

EPSC Presentation 28-08-2020

Introduction to IIoT & JOIN

- with a link to safety -

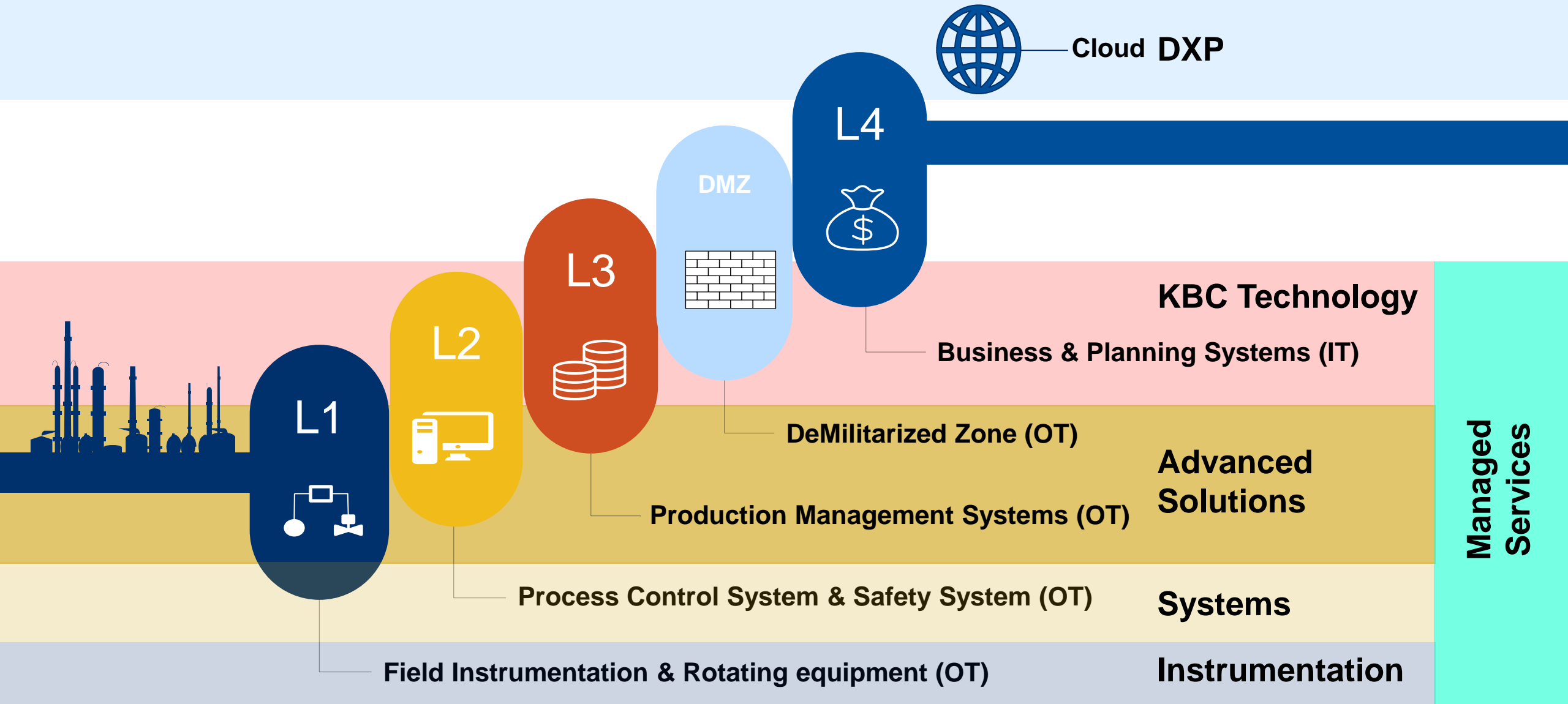
Martijn Kramer

Senior Solutions Consultant

25 August 2020



Yokogawa Business Units (BU)

