



Bert Müller
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Sensor Integration Framework with Interface A

SENSOR INTEGRATION FRAMEWORK WITH INTERFACE A

Agenda

- ▶ Kontron AIS GmbH
- ▶ Motivation
- ▶ Approach and Innovation
- ▶ Framework & Components
- ▶ SEMI Standard Interface A
- ▶ Results & Top Benefits



PORTRAIT

PROVIDER FOR
INDUSTRIAL SOFTWARE

> 30
years experience

> 190
employees



7
products

 **FabLink[®]**

 **EquipmentCloud[®]**

 **ToolCommander[®]**

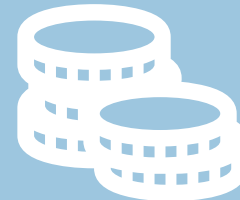
 **FabEagle[®]** Monitoring

 **FabEagle[®]** Connect

 **FabEagle[®]** MES

 **FabEagle[®]** LC

18,1
mio.
€ turnover



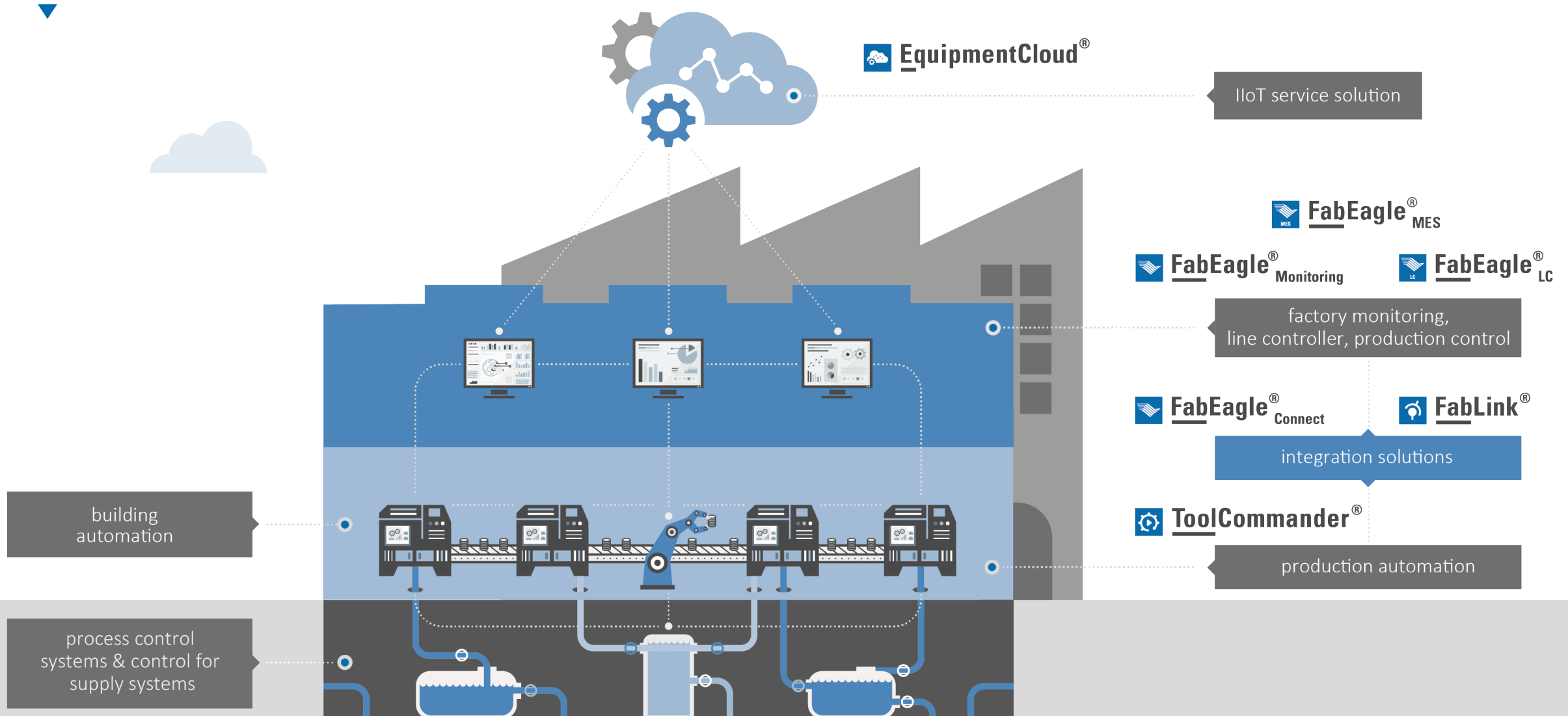
45
countries



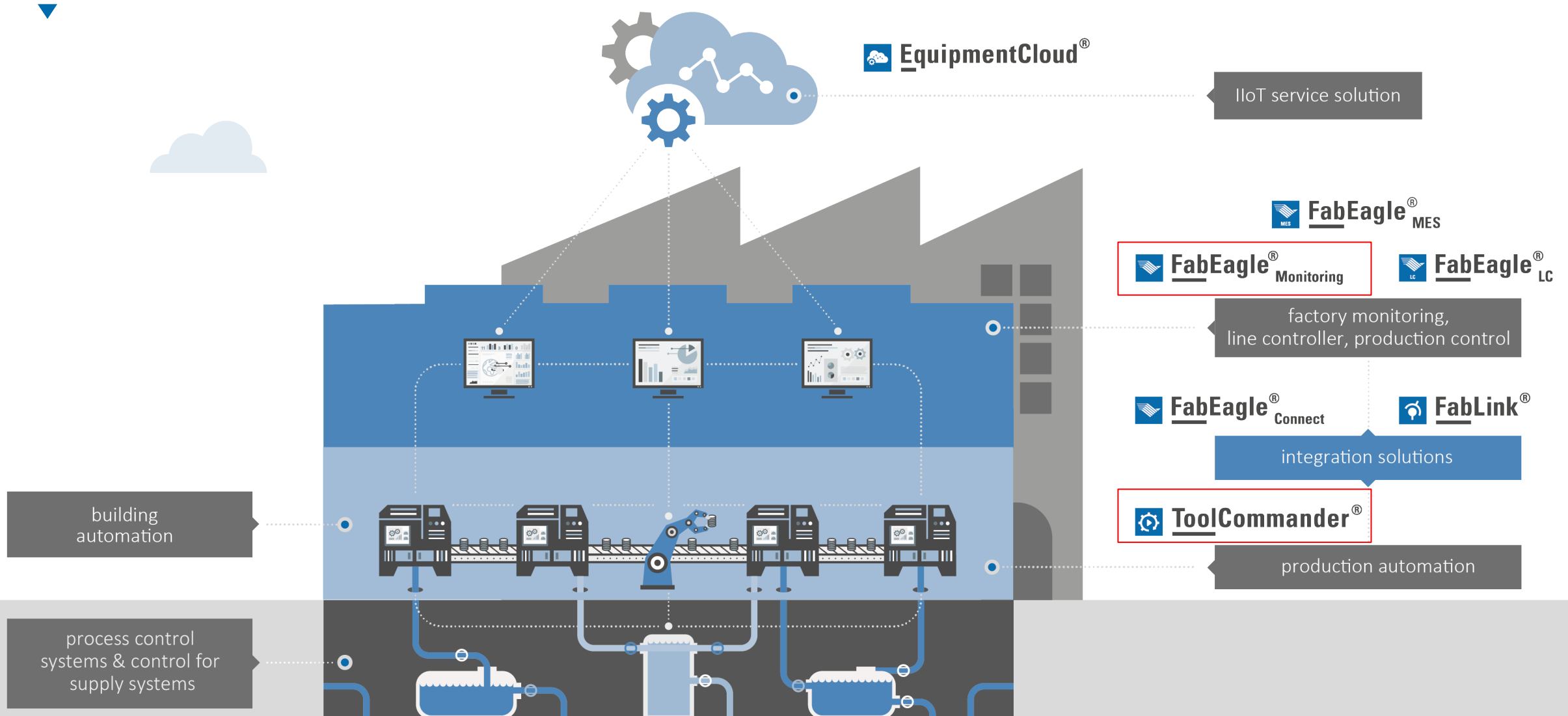
> 200
customers
in 2022

THE BENCHMARK IN INDUSTRIAL SOFTWARE

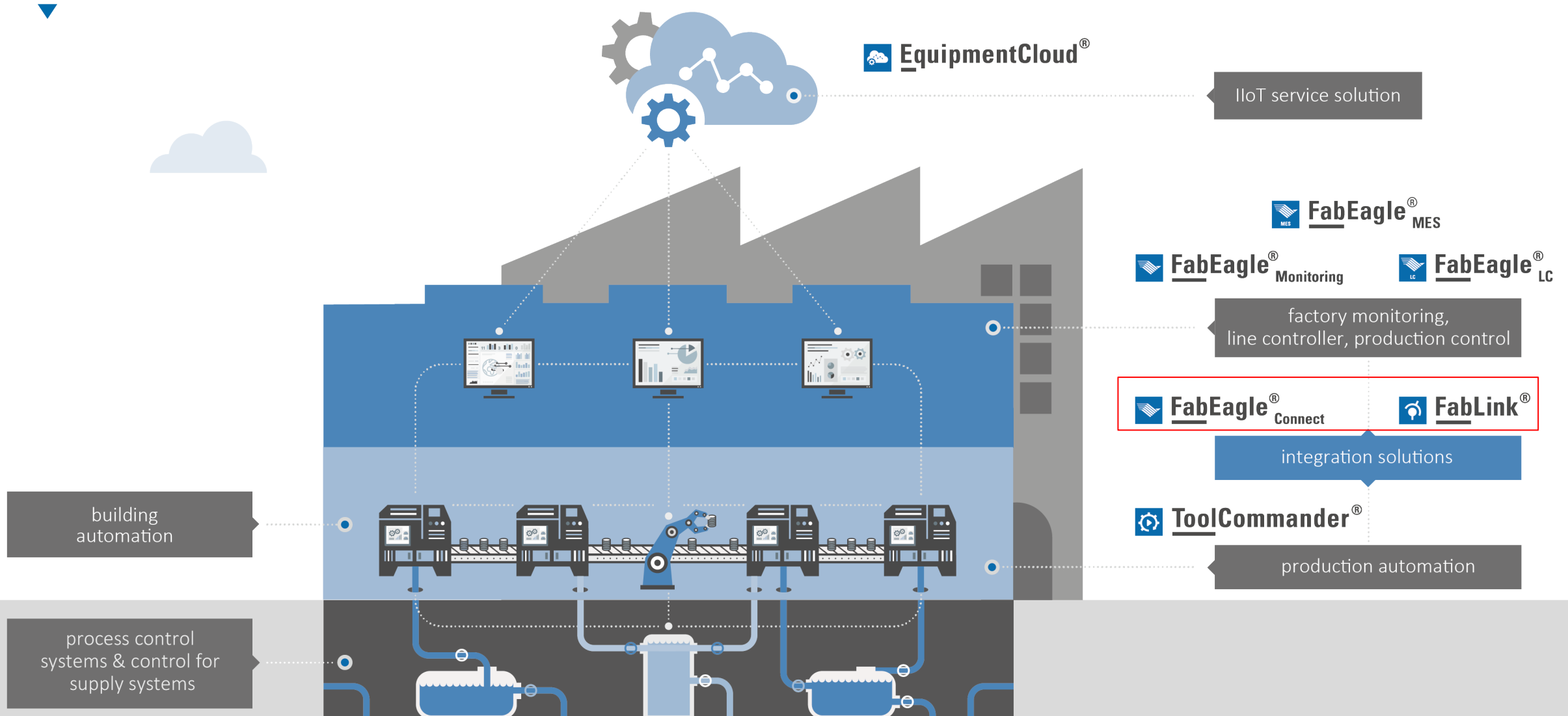
SERVICES & PRODUCTS



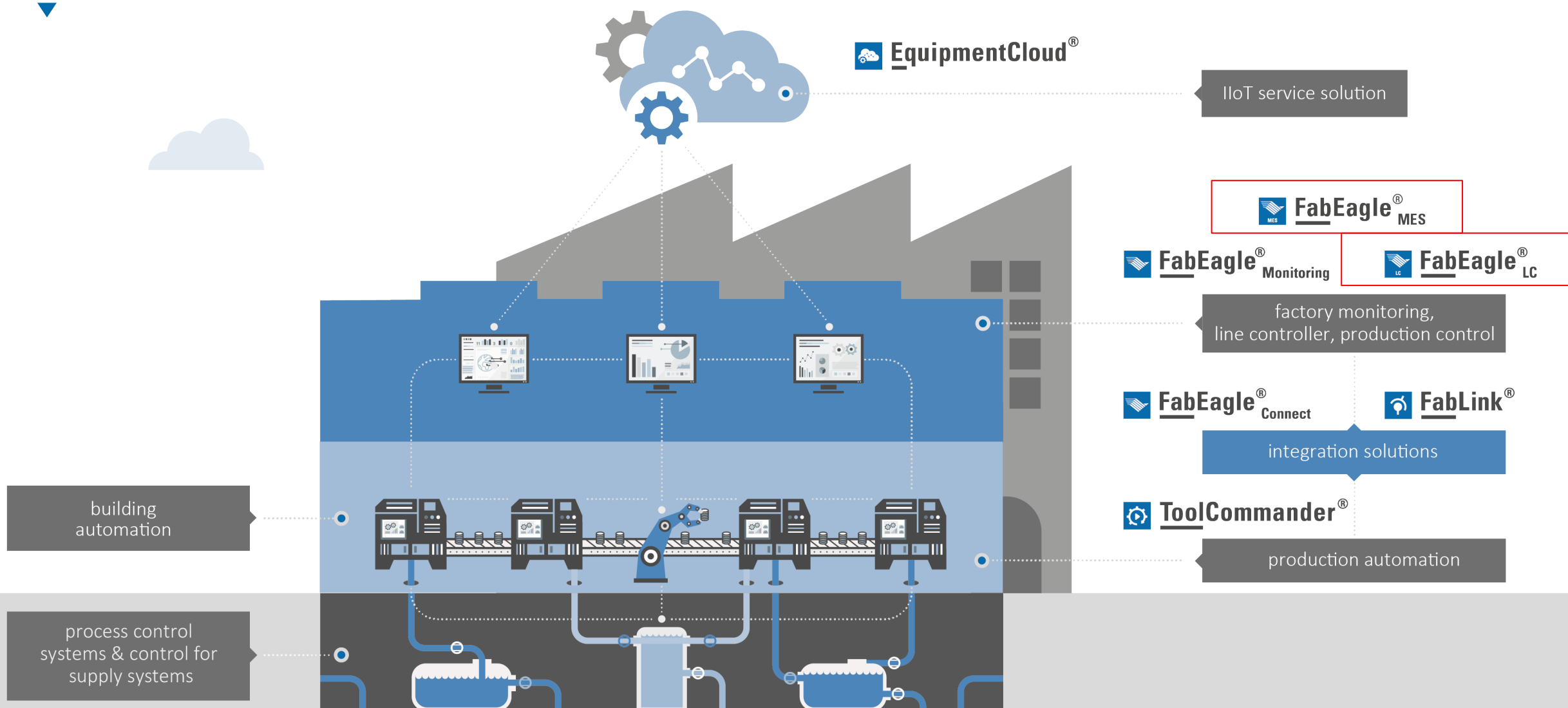
SERVICES & PRODUCTS



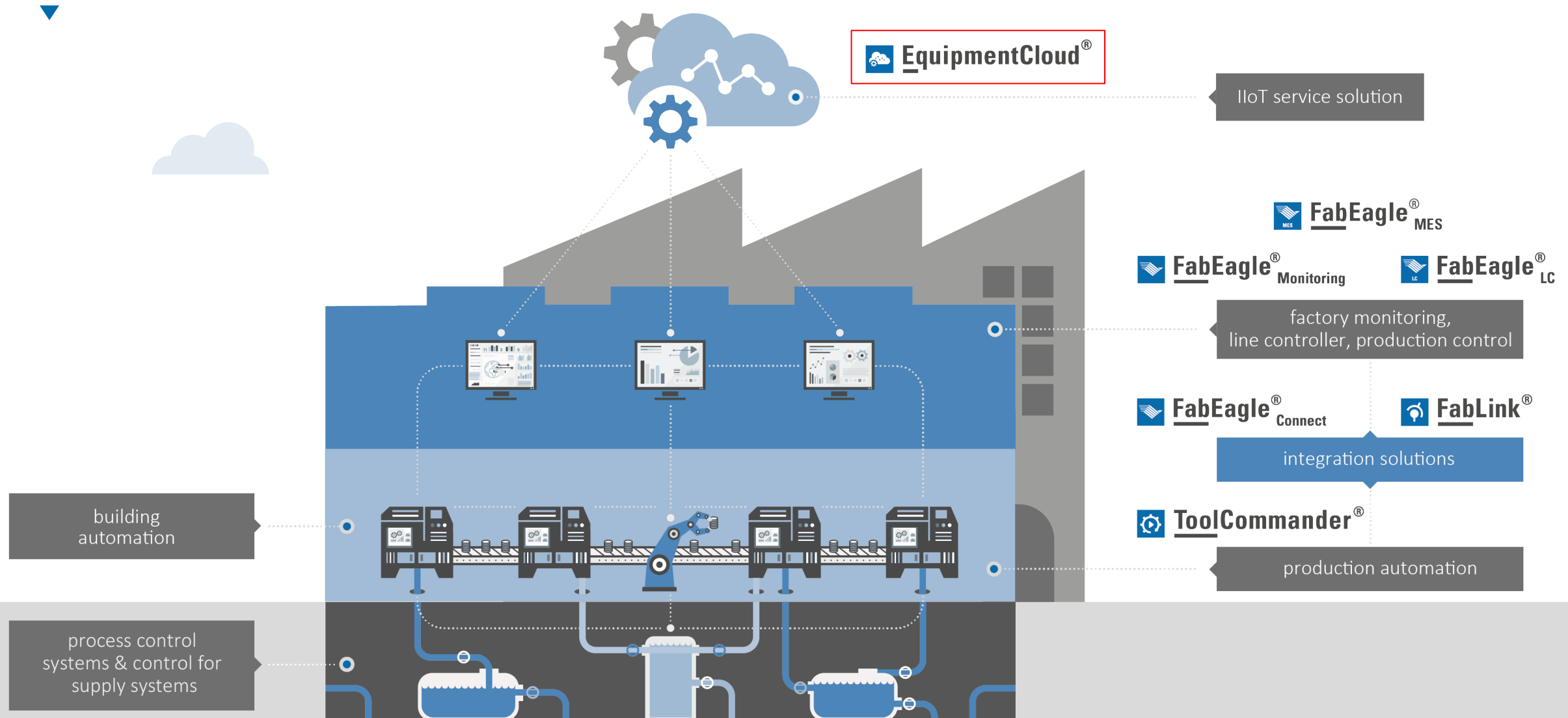
SERVICES & PRODUCTS



SERVICES & PRODUCTS



SERVICES & PRODUCTS



SENSOR INTEGRATION FRAMEWORK WITH INTERFACE A

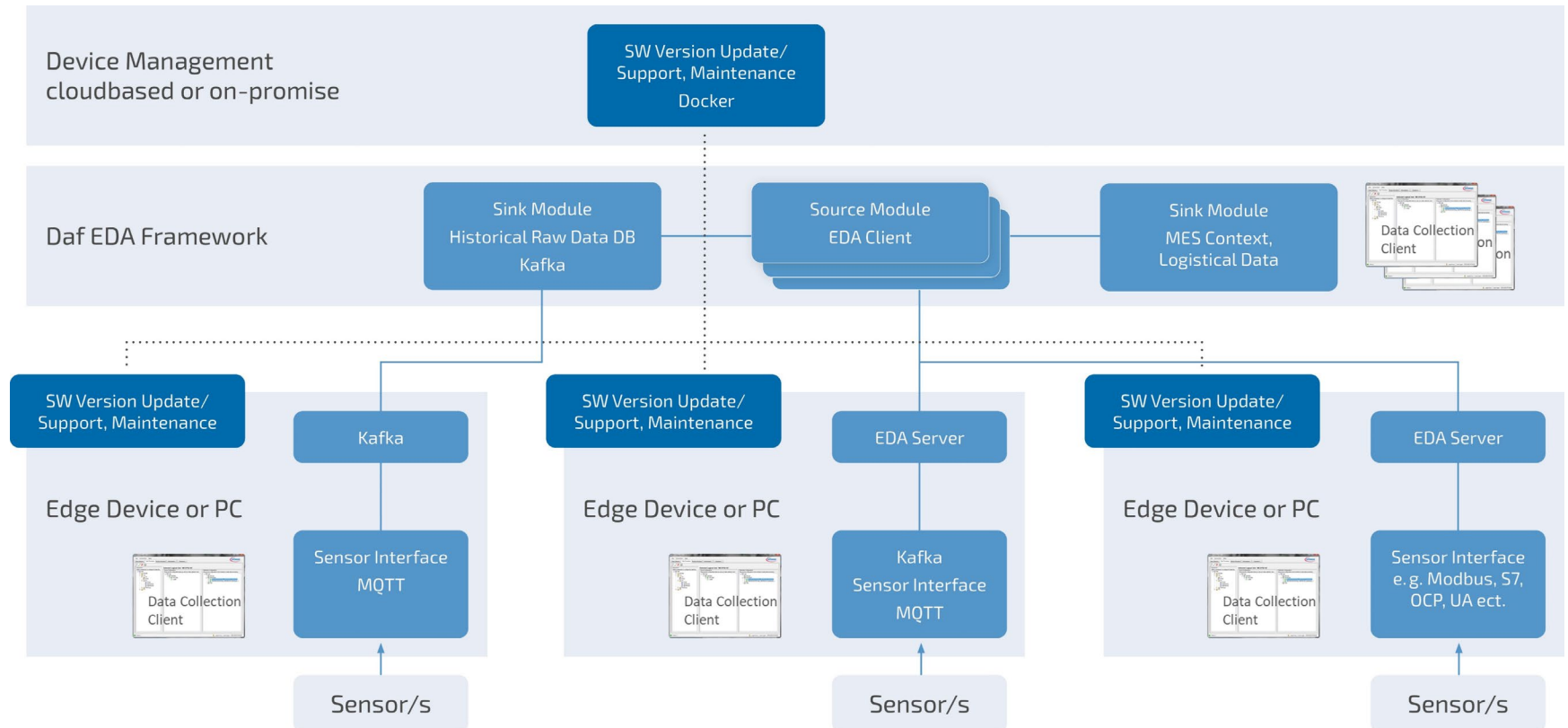
MOTIVATION

Framework to simplify the interface between a variety of external sensors and consumer devices.

The framework simplifies

- ▶ application
 - ▶ driver development
