OPC UA Pub/Sub –

What is it and what is it used for?

PROSYS OPC

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About Prosys OPC

- World leader in multi-platform OPC UA software development
  - Company located in Espoo, Finland
  - 20+ MSc and BSc level OPC UA experts and software developers
  - OPC Foundation partner in Java communication stack development
  - Active member of Open Industry 4.0 Alliance

- Global sales and deliveries
  - 50+ countries
  - 500+ customers
  - 1000+ licenses
  - 50+ projects
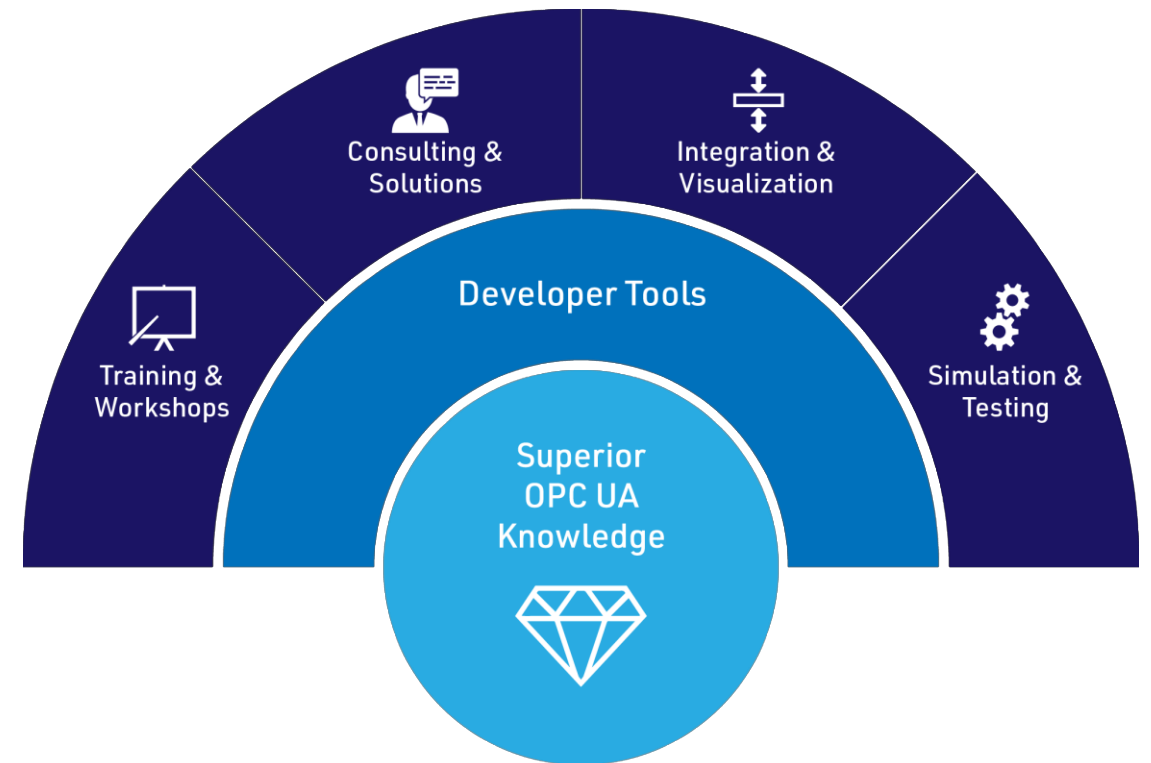
About OPC UA Technology

- OPC UA
  - Is a global standard (IEC62541) for vendor independent device/system connectivity
  - Specifications are developed and managed by OPC Foundation and its over 800 worldwide members
  - Mandatory requirement in Reference Architecture Model for Industry 4.0 (RAMI 4.0)

- OPC UA enables
  - Standardized interface between OT and IT
  - Standard communication from sensor to cloud
  - Secure connections (internet/intranet/extranet)
  - Plug & Produce commissioning

