OPC UA Case Studies

PROSYS OPC

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OPC Day Finland

SUOMEN AUTOMAATIOSEURA RY
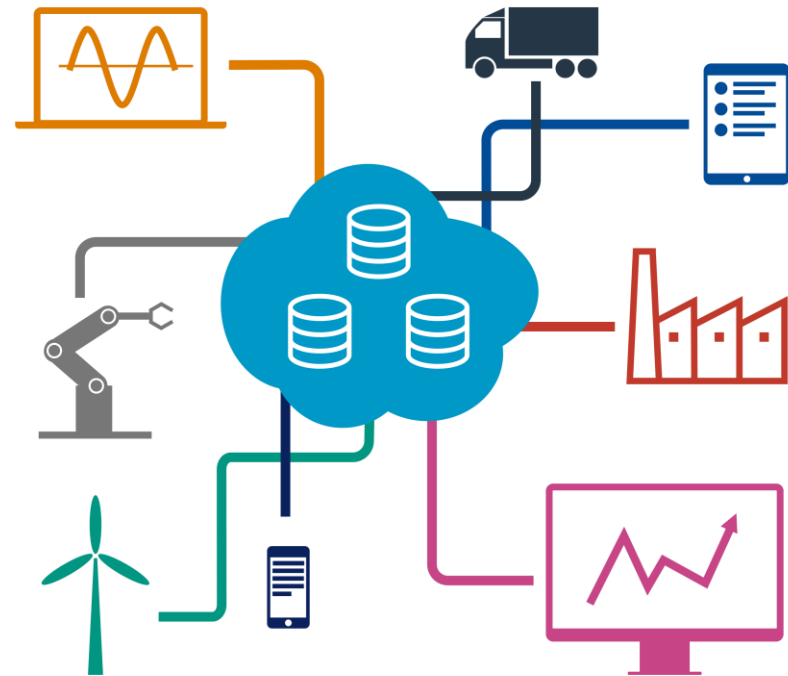FINNISH SOCIETY OF AUTOMATION

Microsoft Partner

ORACLE PARTNER

BECKHOFF Partner

OPC FOUNDATION MEMBER

The Industrial Internet / IoT

Prosys OPC UA software products offer multiplatform capabilities, making them ideal building blocks of any networked system

- OPC UA connectivity
- Sensor data
- Smart devices
- Big data
- Analytics
- Optimization
- Automation

Prosys OPC

Prosys OPC UA Multiplatform Product Family

OPC UA **Java SDK**

FREE
OPC UA **Client**

NEW
OPC UA **Historian**

FREE
OPC UA **Client** for Android
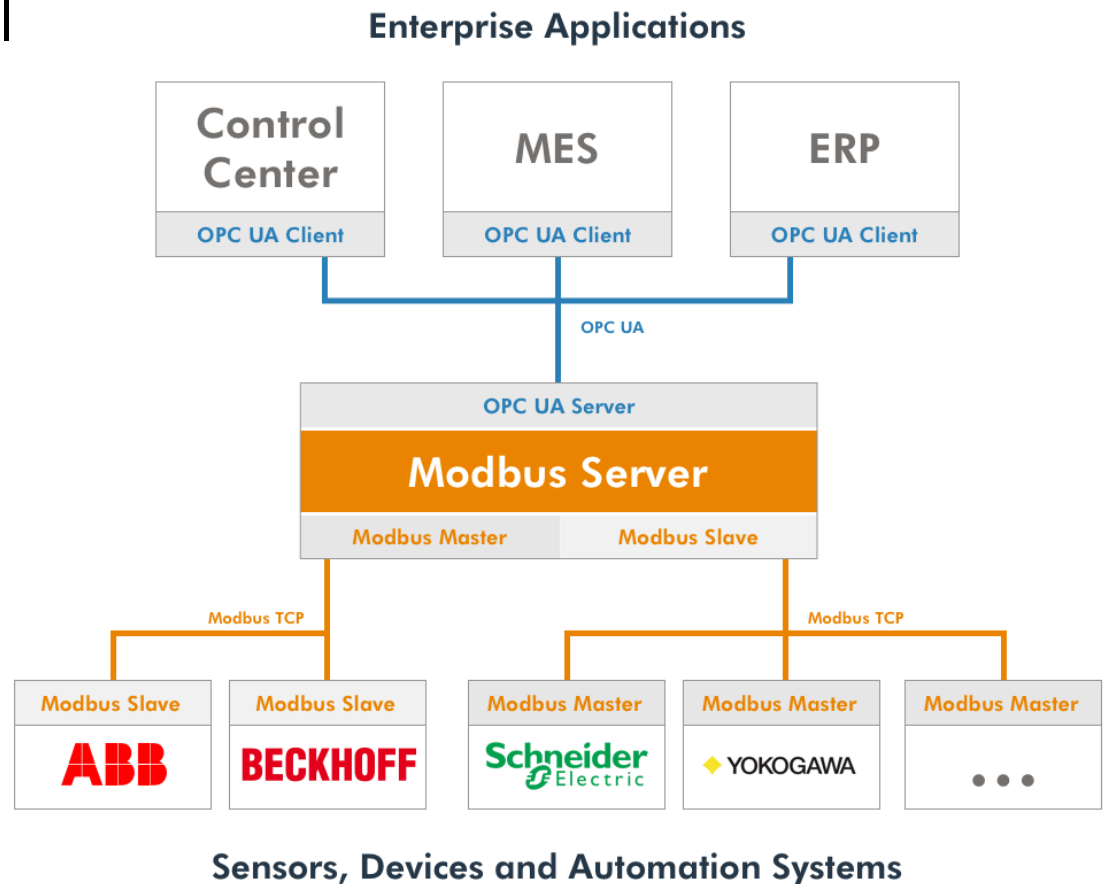
NEW
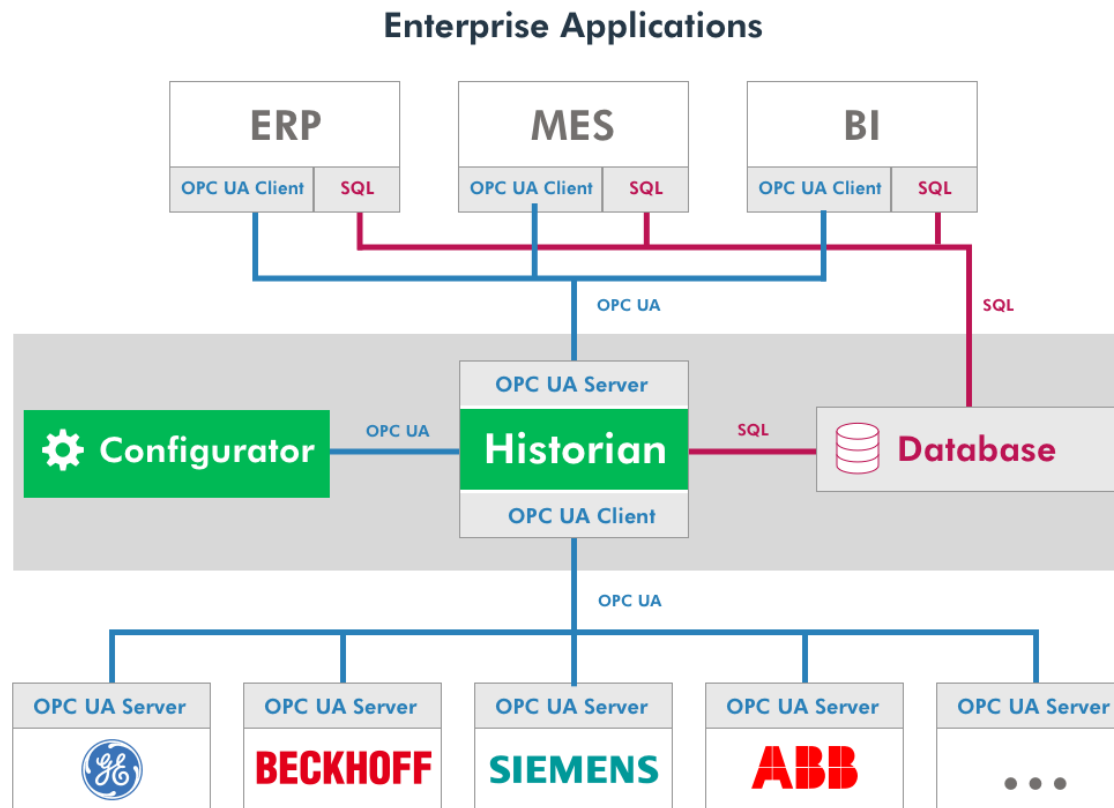OPC UA **Modbus Server**