- with abstractions that separate responsibilities between
- ▶ user application,
 - ▶ sensor framework,
 - ▶ device driver.

componentized framework that allows developers to focus on writing minimal pieces of sensor-specific code enabling a sustainable system of reusable sensor drivers.

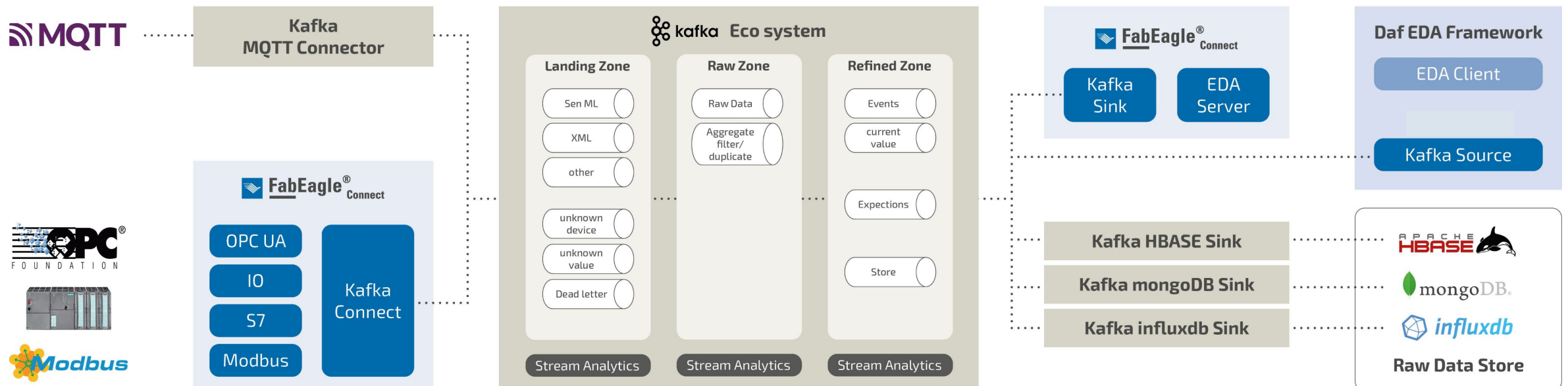


APPROACH & INNOVATION



APACHE KAFKA® ARCHITECTURE

- ▶ for high workload and high availability
- ▶ acts as a device data broker
- ▶ provides connectivity on common established protocols
- ▶ handle, transform and temporary store the raw data
- ▶ Grafana a most flexible tool for access to the raw data