Collaboration Domain Specific Information Models

The OPC Foundation closely cooperates with organizations and associations from various branches.
Specific information models of other standardization organizations are mapped onto OPC UA and thus become portable.
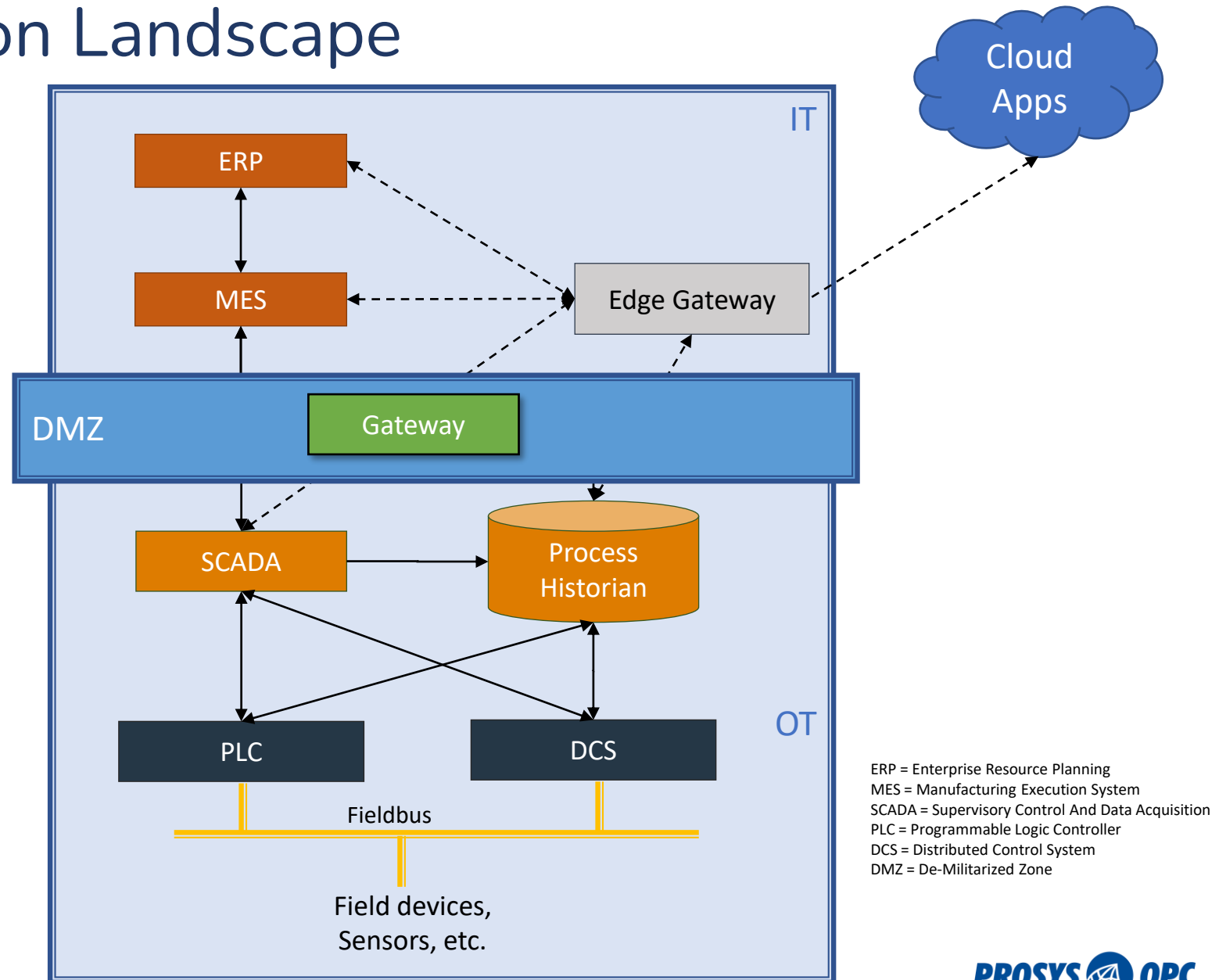
- VDMA
  - 38 mechanical industry domains