FREE
OPC UA **Simulation Server**

Prosys OPC

OPC UA
Modbus Server

- Secure Gateway to Modbus Devices
- Higher Level Information Model
- Modbus Master
- Modbus Slave

Enterprise Applications

Control Center	MES	ERP
OPC UA Client	OPC UA Client	OPC UA Client

OPC UA

OPC UA Server

Modbus Server

Modbus Master	Modbus Slave

Modbus TCP   Modbus TCP

Modbus Slave	Modbus Slave	Modbus Master	Modbus Master	Modbus Master
ABB	BECKHOFF	Schneider Electric	YOKOGAWA	...

Sensors, Devices and Automation Systems

OPC UA **Historian**

- Add History to any OPC UA data
- Single Point of Access

Enterprise Applications

Sensors, Devices and Automation Systems

OPC UA
Java SDK

- Develop once, deploy anywhere toolkit
- Takes care of all the OPC UA communication details
- Client & Server SDK available
- Supports all standard and custom information models via
  – Code generation
  – Modeling Tool (UaModeler)

OPC Foundation certified products are:
- Compliant with the OPC specifications
- Interoperable with other OPC products from other vendors
- Robust, reliable and able to recover from lost communications, etc.
- Usable, by following universally accepted best-practices
- Efficient in managing resources (CPU, memory, disk space etc.)