APPROACH & INNOVATION



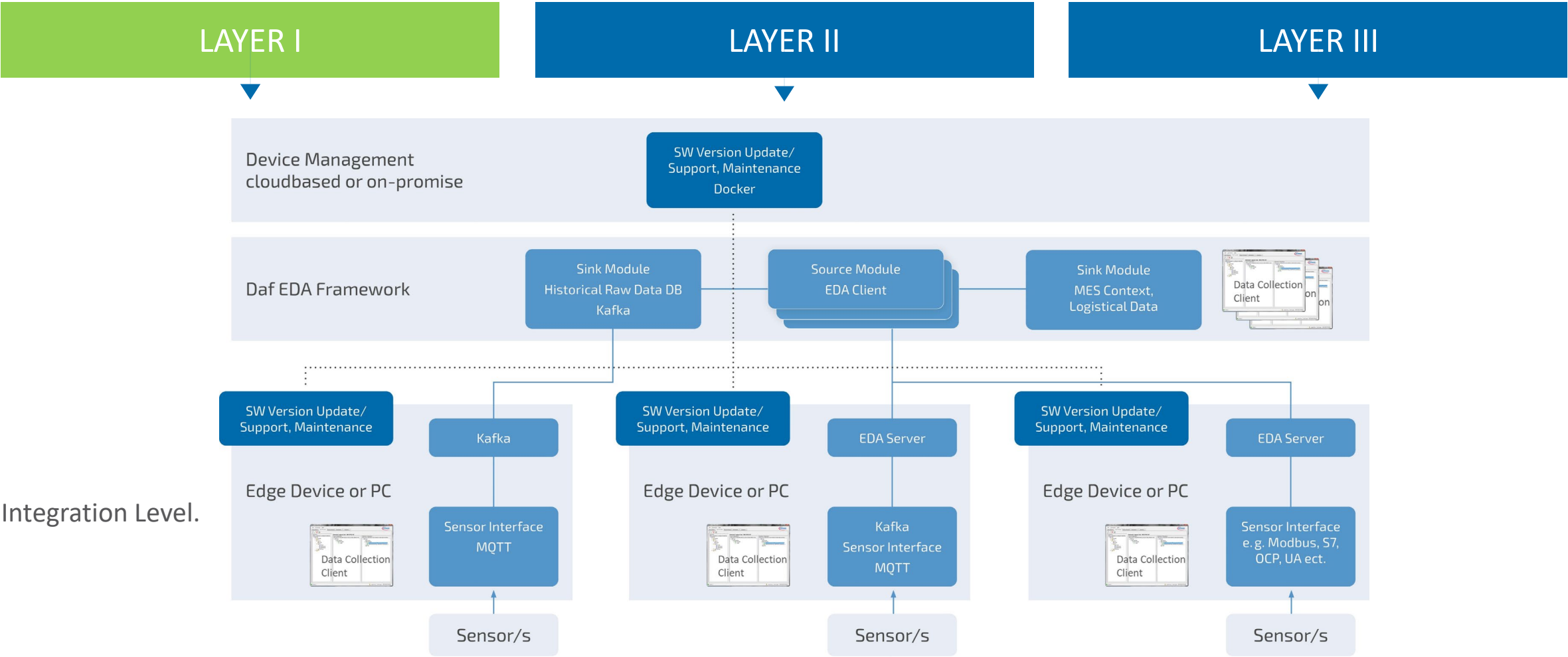
MQTT + APACHE KAFKA® ARCHITECTURE

- ▶ **MQTT Broker**
 - ▶ Persistent + offers MQTT-specific features
 - ▶ Consumes push data from IoT devices
 - ▶ not built for high scalability, longer storage
- ▶ **Kafka Connect**
 - ▶ Kafka Consumer + Kafka Producer under the hood
 - ▶ Pull-based
 - ▶ Scalability and integration features (fault tolerance, load balancing, routing, filtering, converters ect.)