- DEXPI

- NAMUR
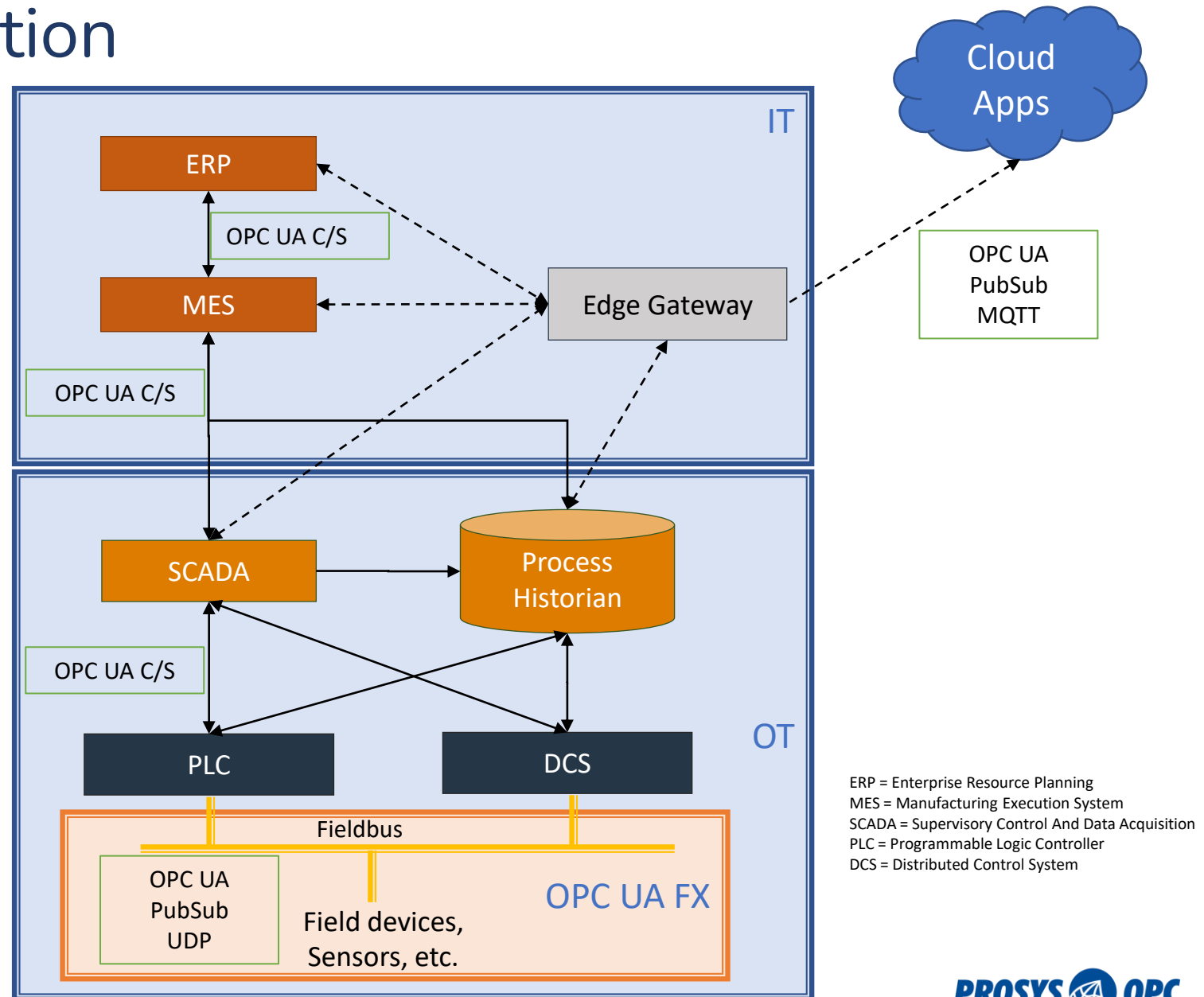 - Module Type Package (MTP)

- OPAF

Industrial Application Landscape

- IT Networks
  - Connected to Internet
  - High Level Production Control

- OT Networks
  - Secured from the Internet
  - Low Level Production Control

- Edge Gateway
  - Secure Data Delivery to Applications in the Cloud

- Security
  - Separated Networks
  - DMZ areas in between for additional security

Cloud Apps

IT

ERP

MES

Edge Gateway

DMZ

Gateway

SCADA

Process Historian

OT

PLC

DCS

Fieldbus

Field devices, Sensors, etc.