Prosys OPC

Case Studies

Case Neste Jacobs

- Advanced Process Control (APC) and real-time process database

- Originally for highly optimized control of petrochemical processes

- Later applied for optimization of other production processes

- Rebuilt completely based on OPC UA information models

- Enables integration of DCS and PLC data as well as various application modules

Case Neste Jacobs

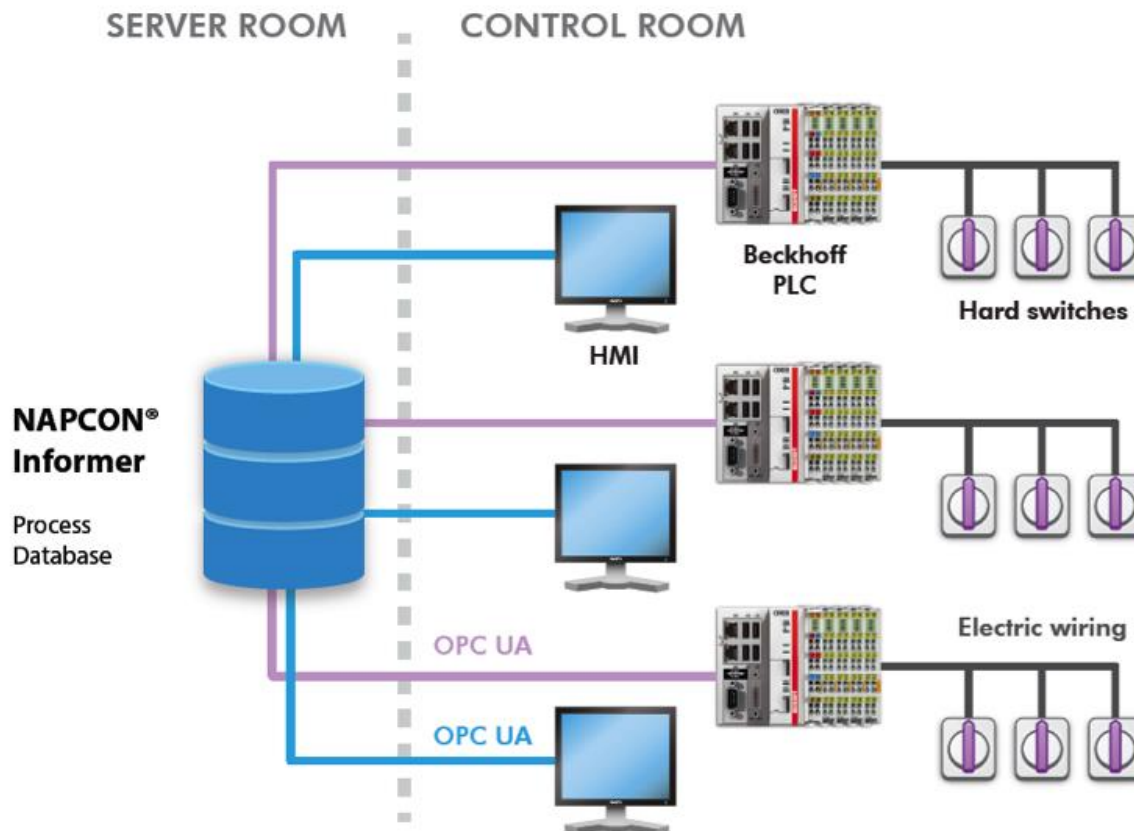- Web interfaces for monitoring and control
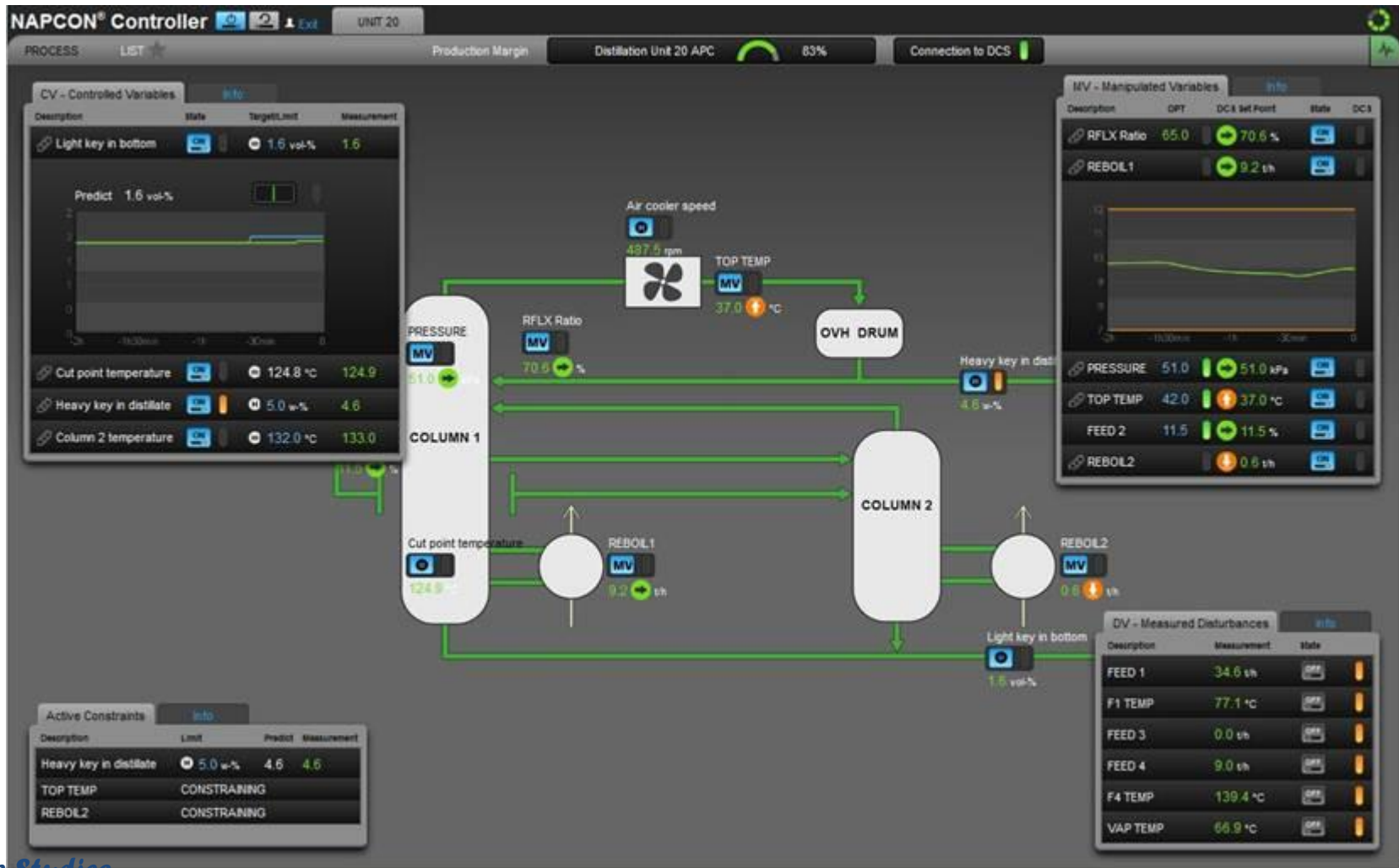
Case Neste Jacobs