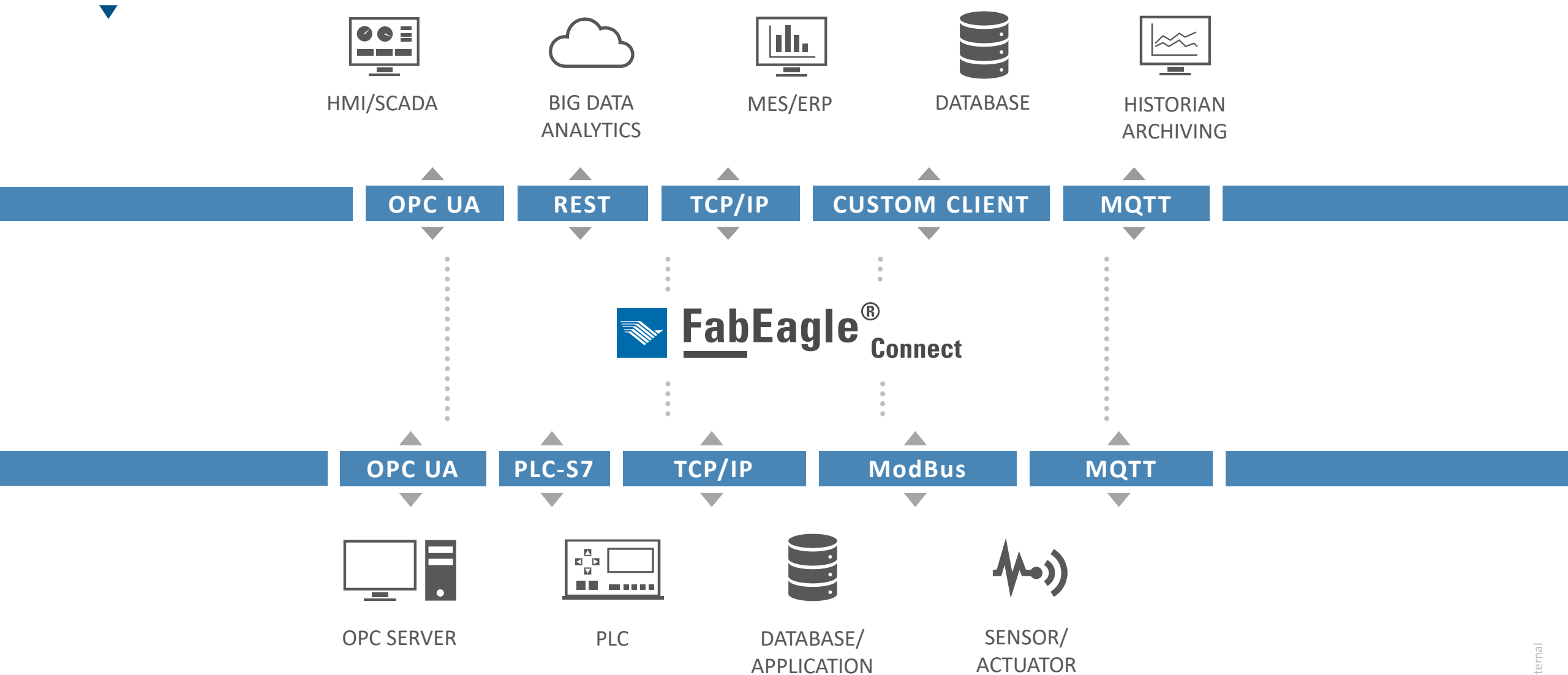


MQTT and Apache Kafka are a perfect combination

LAYER



INTERFACE & USE CASE



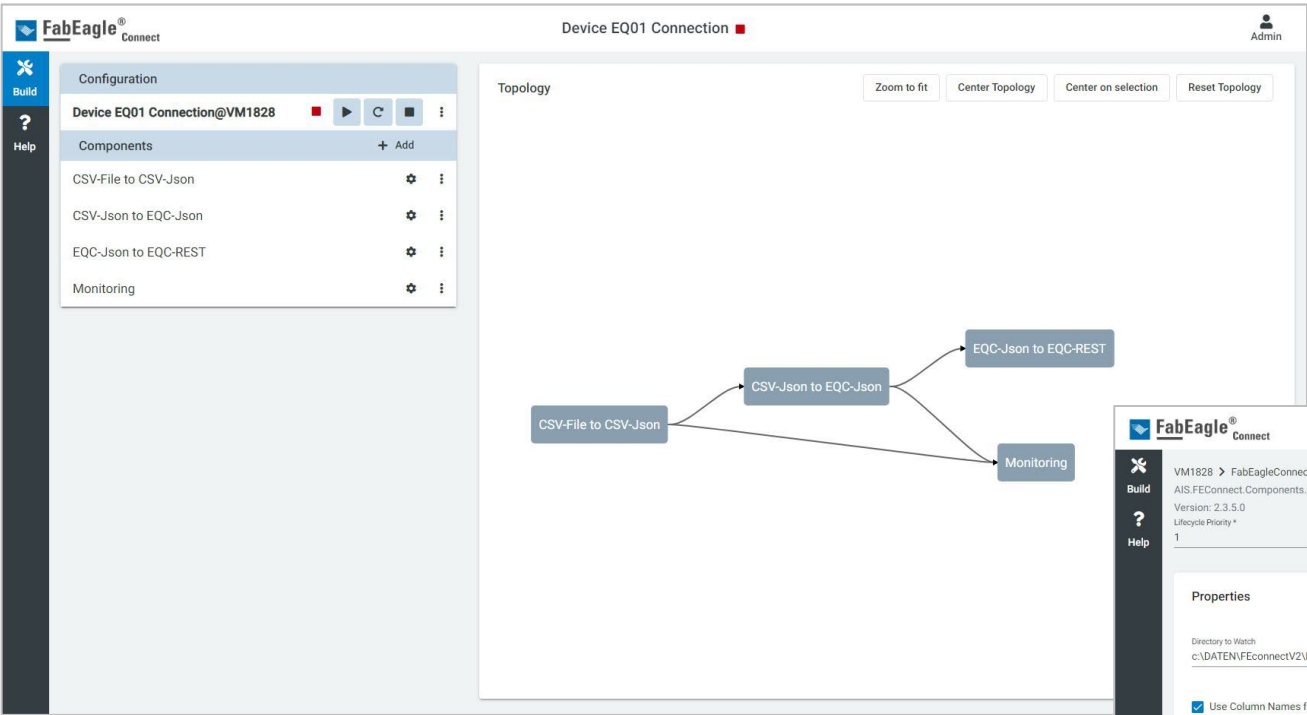


Abb. Build - Topology

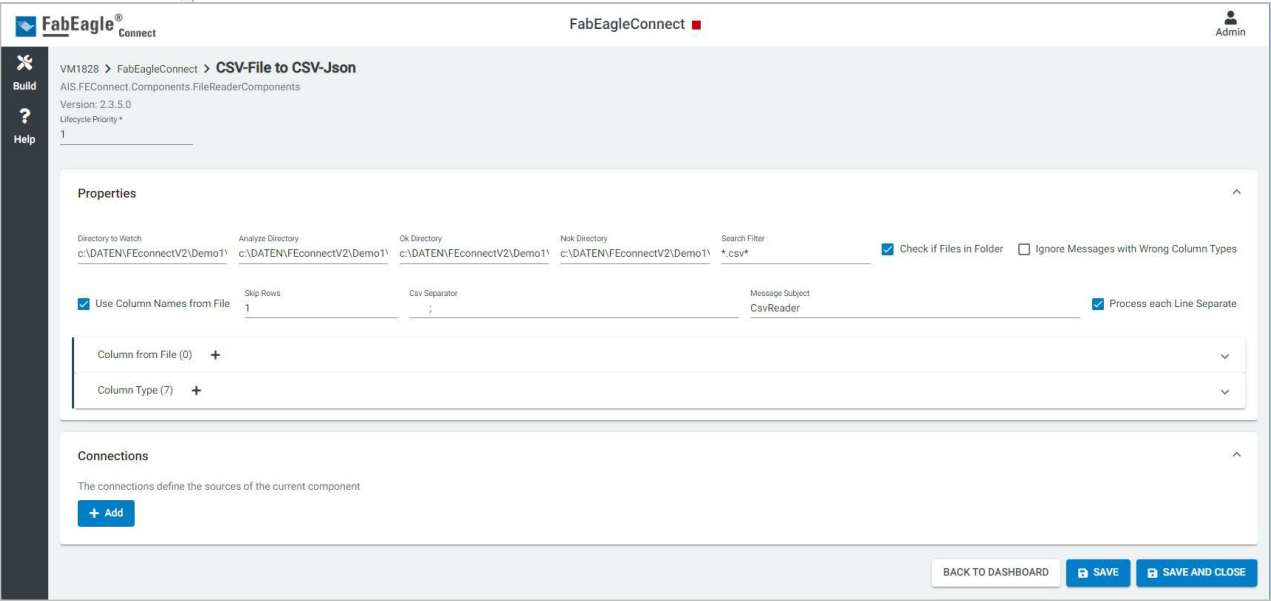
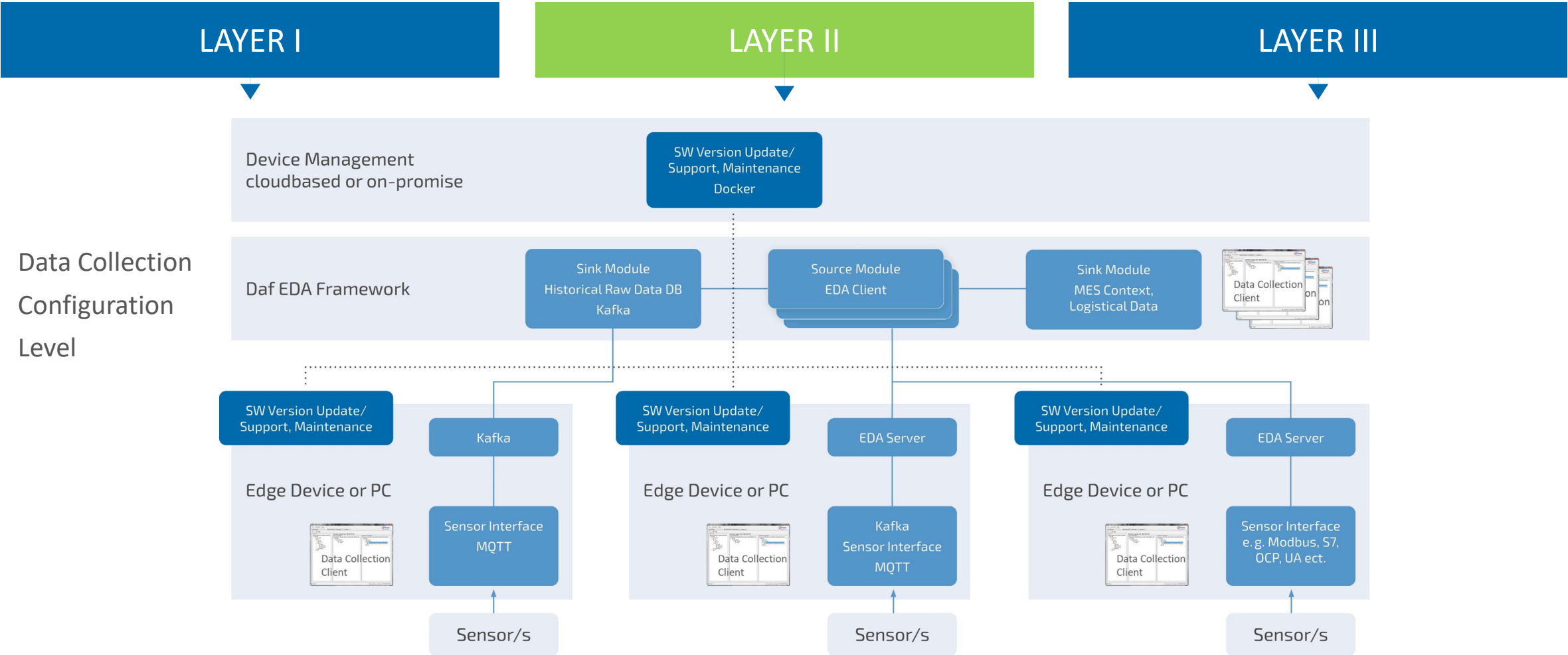


Abb. Build – Configuration dialog

LAYER

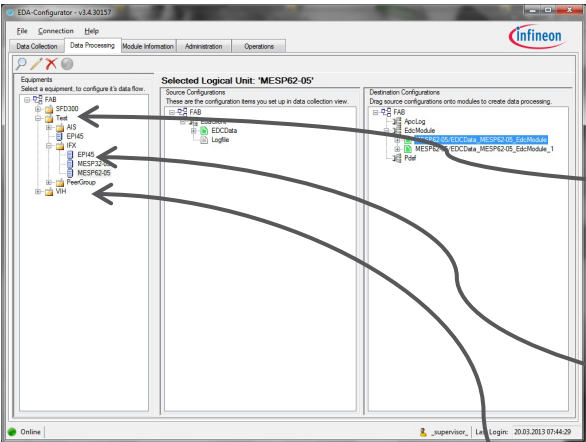


APPROACH & INNOVATION

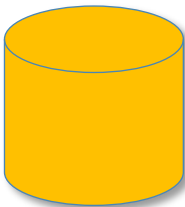


Daf EDA Client Framework

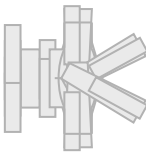
DaF –Studio (EdaConfigurator)