ERP = Enterprise Resource Planning
MES = Manufacturing Execution System
SCADA = Supervisory Control And Data Acquisition
PLC = Programmable Logic Controller
DCS = Distributed Control System
DMZ = De-Militarized Zone
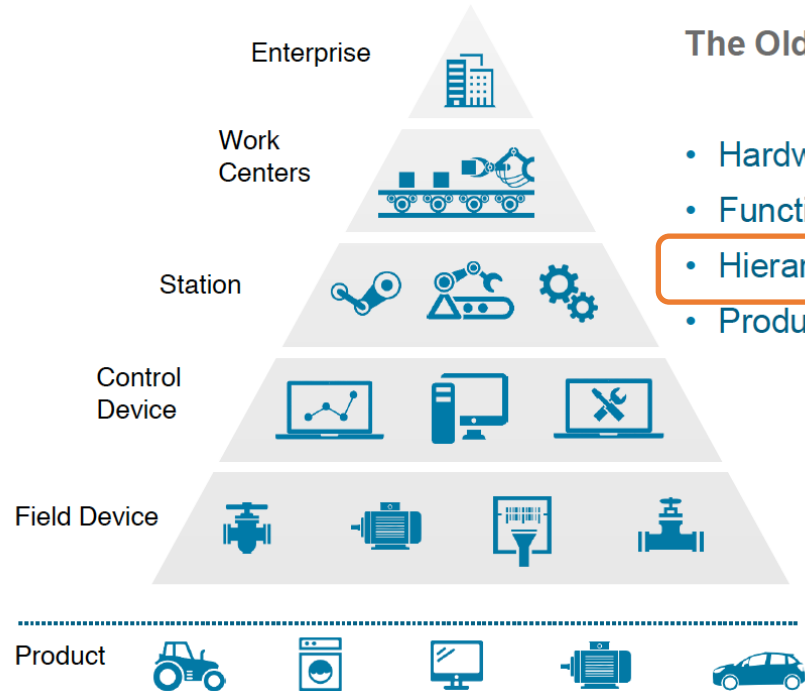
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OPC UA Communication

- OPC UA Client/Server (C/S)
  - Process Monitoring
  - Production Control (SCADA)
  - Production Orchestration (MES)

- OPC UA PubSub UDP
  - Field Level
  - ➤ OPC UA FX

- OPC UA PubSub MQTT
  - Cloud Connectivity
  - ➤ Information Level "Infobus"

ERP = Enterprise Resource Planning
MES = Manufacturing Execution System
SCADA = Supervisory Control And Data Acquisition
PLC = Programmable Logic Controller
DCS = Distributed Control System