NESTEJACOBS

NAPCON

- Training Simulator Enhanced with OPC UA Integration

Case Valio

- Biggest producer of milk products in Finland
- OPC UA in wide use in all production sites in Finland
- Enables wide distribution of production information
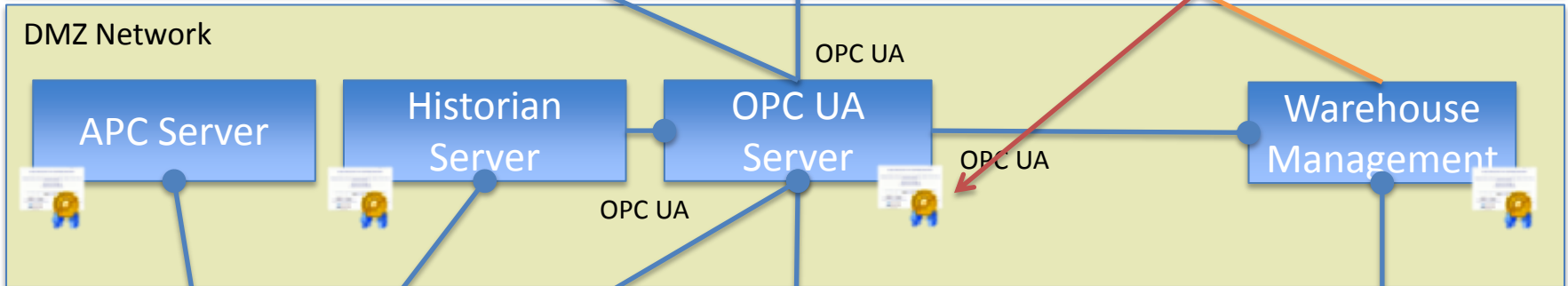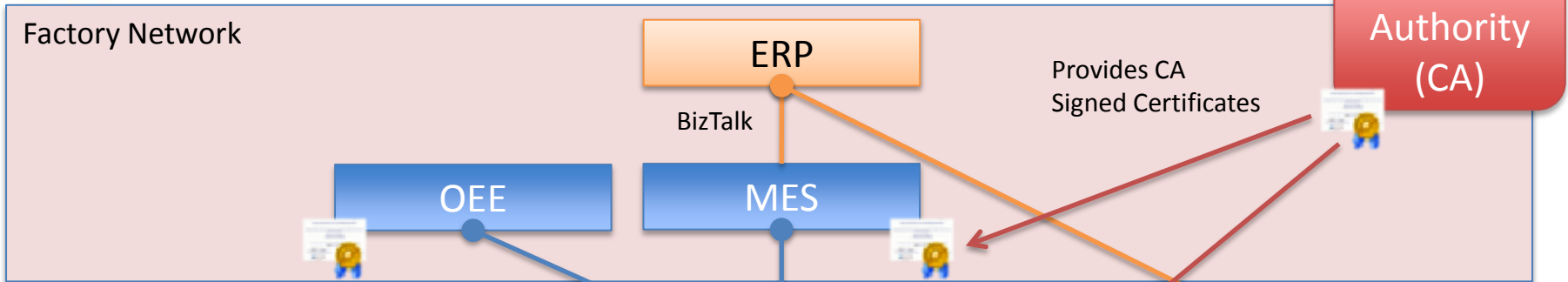
Security Principles