Create Data Collection



MES Context Data

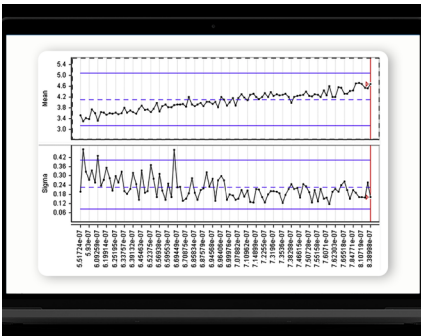


Prozess Equipment Data



External Sensor Data

APC Solution

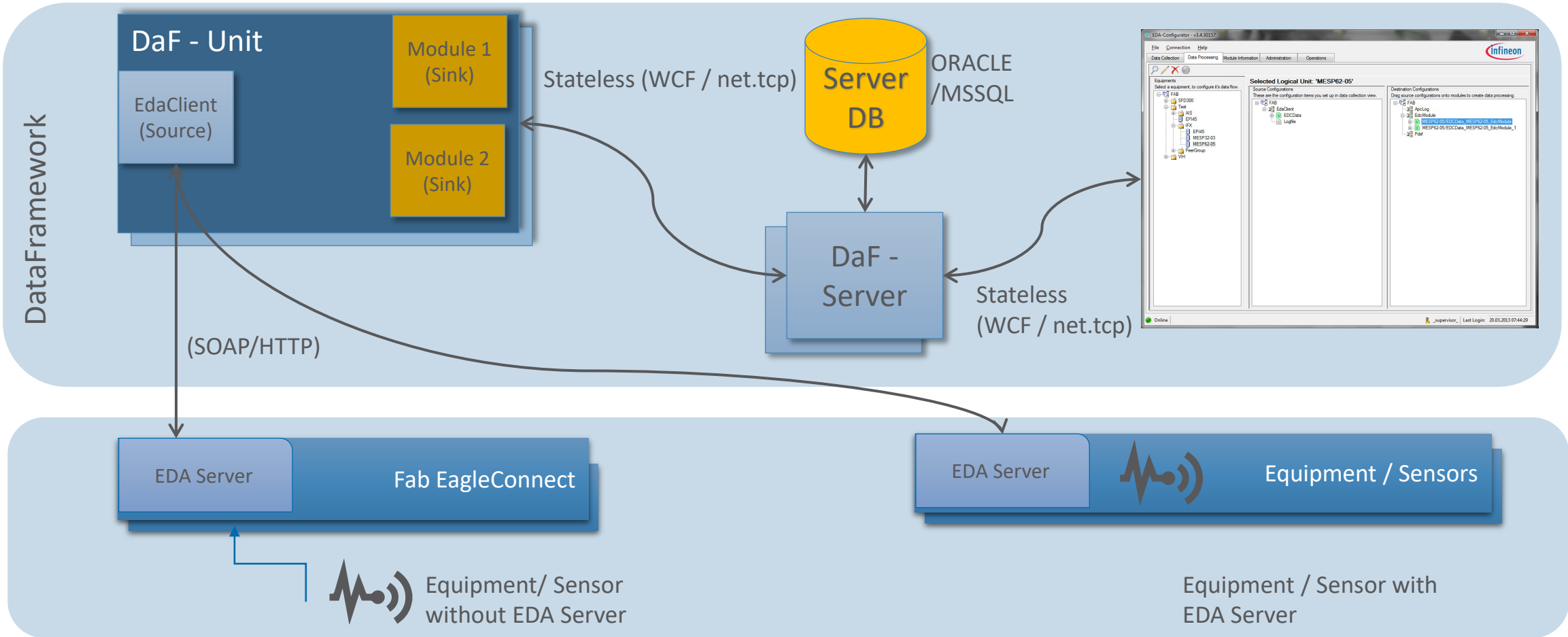


APPROACH & INNOVATION



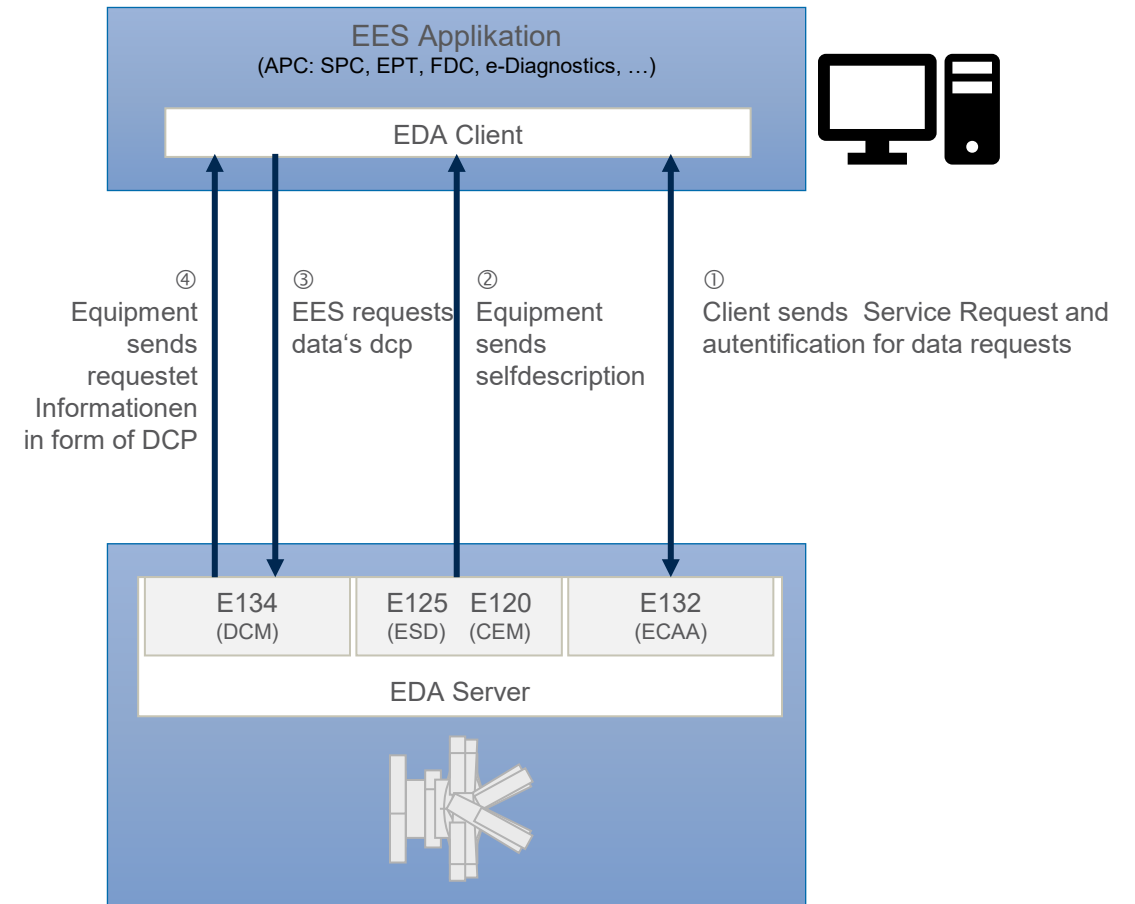
Daf EDA Client Framework

DaF –Studio (EdaConfigurator)



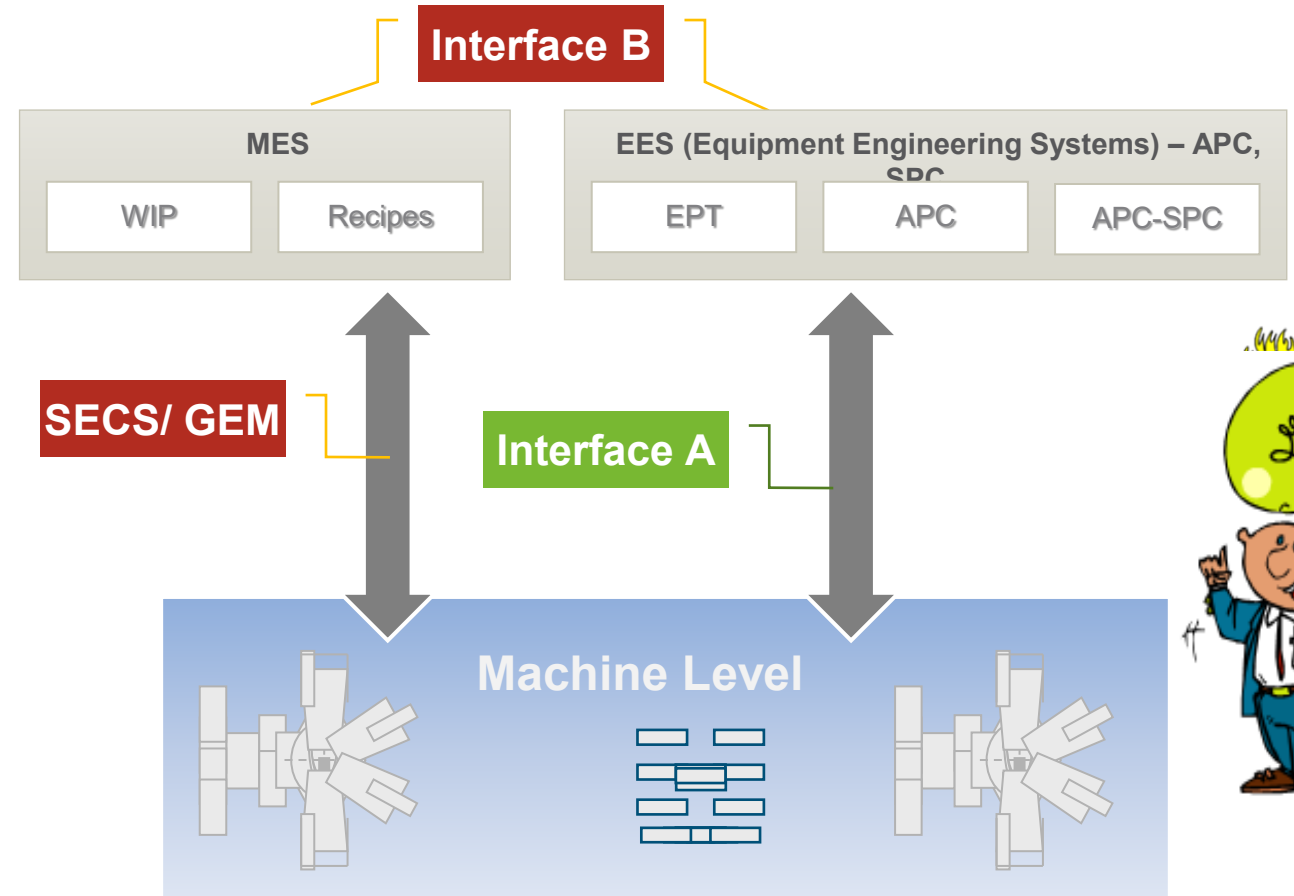
SEMI STANDARDS INTERFACE A - OVERVIEW

- ▶ EDA/Interface A is comprised of multiple SEMI standards.
- ▶ The following five are the primary SEMI standards:
 - [E120](#) Specification for the Common Equipment Model (CEM)
 - [E125](#) Specification for Equipment Self Description (EqSD)
 - [E132](#) Specification for Equipment Client Authentication and Authorization
 - [E134](#) Specification for Data Collection Management
 - [E164](#) Specification for EDA Common Metadata



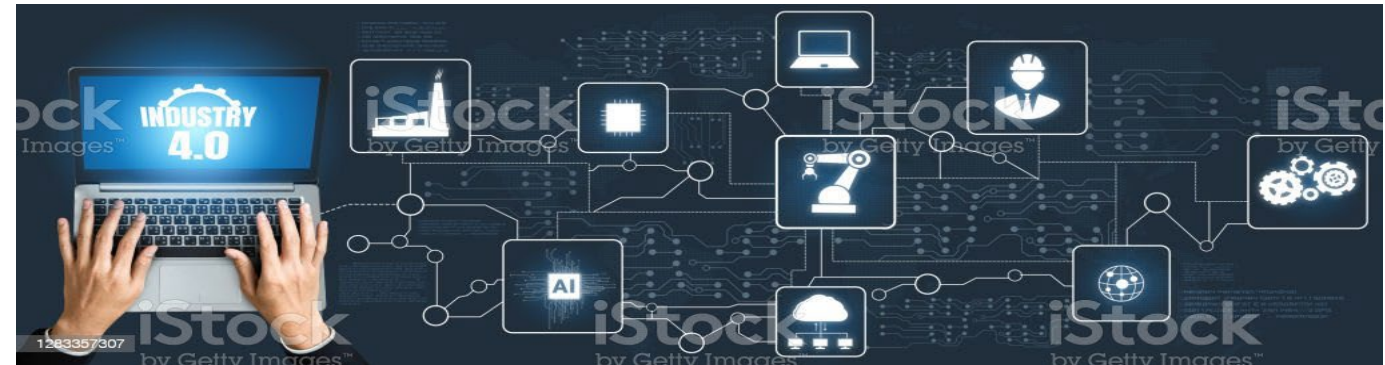
SEMI STANDARDS INTERFACE A - OVERVIEW

- ▶ EDA does not replace
 - ▶ SECS/GEM and GEM300
- ▶ EDA does not provide
 - ▶ equipment control
 - ▶ Configuration
- ▶ EDA to provide
 - ▶ flexible,
 - ▶ high-performance data collection capabilities.