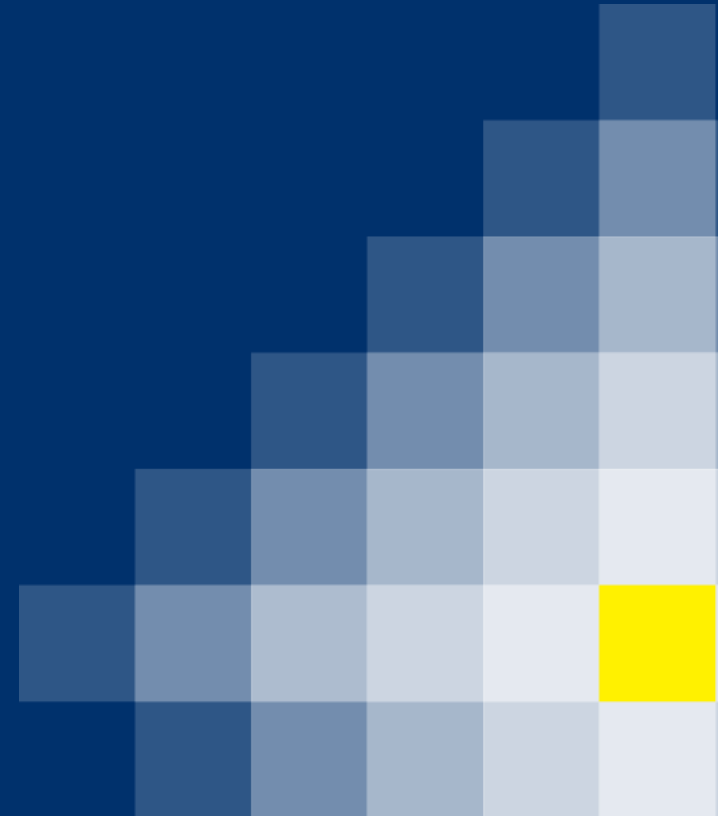


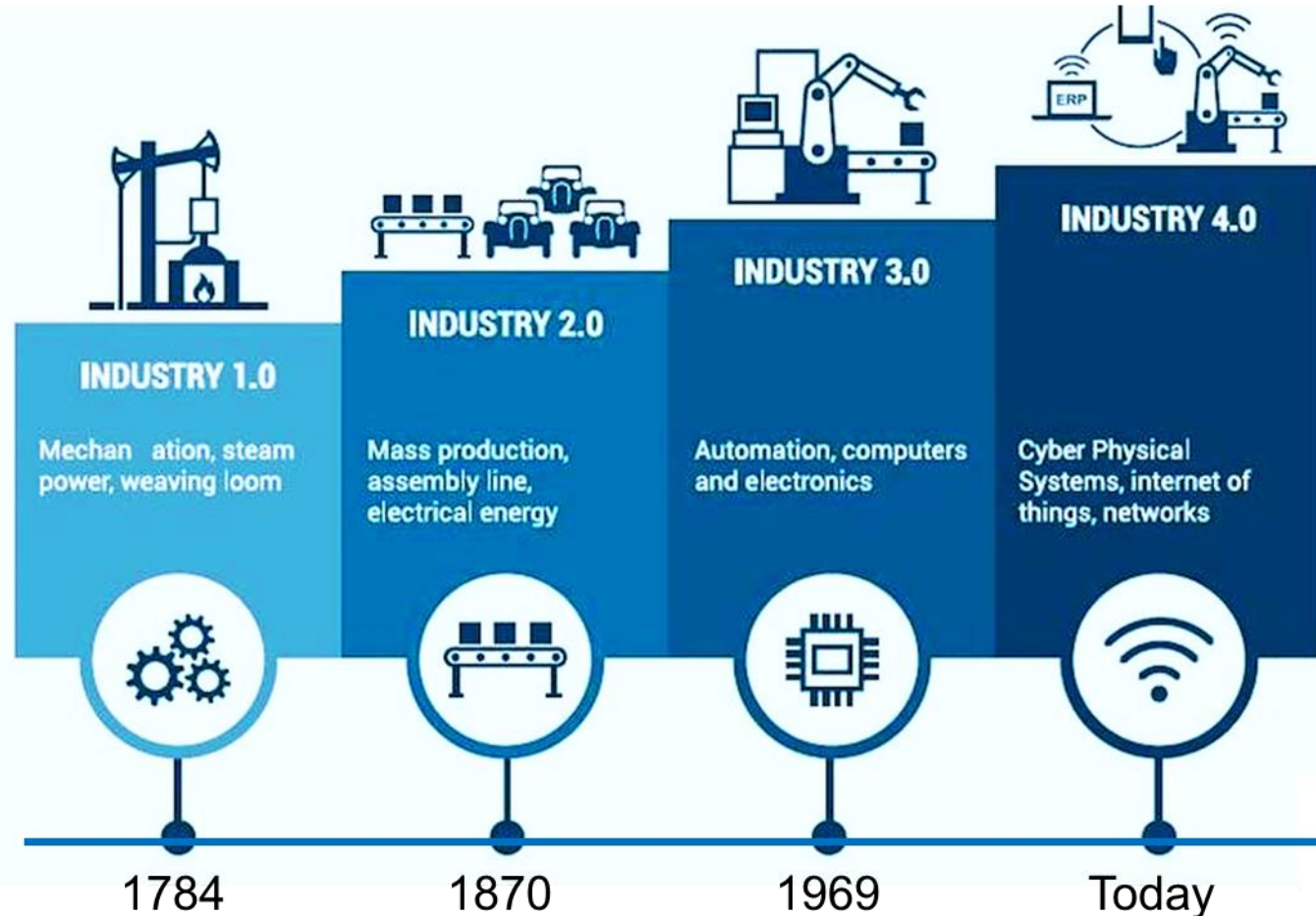
Agenda

1. Industry 4.0
2. Growing influence of IIoT in the industry
3. JOIN: IIoT solution incl. use cases
4. Q&A



Industry 4.0



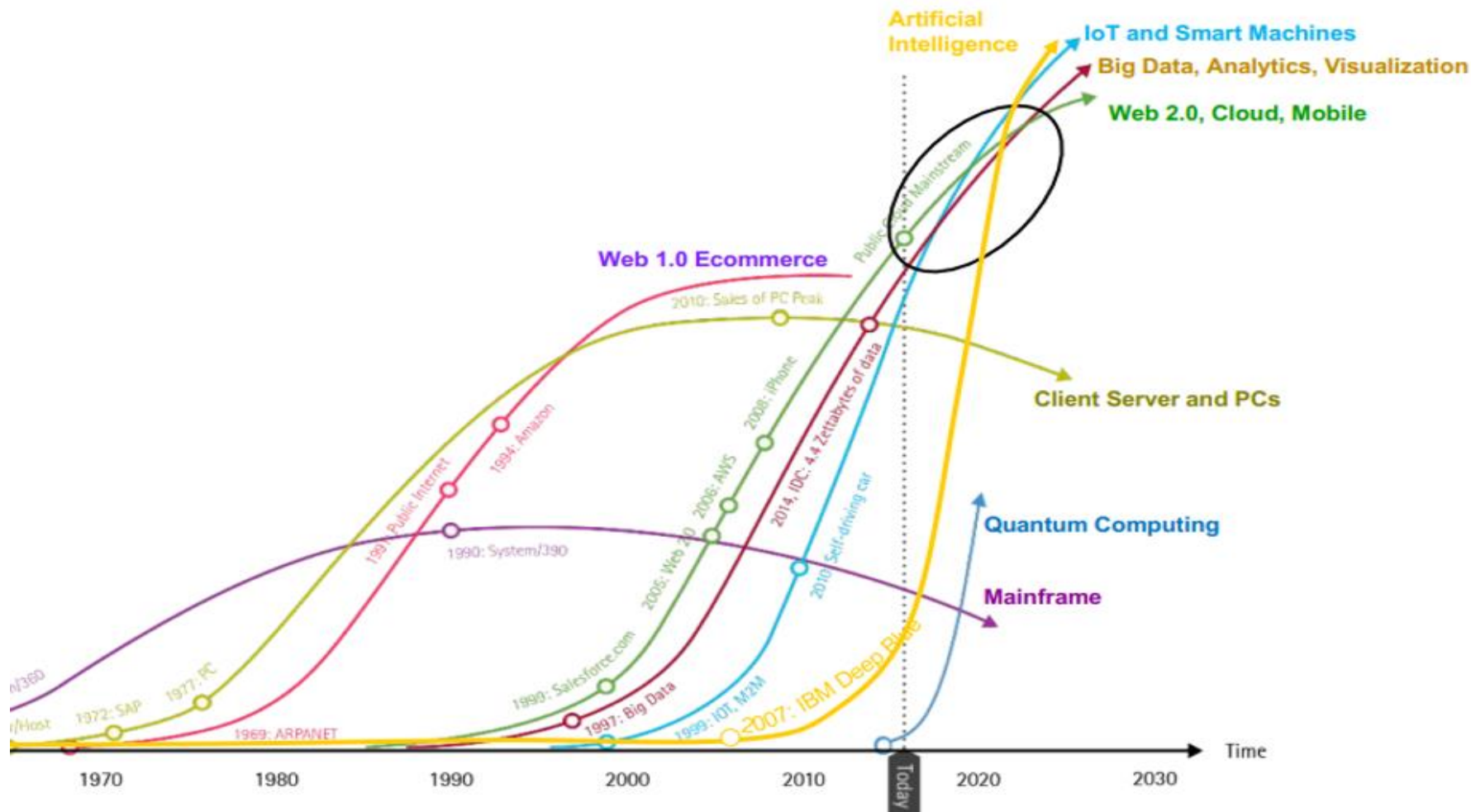


The Fourth Industrial Revolution

as some call it, has the potential to **disrupt** entire industries and trigger massive job loss through technological innovations, such as artificial intelligence, machine learning and 3D printing.

