Summary