BETTER PERFORMANCE WITH EDA

- ▶ “With the evolution of Industry 4.0, advancing the EDA Standards with newer technologies will enable the flow of higher volumes of data throughout the manufacturing facility.”
- ▶ detect and predict problems
- ▶ make informed decisions
- ▶ minimize equipment downtime



2010



2022

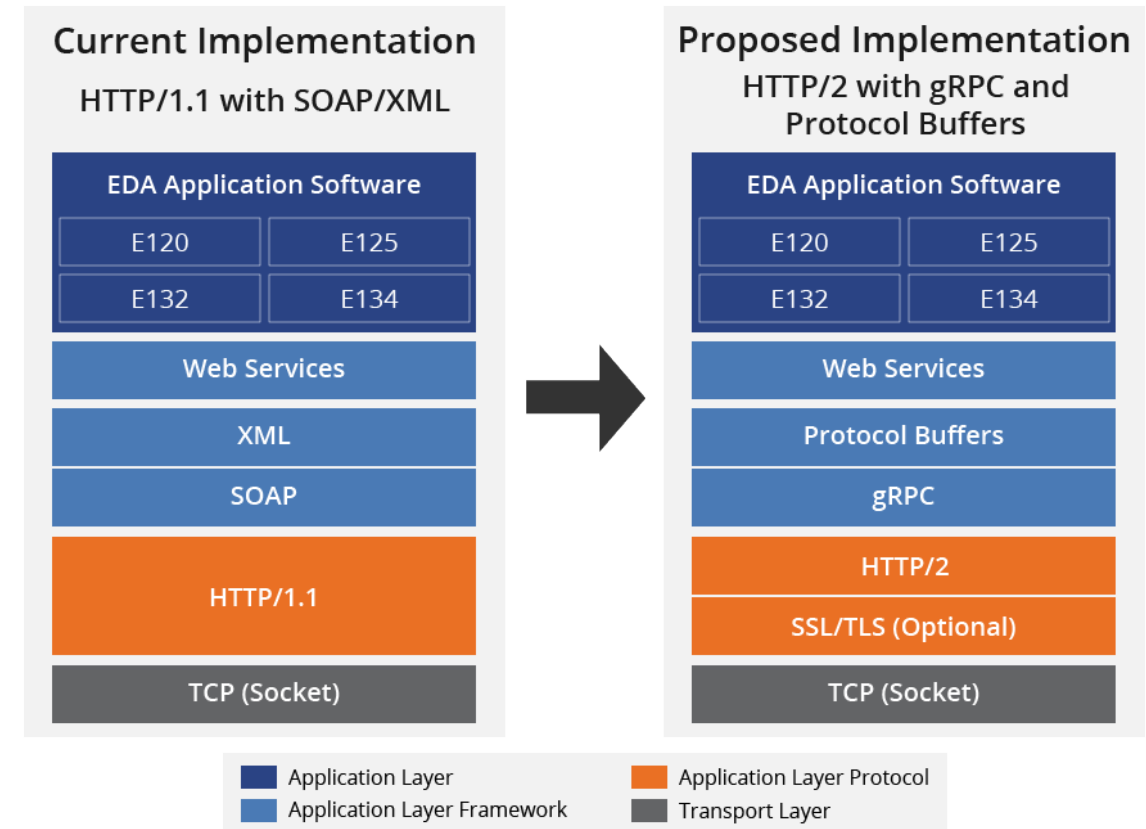
EDA Freeze 2

A couple of things have changed

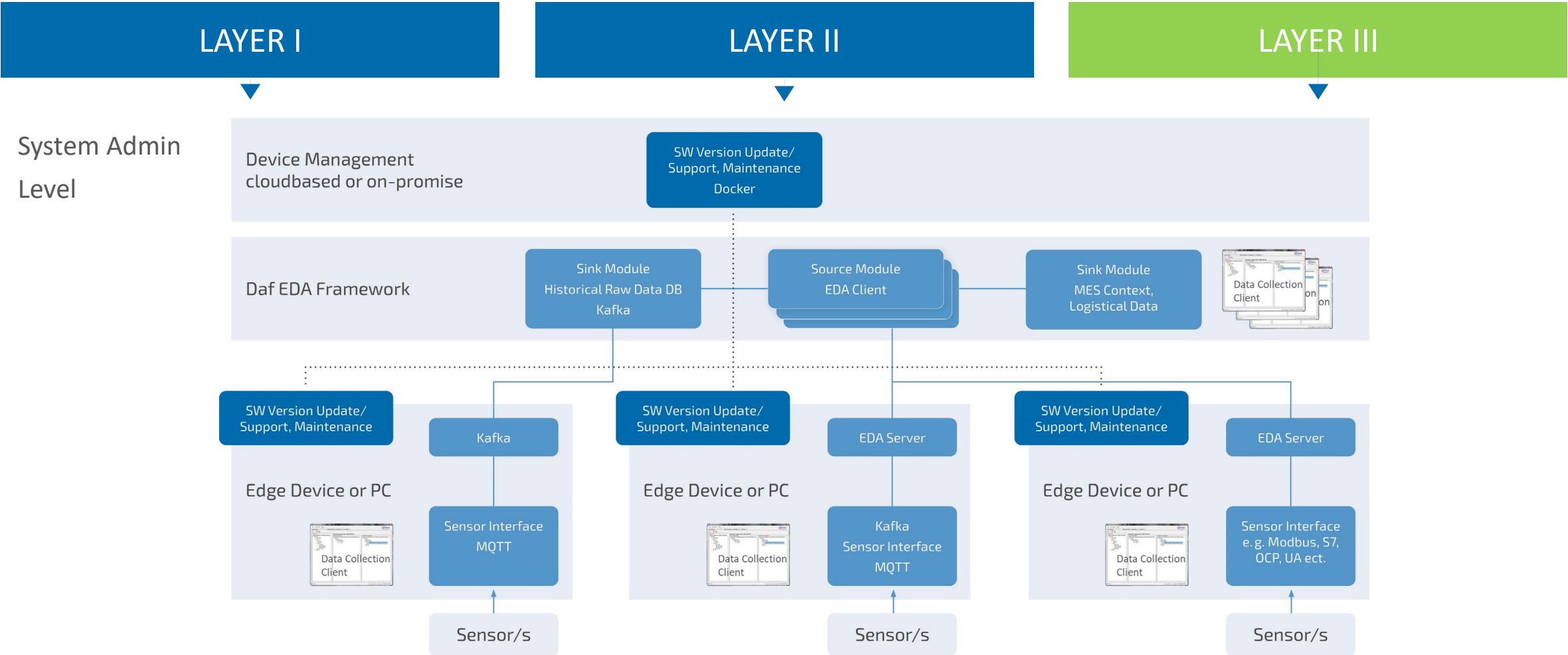
- ▶ technology has evolved significantly
- ▶ end users need more data at faster rates

SEMI STANDARDS INTERFACE A - NEXT GEN

- The following aspects of the technology advancement will contribute to improved performance:
- Message Encoding:
 - XML will be replaced with Protocol Buffer
 - Message Negotiation:
 - SOAP will be replaced with gRPC
 - Message Communication:
 - HTTP/1.1 will be replaced with HTTP/2