(Mc Kinsey.com - 20 augustus 2018)

Industry 4.0: drivers & enablers



Source: Accenture

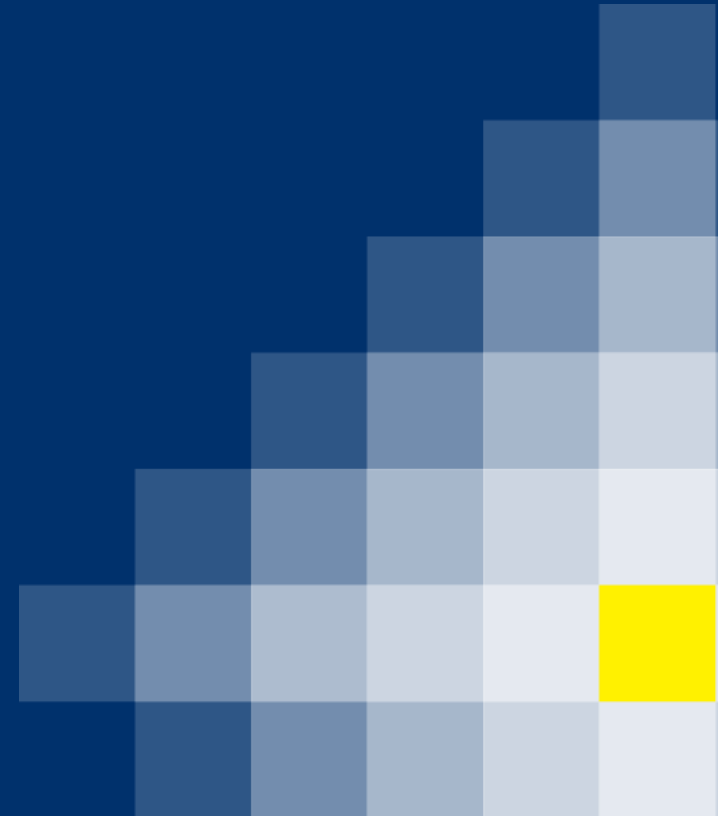
Drivers:

- IoT (Devices)
- Cloud & computing
- Big data
- AI

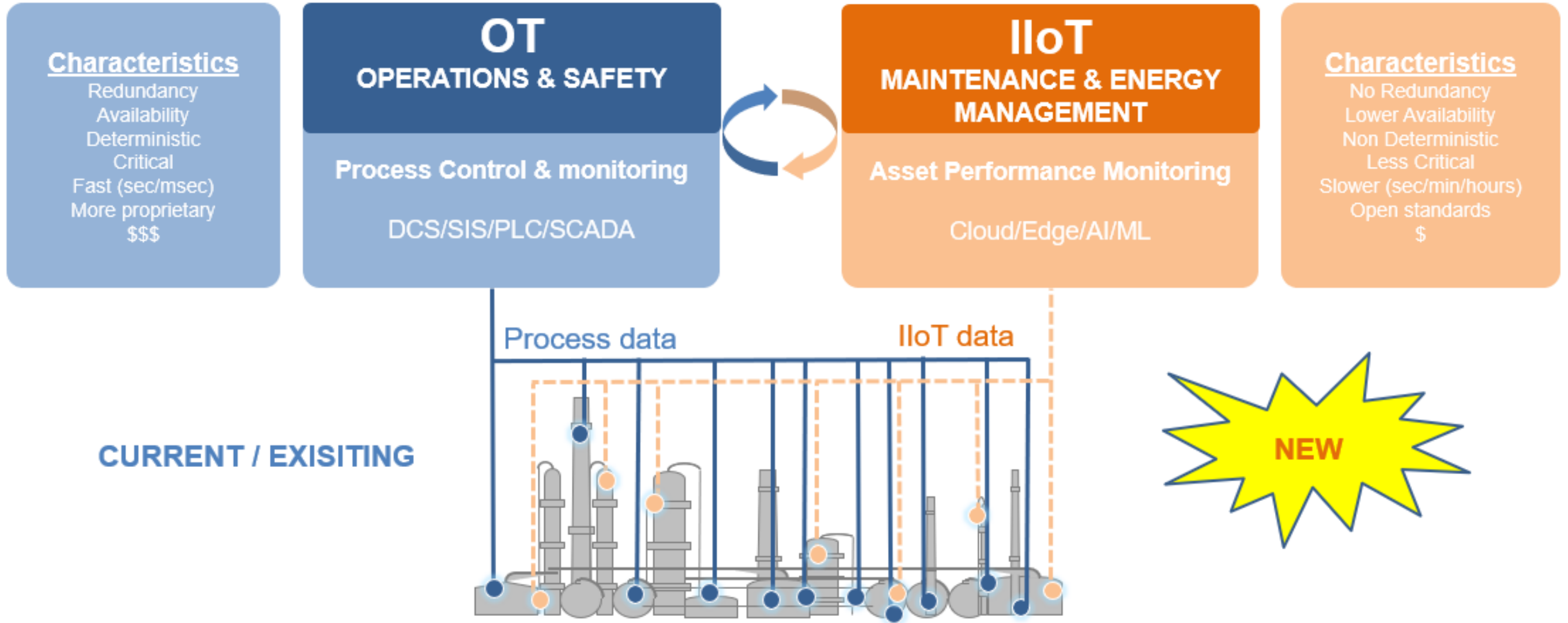
Technical Enablers:

- Smart devices & sensors
- Comm. technologies
- Computing power
- Storage capacity
- => Low costs

Growing influence of IIoT in the industry

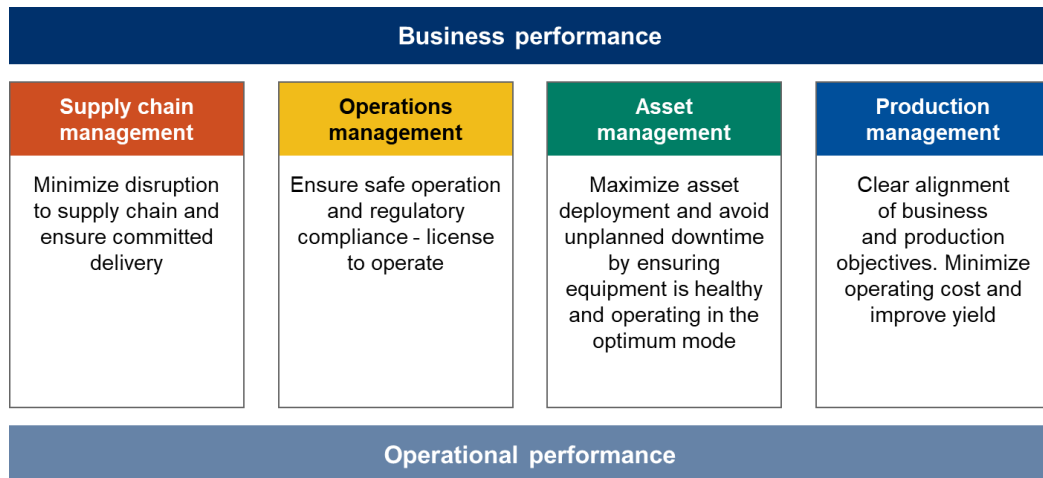


Industry 4.0: Why? Future Convergence: OT vs IIoT



Industry 4.0: Why? Effects on L3 (MES)