Smart Manufacturing Trends

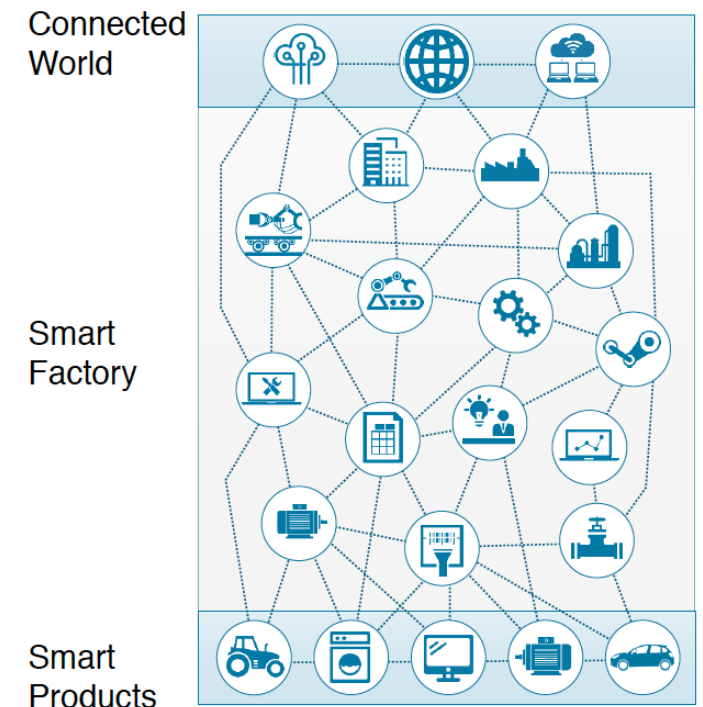**The Old World: Industrie 3.0**

- Hardware-based structure
- Functions are bound to hardware
- Hierarchy-based communication
- Product is isolated
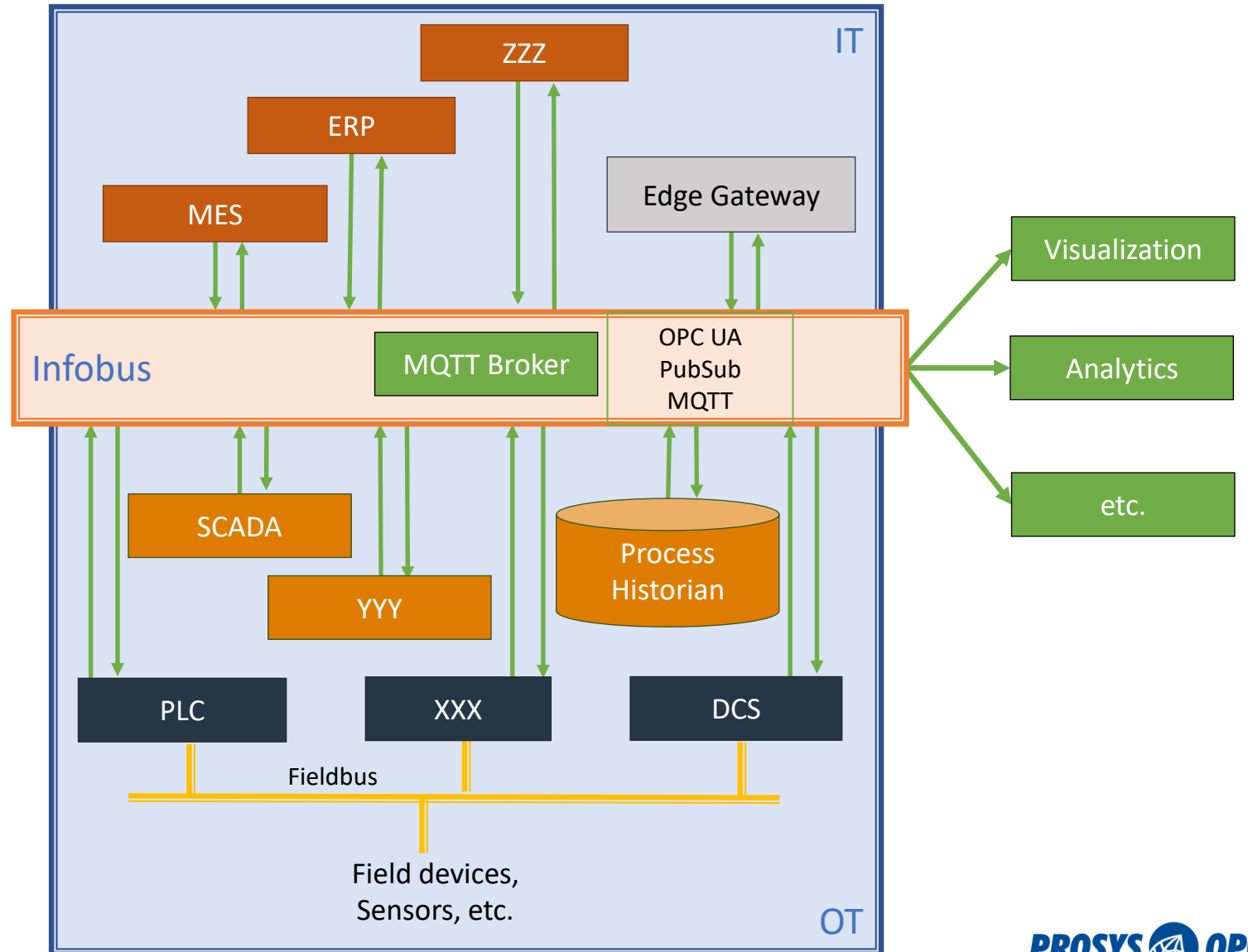
The New World: Industrie 4.0

- Flexible systems and machines
- Functions are distributed throughout the network
- Participants interact across hierarchy levels
- Communication among all participants
- Product is part of the network