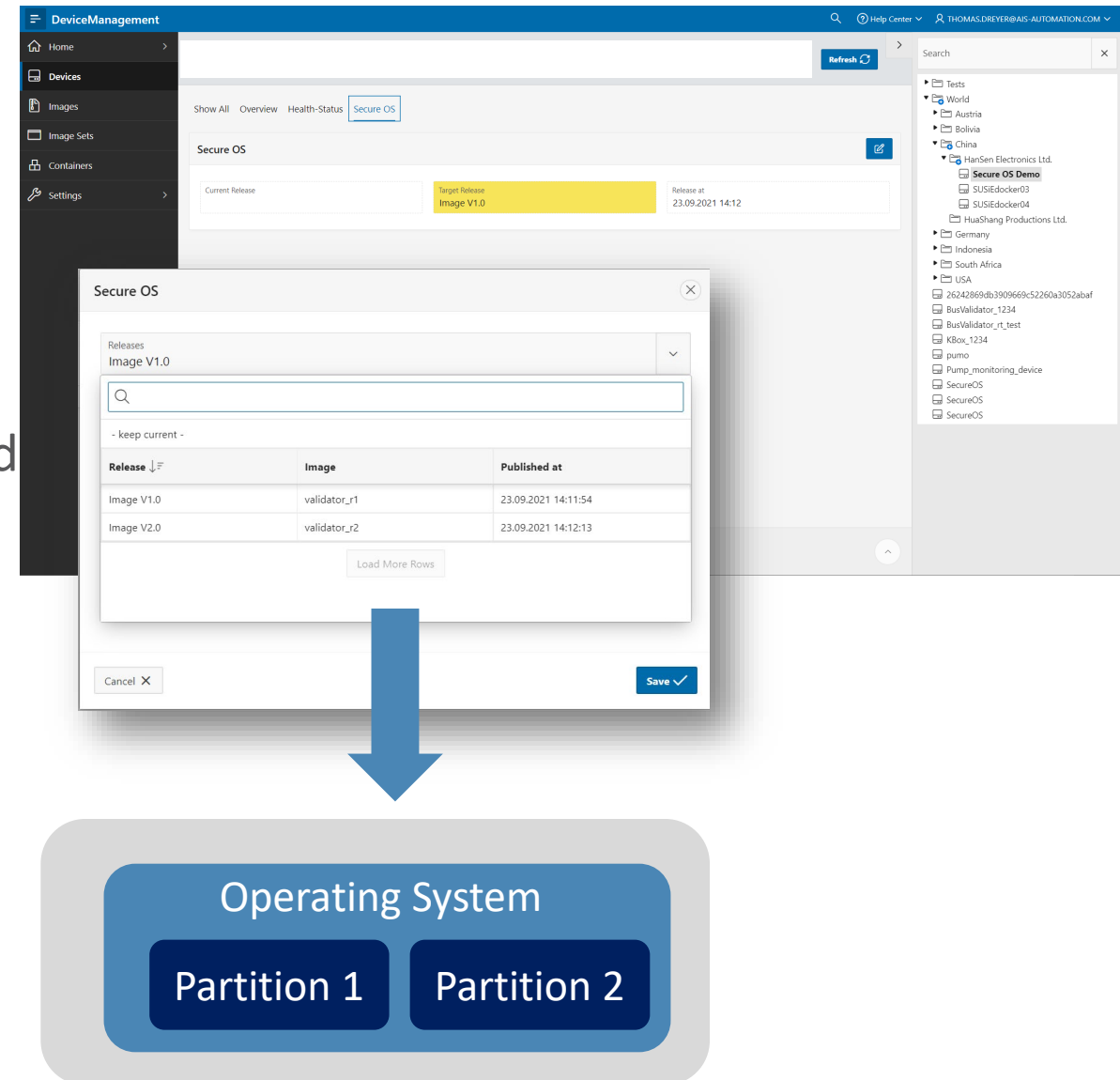
Source: www.Semi.org

LAYER



DEVICE MANAGER

- ▶ Management of Operating System
- ▶ Connect to any device with one click
- ▶ Two partitions – always one active
- ▶ Download of new OS versions in the background
- ▶ Switch partition if complete
- ▶ Report current version to Device Management



APPROACH & INNOVATION



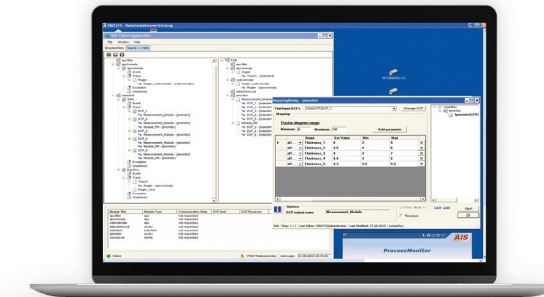
EDGE DEVICE AS HW PLATFORM

- ▶ installed nearby the sensor to handle heavy load
- ▶ support interface require short distance cable length



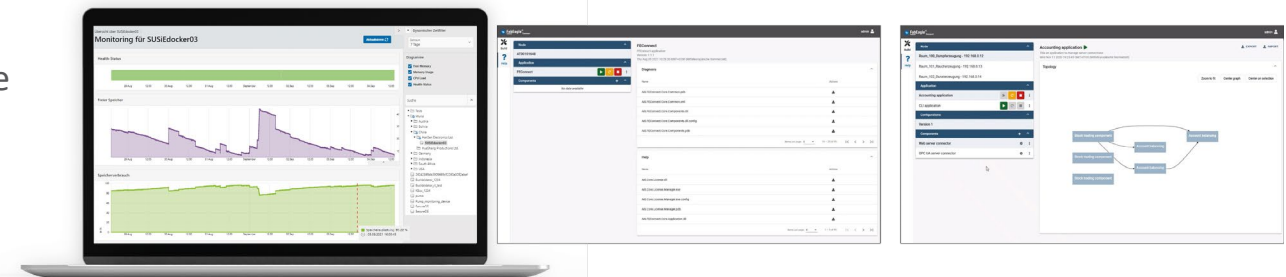
FABLINK® SUITE DESIGNER

- ▶ configure E164 Interface A compliant EQ structure
- ▶ assign sensor data to preferred modules, device and components



EDGE DEVICE AS HW PLATFORM

- ▶ administrating instances of FabEagle® Connect hardware
- ▶ provides auto software updates
- ▶ offers various analytics



RESULTS & TOP BENEFITS



RELIABLE AND EASY TO CONFIGURE

- ▶ Variety of prepared components enable a quick start
- ▶ Reliable operation of the interfaces is ensured using various diagnostic functions



SCALABLE AND EXPANDABLE

- ▶ Apps for small amounts of data or high data rates can be easily implemented
- ▶ Simple applications can later be expanded through configuration or divided into several parallel configurations



FUTURE-PROOF AND OPEN

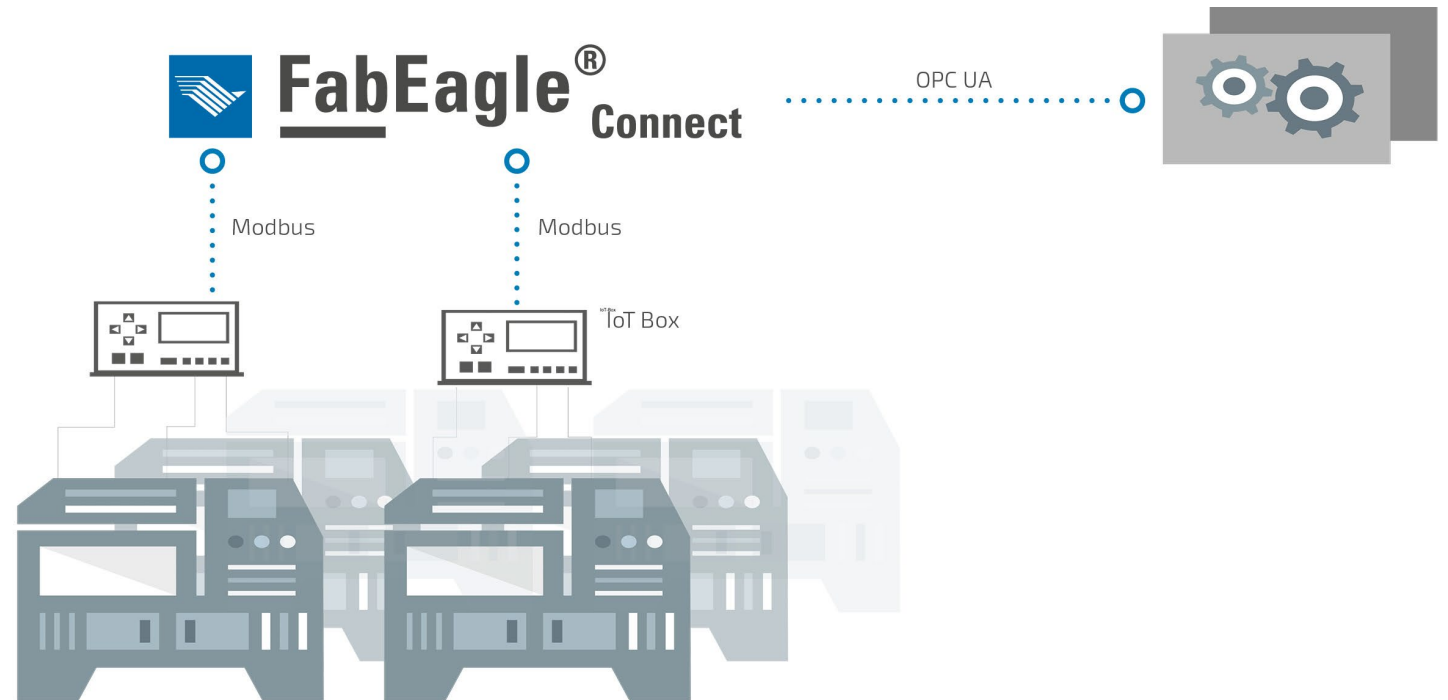
- ▶ New interface standards for I4.0 and IoT applications in the smart factory are continuously developed and provided as components

PROJECT EXAMPLE



CONNECTION OF CNC MACHINES TO MES

- ▶ Connection of over 50 CNC machines of different manufactures and models
- ▶ Provision of IoT module for recording simple digital signals (door switches, ...)
- ▶ Provision of data via OPC-UA to the MES
- ▶ Pre-processing of data to machine states (switch active + indicator light = machine active)





Thank you for your attention



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Visit our website : www.kontron-ais.com