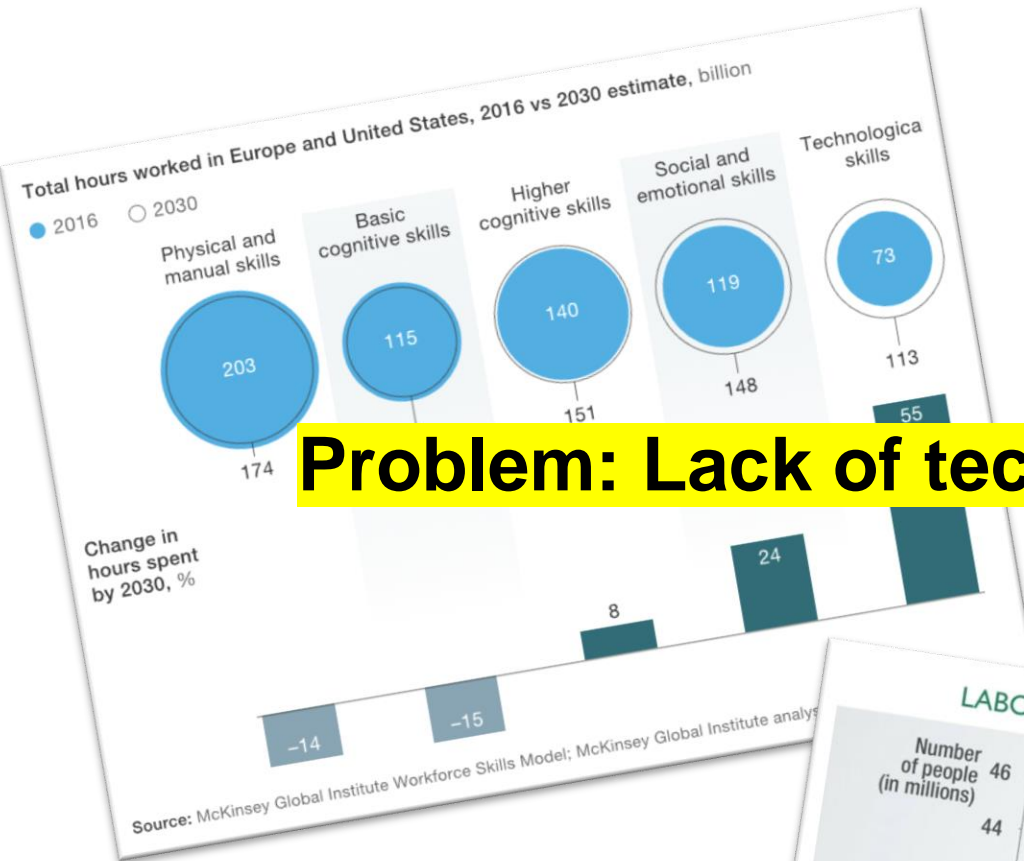
Predictive analytics in industry has following tangible benefits:



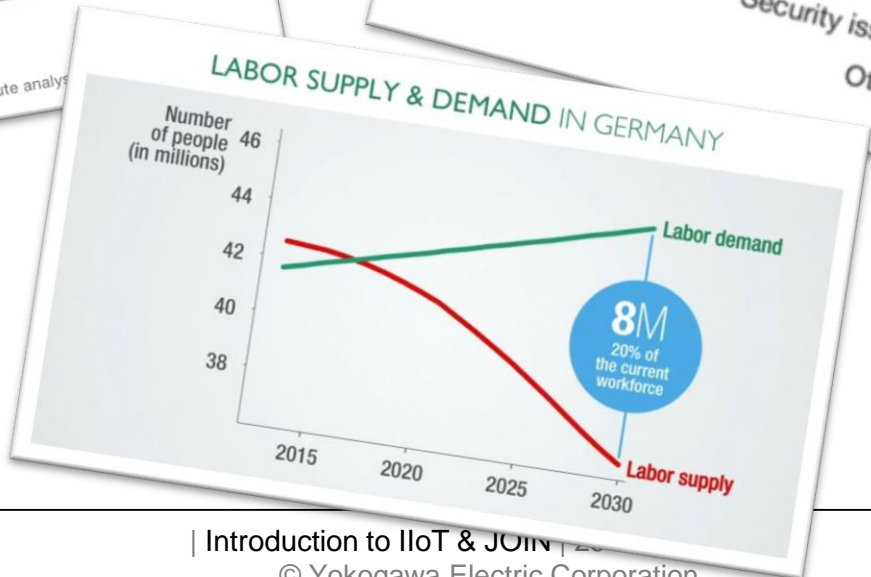
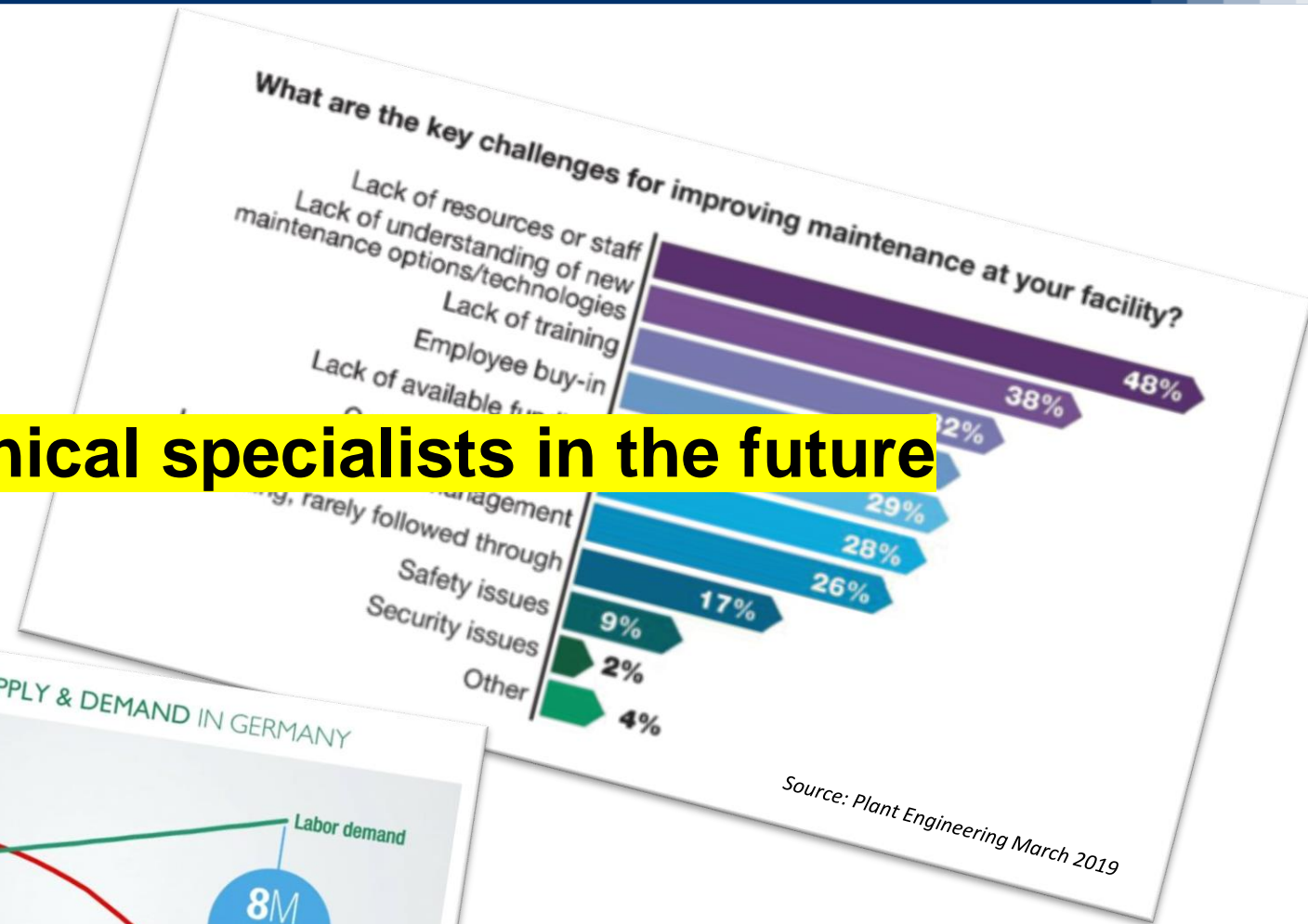
- ✓ SHE: reduction of incidents with 3 to 40%
- ✓ Availability: increase with 2 to 6%
- ✓ Employment productivity: gain of 5 to 25%
- ✓ Inventory of spares: reduction with 5 to 10%
- ✓ Reactive maintenance: reduction with 10 to 40 %
- ✓ IT Total Cost of Ownership: reduction with 5 to 25 %
- ✓ Capex avoidance
- ✓ Sustainability improvement
- ✓ Improved turnaround scope