- OPC Classic (DA, AE, HDA) converted to OPC UA with UaGateway
- OPC UA Security used whenever crossing network borders
- Production information delivered to office network via intermediate DMZ (Demilitarized Zone) network
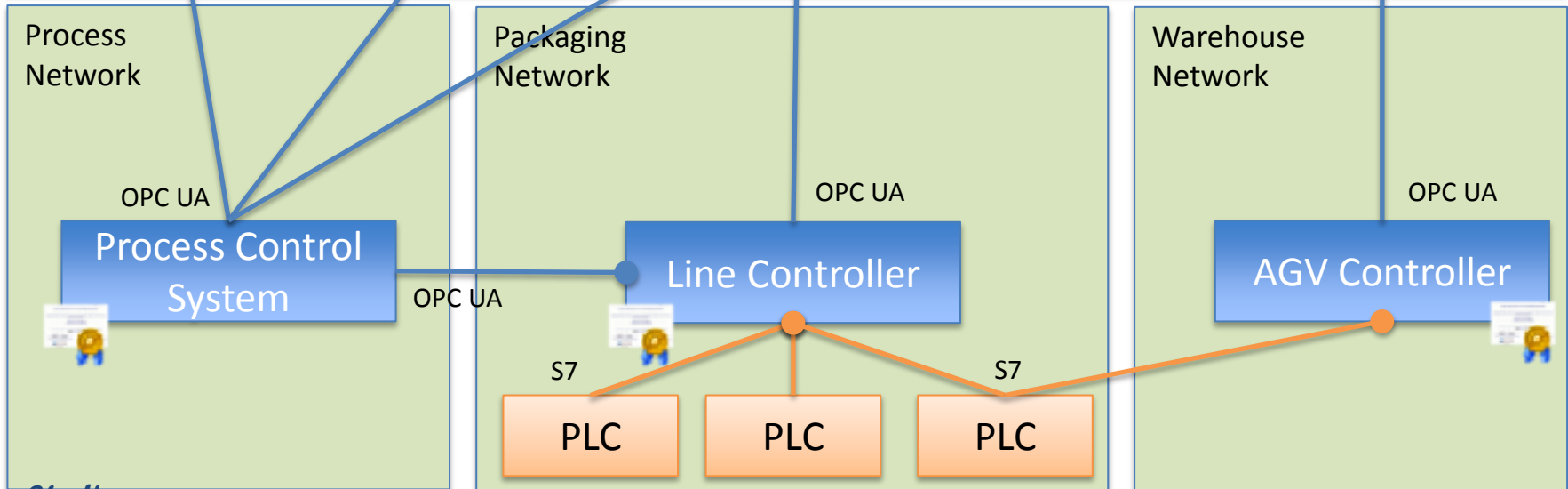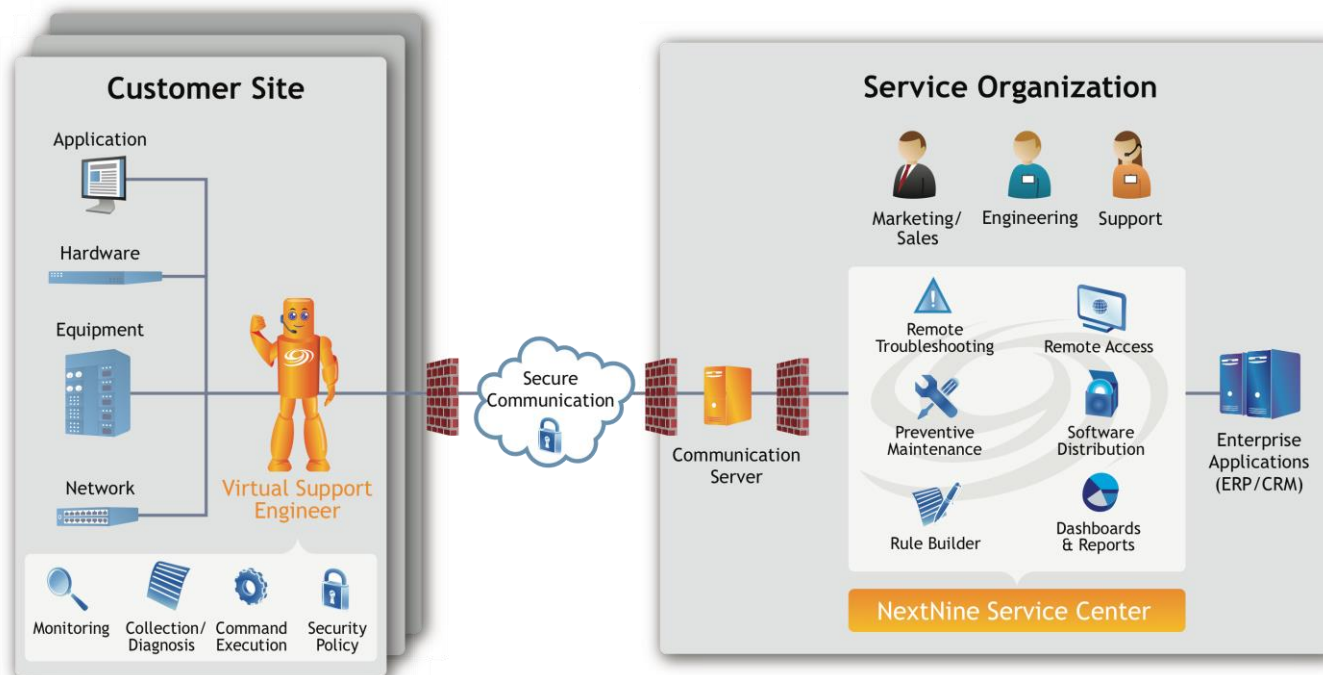- Application Instance Certificates Generated with a central Certificate Authority (CA)
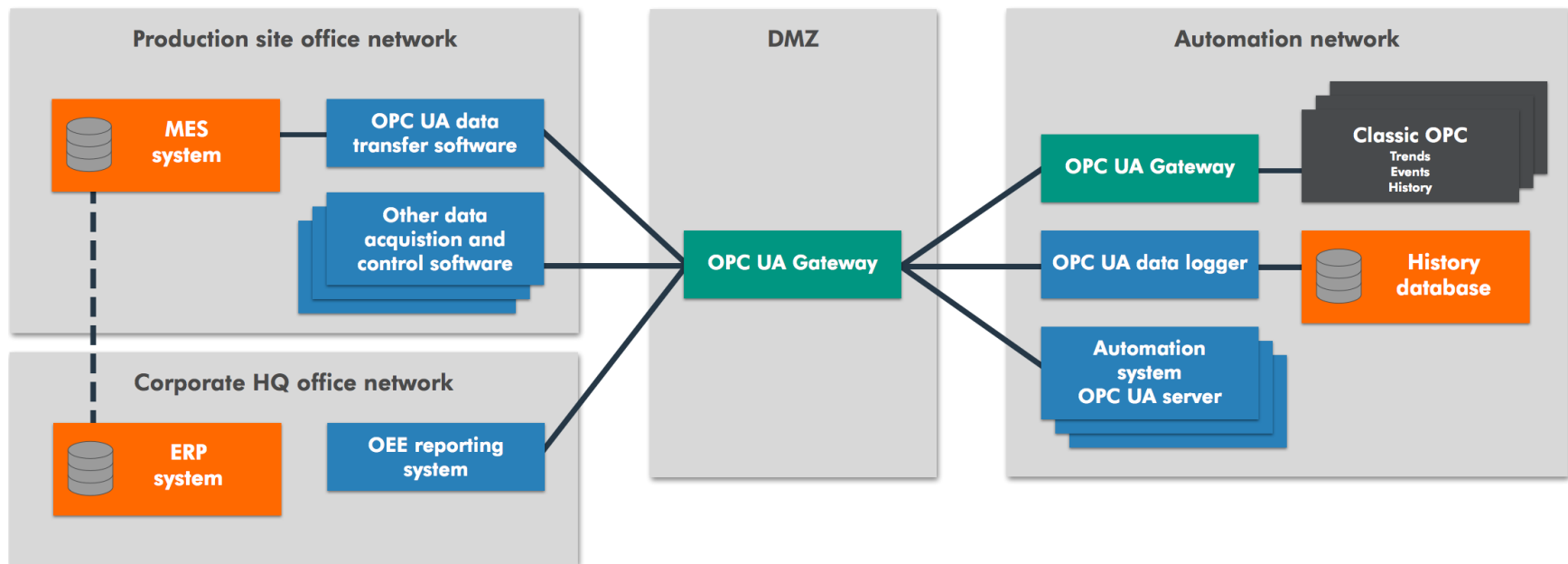
Case NextNine

Virtual Support Engineer™ (VSE)

Remote monitoring platform for

- Applications, operating systems, databases, etc.
- Protocols: Telnet, FTP, DBI, SNMP, WMI, etc. + OPC UA

Case NextNine

OPC UA support was added to monitor
- Process Control and
- Industrial Automation Systems

Achieving
- Data-Read and Subscription based access to data originating from various plant floor devices
- Multiple platform support with Java
- Security implementation based on new standards of authentication, authorization, encryption and data integrity
- Wide availability of Wrappers that allow the VSE client to capitalize on the existing install base of classic OPC Servers

Case NextNine

Why NextNine chose Prosys OPC UA Java SDK

- An easy to use Java API that abstracts the complexities of the OPC Foundation UA Java Stack

- Prosys has a long track record in the OPC development community and has been dominant working around the Java stack within the OPC Foundation

- The Prosys product support team was outstanding in their response time when dealing with various concerns and enquiries that we sent to them

"Our experience with Prosys has been very positive and we would strongly recommend their SDK package to anyone looking to save time and money when implementing OPC UA within their Java application"

Michael Rooz, NextNine Inc.