Enterprise

Work Centers

Station

Control Device

Field Device

Product

Client/Server

Publisher/Subscriber

Connected World

Smart Factory

Smart Products

(Martin Hankel, Plattform Industrie 4.0 / Graphics © Anna Salari, designed by freepik)
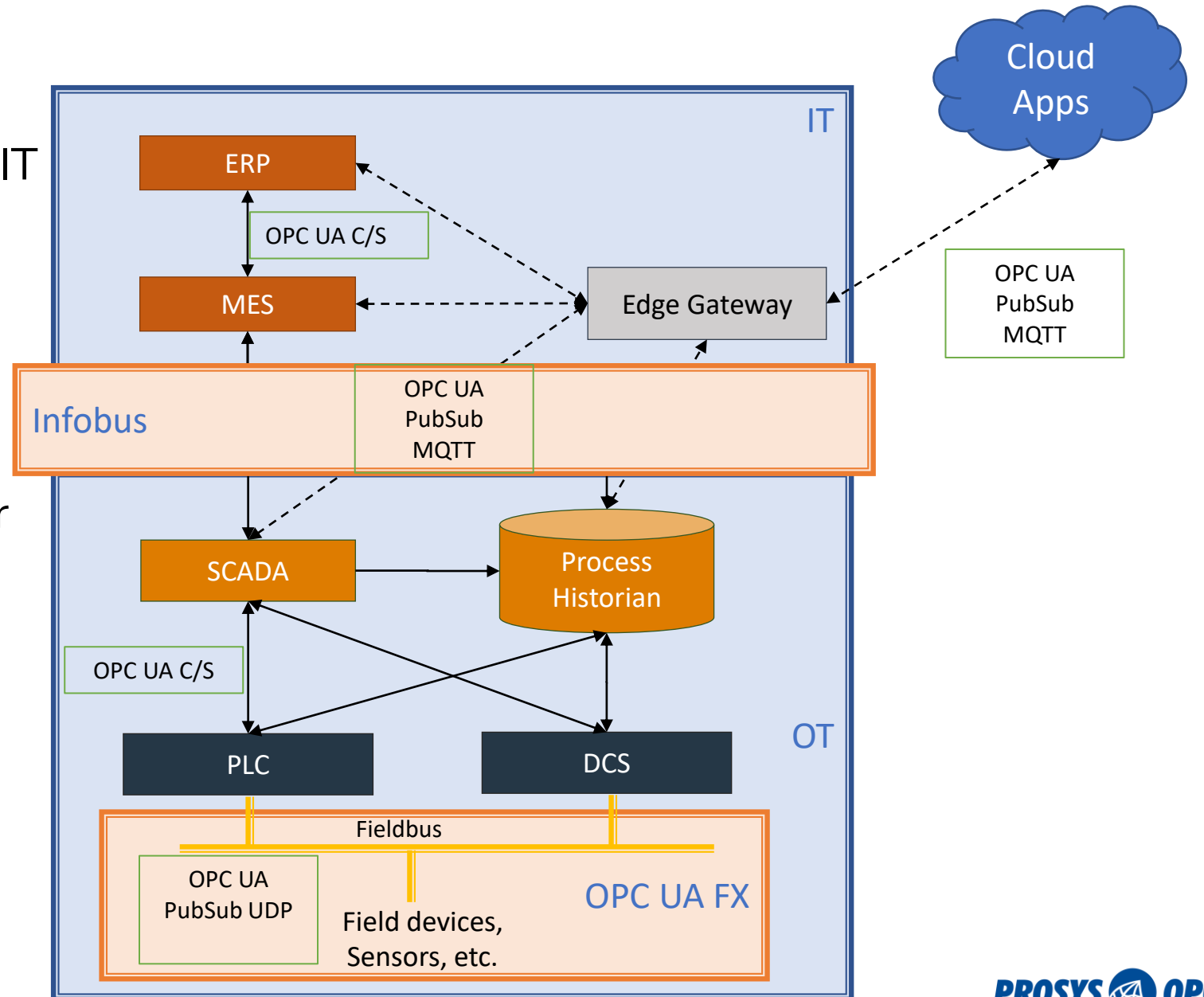
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Information Level Communication Bus "Infobus"

- Everything is connected to everything
  - More devices
  - More machines
  - More systems
  - More applications
  - More and more connections!

- MQTT Broker
  - Applications publish data to a central location
  - Applications subscribe to data that they need

- OPC UA PubSub MQTT
  - Standard message formats (Payload)
  - Standard topic trees (Organization)
  - Information models (Semantics)

- New Use Cases

IT

ZZZ

ERP

MES

Edge Gateway

Infobus

MQTT Broker

OPC UA PubSub MQTT

Visualization

Analytics

etc.

SCADA

YYY

Process Historian

PLC

XXX

DCS

Fieldbus

Field devices, Sensors, etc.

OT

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Summary

- OPC UA is designed for both IT and OT communication

- Client/Server works in traditional hierarchical communication

- Publisher/Subscriber is set for new requirements
  - Cloud Communication
  - Field Level
  - Information Level

- Security is always available!

Thank you!

More information:

https://prosysopc.com/blog/#PubSub

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« All blog posts

OPC UA PubSub Explained

14.12.2021

I was talking about OPC UA PubSub at the OPC Day Finland 2021. The speech is available at YouTube, and the slides are also available, but I decided to write about it, too. The topic is important and needs more attention, so that we can all understand it correctly.

OPC Day International 2022 - All Presentations

18.05.2022

The OPC Foundation has hosted OPC Day events since 2011. Since 2020, the events went online and the OPC Day International 2022 was the greatest OPC Day event ever with 5 days of programme from experts around the world sharing their experiences and visions around the usage and possibilities opened by OPC UA.

I gathered quick links to all the presentations that are now online, for you to easily watch, even if you were not able to attend the presentations online. The PDFs for this and the previous events are availalbe from this page.

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