Source: partly from GE Predix

Industrie 4.0: Why? Retirement wave



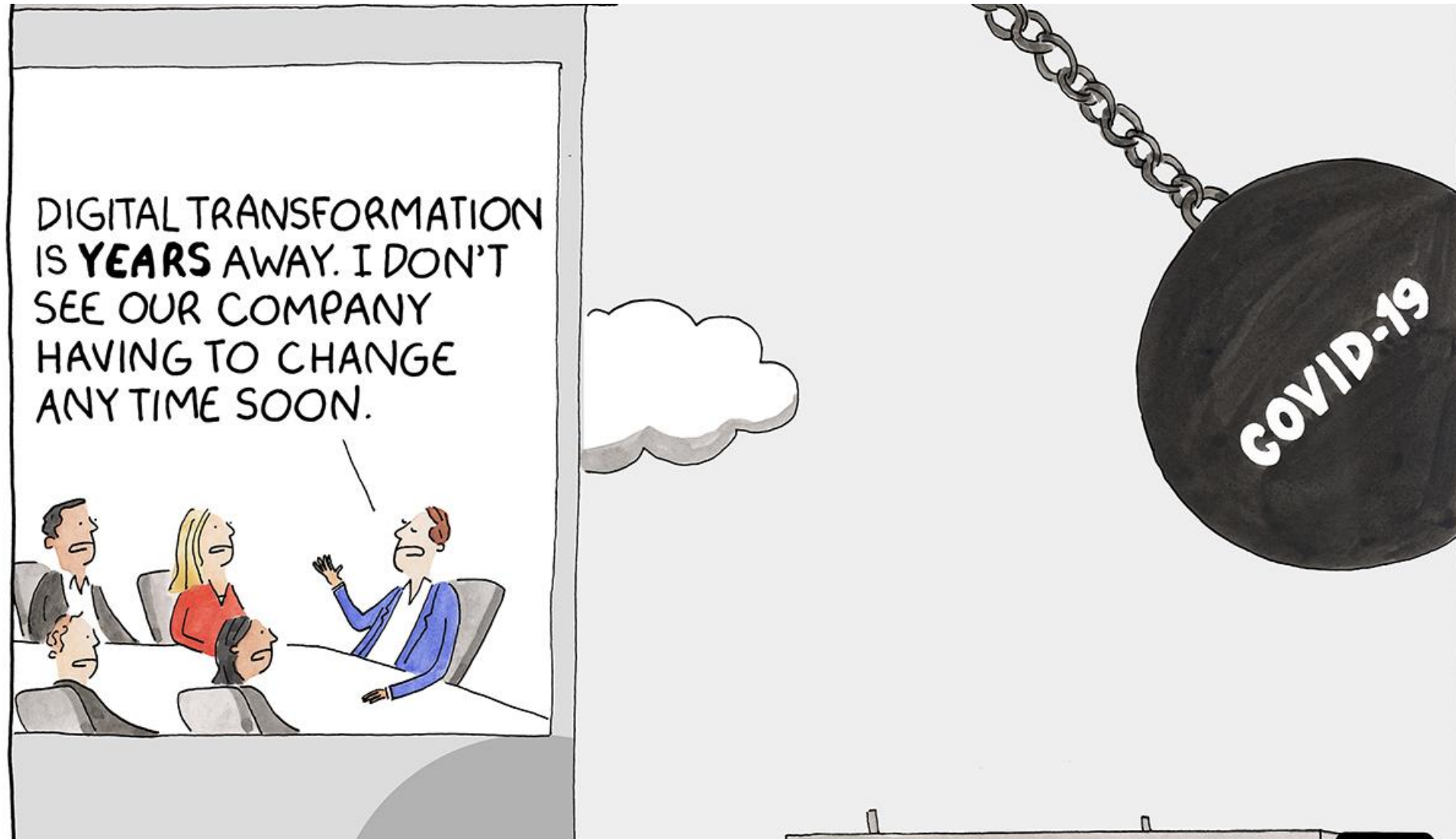
Problem: Lack of technical specialists in the future