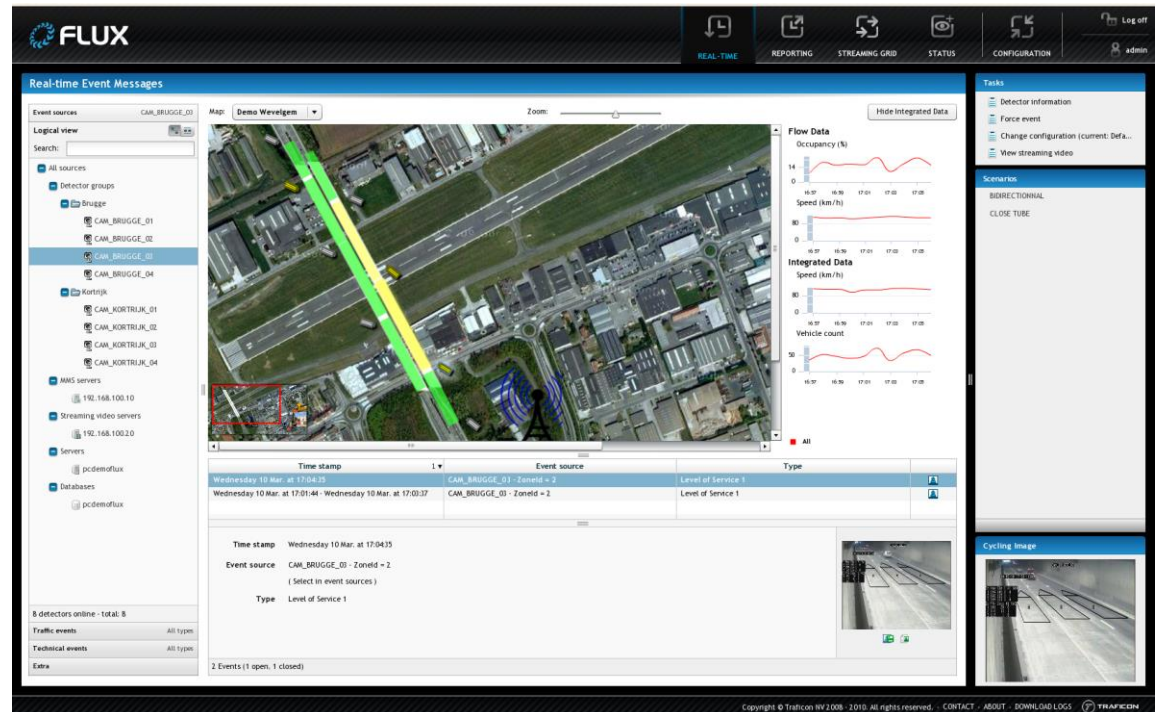# Case FLIR Intelligent Transport Systems (ITS)

◆FLIR®

Flux Traffic Management Server

Road and tunnel monitoring

- FLIR video
- 300+ sensors
- Redundancy for fail-safe operation

Web User Interface

- Monitoring
- Reporting
- Events
- Alarms

Case Studies

Case FLIR ITS
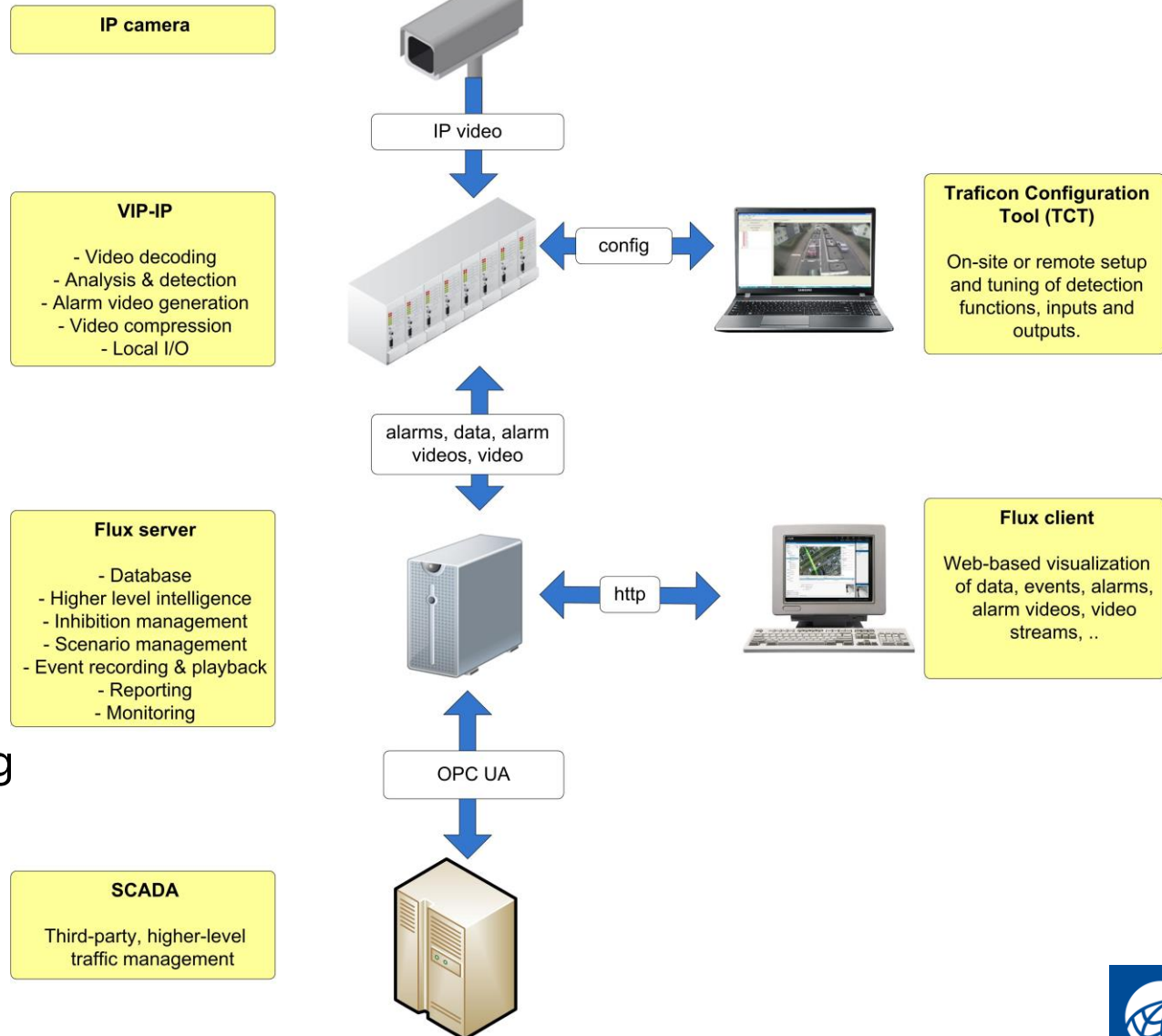

Collects
- Traffic data
- Events
- Alarms
- Video images

Integrates to higher level information
- Lighting
- Ventilation
- Traffic signaling
- Etc.