Digital Transformation Journey to IA

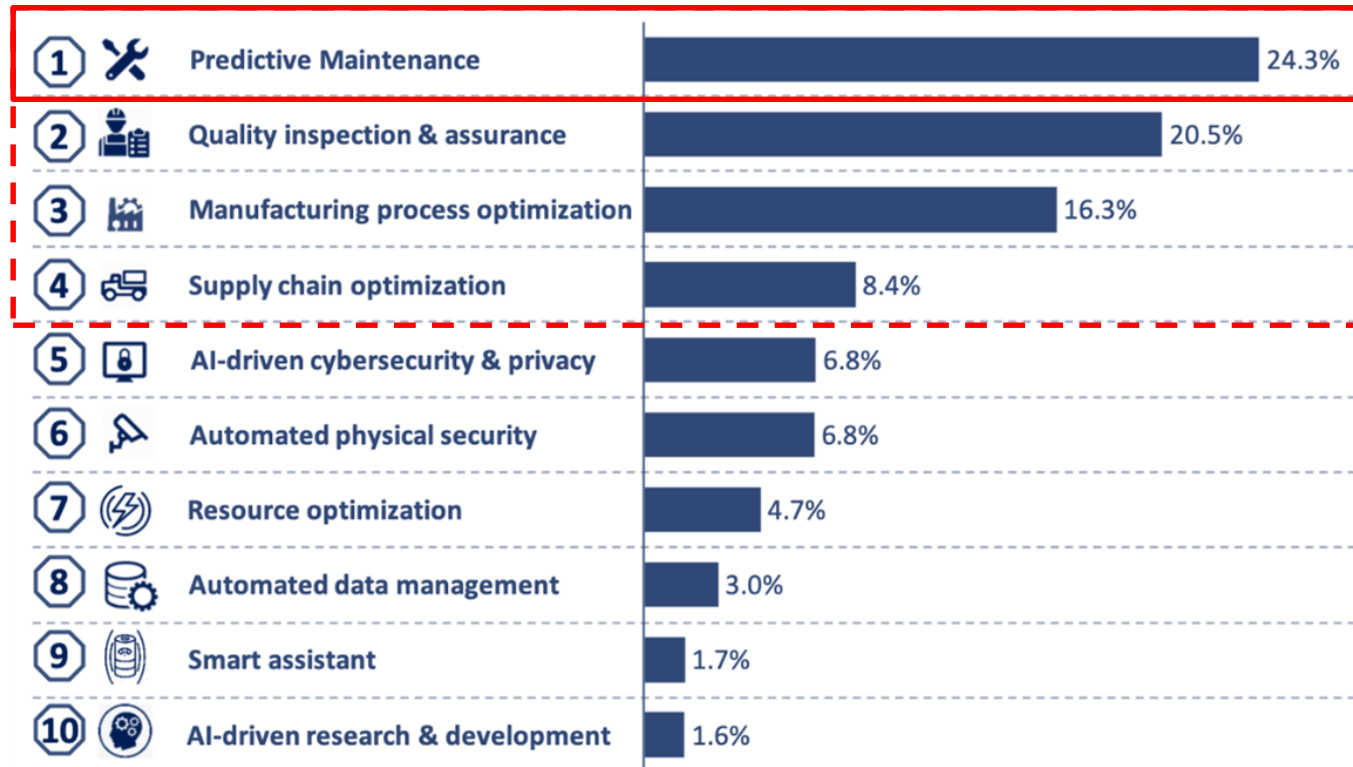


Digital Transformation?



Market feedback

- Top-10 use cases where Artificial Intelligence (AI) tools and techniques contribute to any kind of optimization