IP camera

VIP-IP

- Video decoding
- Analysis & detection
- Alarm video generation
- Video compression
- Local I/O

IP video

config

Traficon Configuration Tool (TCT)

On-site or remote setup and tuning of detection functions, inputs and outputs.

alarms, data, alarm videos, video

Flux server

- Database
- Higher level intelligence
- Inhibition management
- Scenario management
- Event recording & playback
- Reporting
- Monitoring

http

Flux client

Web-based visualization of data, events, alarms, alarm videos, video streams, ..

OPC UA

SCADA

Third-party, higher-level traffic management

Case FLIR ITS

With Prosys OPC UA Java SDK Flir ITS was able to

- Add an OPC UA interface to their Java-based Flux server with minimum effort

- Keep focus on their own core task: the traffic information processing and storage

- Achieve 100% standard interface implementation to various SCADA systems

- Ensure proper maintenance & updating

"Thanks to Prosys Java OPC UA SDK, we were able to create a standard interface to integrate with a wide variety of customer systems in a very short time, be assured of 100% third-party compatibility and rely on future maintenance for sustaining the product."

Eddy Vermeulen
Product Manager, Flir ITS

Case Studies

Case Bosch Rexroth

Integration of the Java VM within IndraMotion MLC
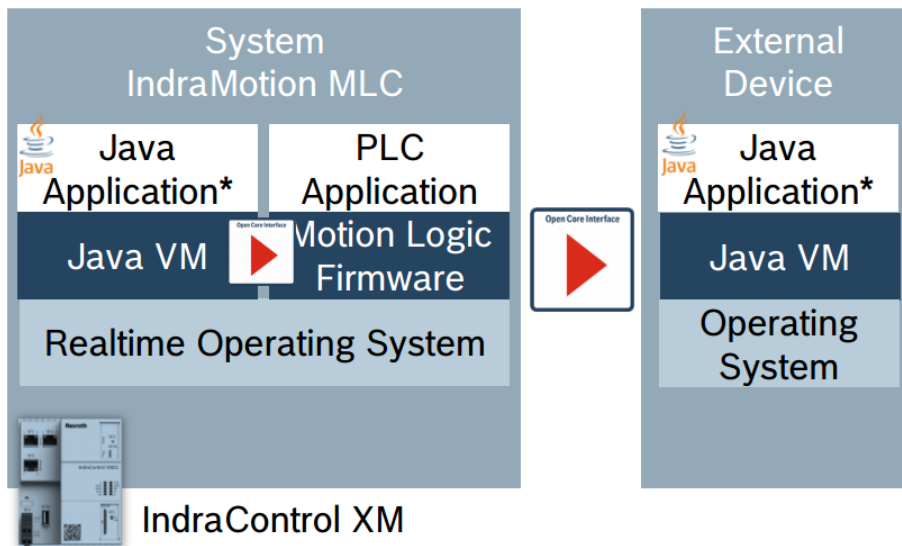
- IndraMotion MLC provides the Java VM **Java 8 SE Embedded Compact Profile 3** for the IndraControl HW platform
- Java applications could be **developed and optimized on external devices**
- The application will **run without changes and adaptions on the control system**
- Open Core Interface ▶ **remains the same**
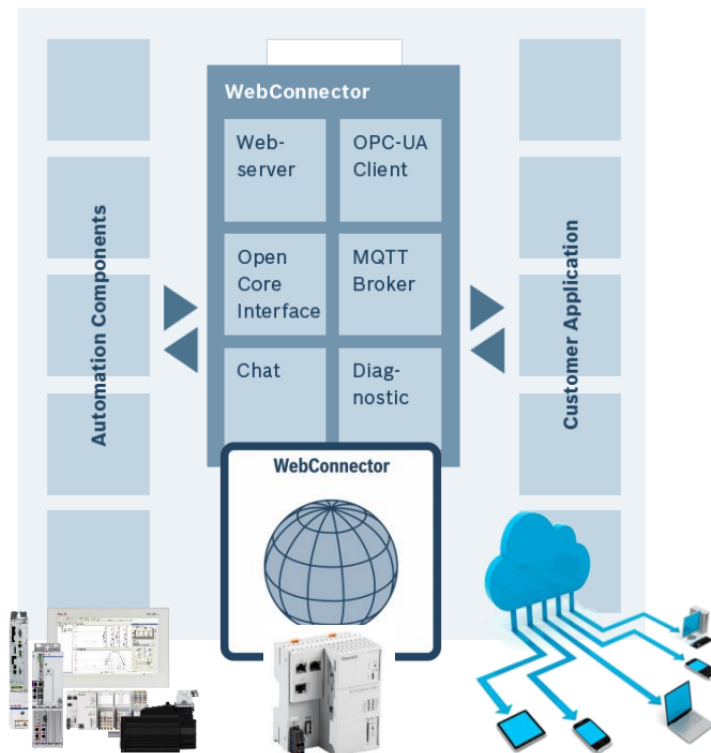- Everything follows the Java motto

"Write once, runs anywhere"

*non-realtime application; Open Core Interface ▶

Case Bosch Rexroth

WebConnector – The gateway to the IoT world

- **The WebConnector OSGi bundle**, "The Babel Fish" between Web- / .NET- based applications and industrial control systems and components

- **Performant and open data interface** using an integrated Jetty webserver, provides **OPC-UA client**, customized JS client library and WebSockets

- Support of light-weight IoT protocols, like **OASIS MQTT[1), Oracle StreamExplorer, Oracle Cloud Service,** easy extendable with new protocols

- Enables platform independent design for **HTML5 web app solutions**

1) MQTT = „Message Queue Telemetry Transport", offenes M2M-Protokoll, siehe http://mqtt.org/
OASIS = Organization for the Advancement of Structured Information Standards, siehe https://www.oasis-open.org/

Case Aachen University

- The Institute of Information Management in Mechanical Engineering (IMA)

- Integration and analysis of production data in a holistic way

- Development of knowledge graphs for semantic and smart data applications

- For intelligent information exchange based on service-oriented architectures and loosely-coupled systems by means of e.g. DDS, OPC UA

- Enabling Industry 4.0 solutions in context of existing production sites

Hoffmann, M.; Thomas, P.; Schütz, D.; Vogel-Heuser, B.; Meisen, T.; Jeschke, S. (2016): Semantic Integration of Multi-Agent Systems using an OPC UA Information Modeling Approach. In: *14th International Conference on Industrial Informatics (INDIN 2016)* Poitiers, France.

Multi-Agent System

- Plug-and-Produce: external agents on Raspberry Pi modules

Intelligent Agents
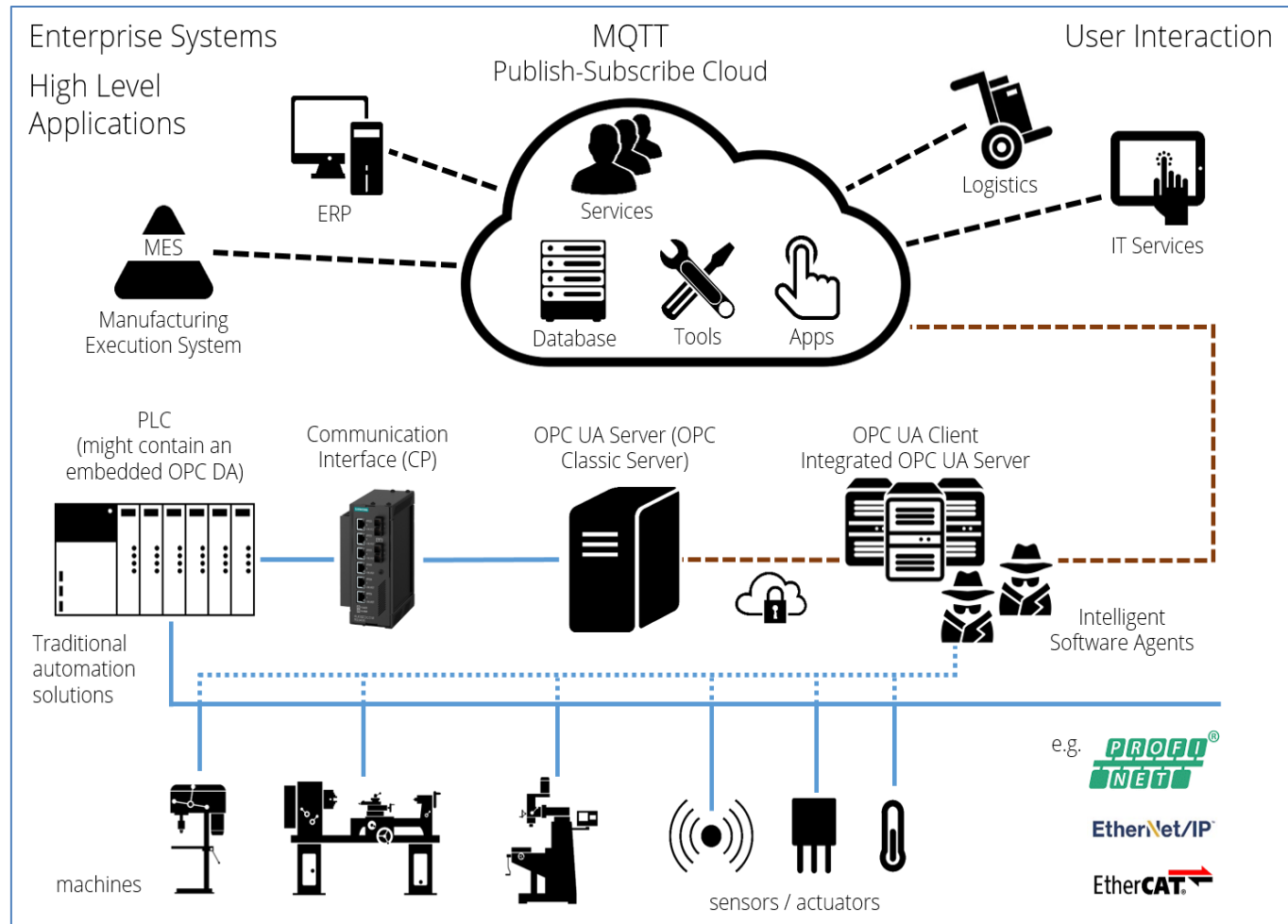
- Intelligent software agents are capable of "speaking in the name" of each machine they are representing, including:
  - **Self-awareness:** *"Who am I?"*
  - **Capabilities**: *"What can I do?"*
  - **Reactiveness**: *"What happens around me?"*
  - **Proactiveness**: *"What can I do to help reaching the overall goal of the production?"*

- The agents support self-configuration in terms of their location (currently IP address) and are capable of changing their underlying resources, e.g. machine types, products or transport units.

Demonstration

- Hannover Messe 2016

Demonstration

1. The customer specifies a **tailored product** according to his specific demands. The customization of the product is performed by choosing the parameters of each production step of the process, which for the actual scenario are **"drilling", "milling", "turning" and "assembly"**.

2. During the simulation of the production process, the software agents – each representing one machine or transport belt – **organize the manufacturing process autonomously**

3. The machines **simulate each production step** (visible through the LEDs located at the machines and at the control panel)

4. **Transports between the machines are simulated** by moving the transportation vehicles along the belt going from the "start" to the "target" machine

5. The production process continues **until the product is finished**.

OPC UA & MQTT

- Communication entirely over OPC UA
- OPC UA based information model
  - self-representation
  - decision-making
  - sensing of the agent's environment
  - proactive behavior
- Enables intelligent integration
  - sensor data
  - control and management variables
- MQTT to keep top level applications up to date
  - MES
  - ERP
  - logistics
  - IT Services

Java

- Java based solution because of the good quality libraries for
  - Industrial Software Agents
  - Artificial Intelligence
  - OPC UA
  - MQTT

Thank you!

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