An Integrated IIoT ecosystem

join
Connect Predict Accelerate

YOKOGAWA 

HW / SW (incl 3rd party)
System Integrator (OT/IT)
Security
Managed services

perfact
GROUP

Maintenance Expertise & Consultancy
Algorithms
Training
Change Management

We offer an “One-stop-shop” for any Industry 4.0 related request

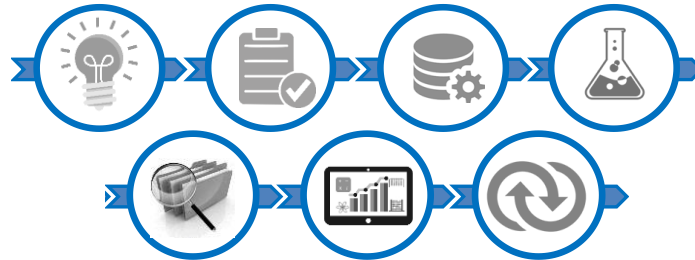
IIoT: Value Proposition

Vision – Roadmap - Strategic Partnership

People



Process

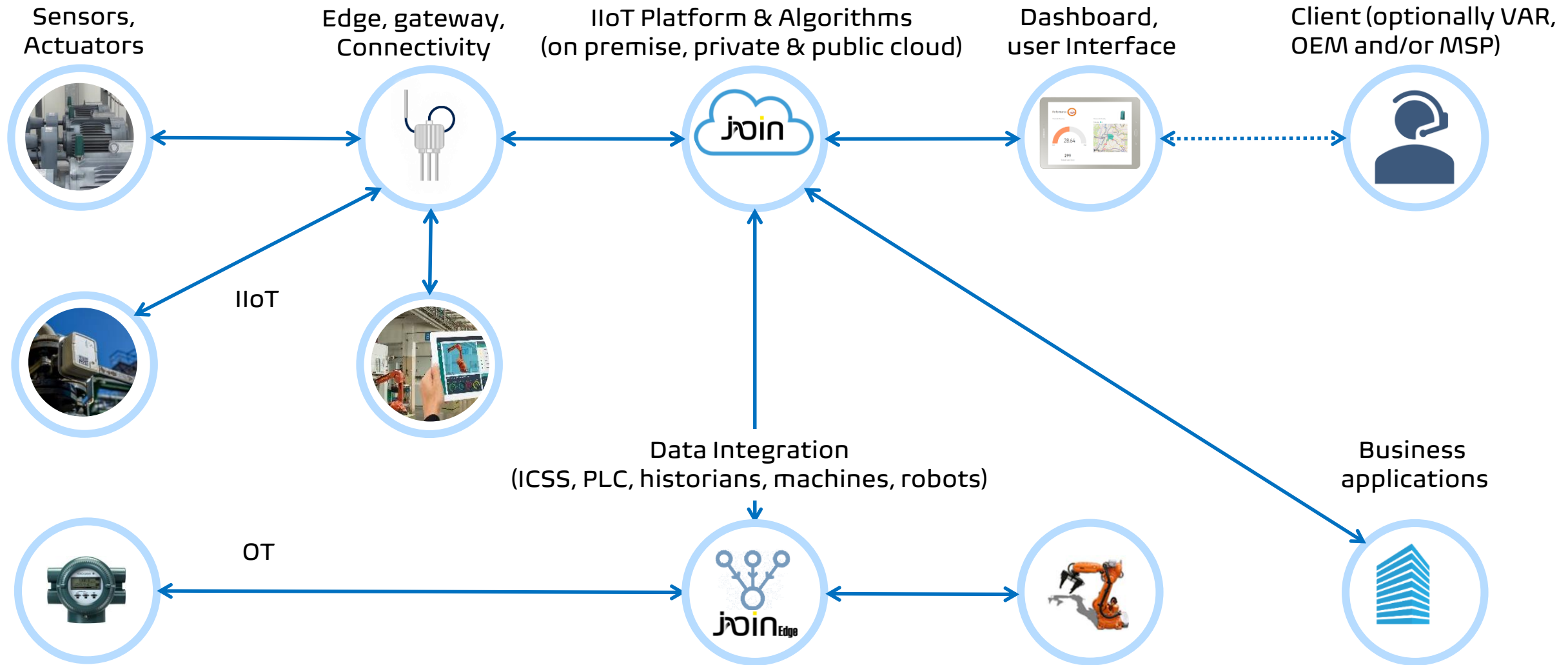


Technology

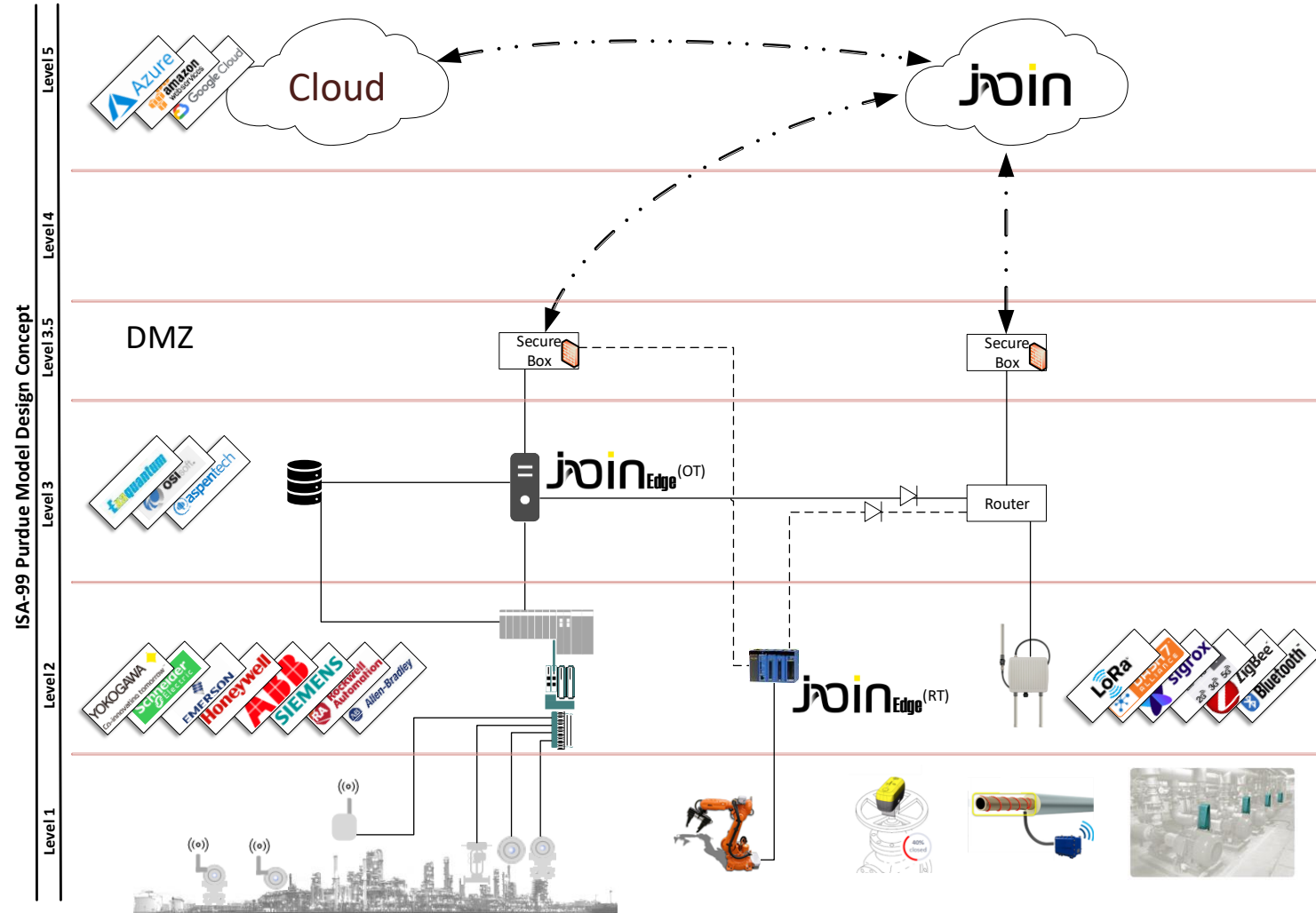


Project Management & Support

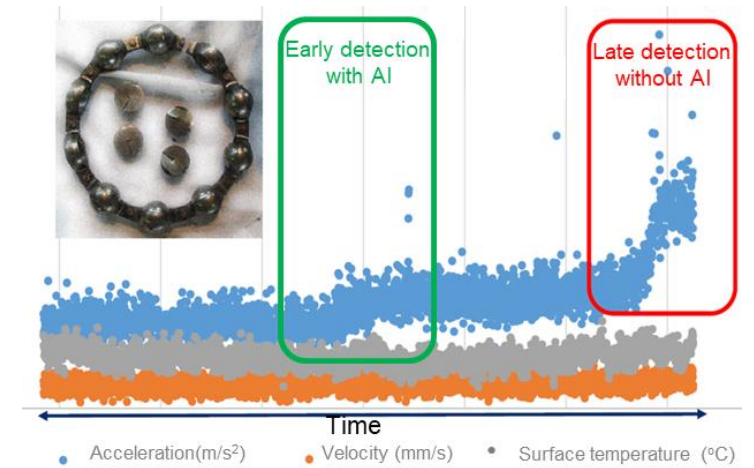
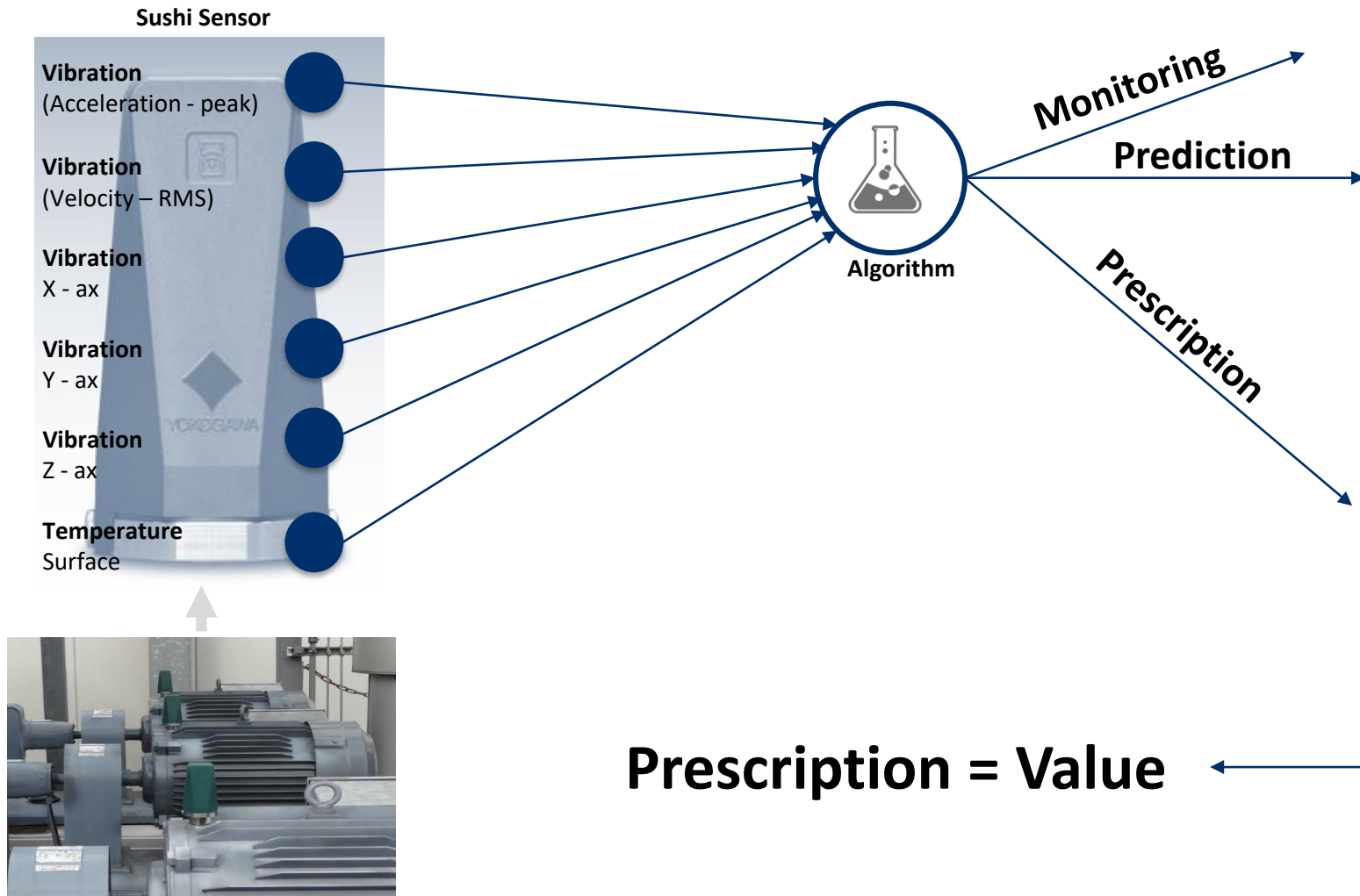
JOIN Platform: Architecture (Simplified)



JOIN Platform: Architecture (Detailed)



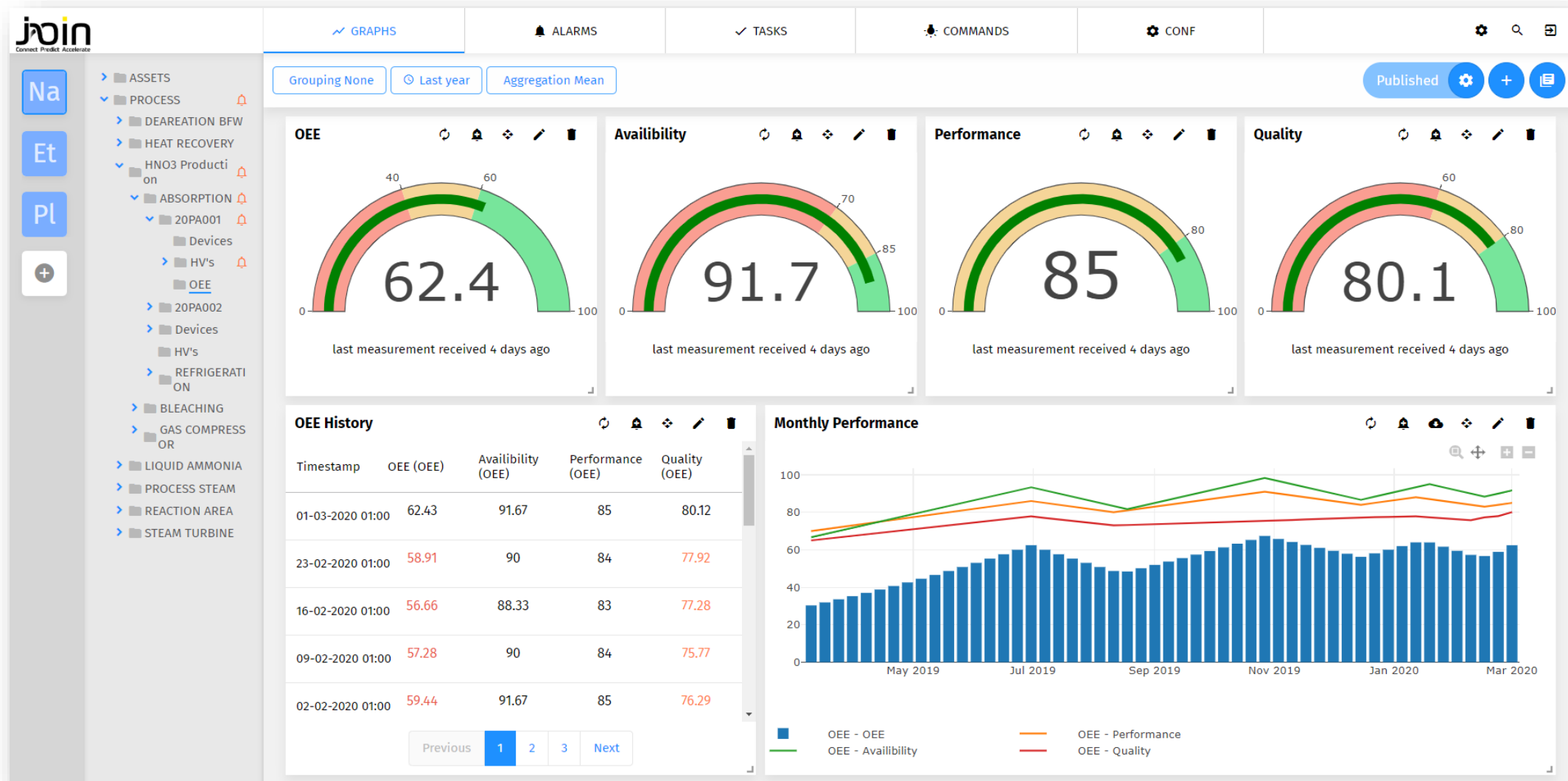
Example: Algorithm for Sushi



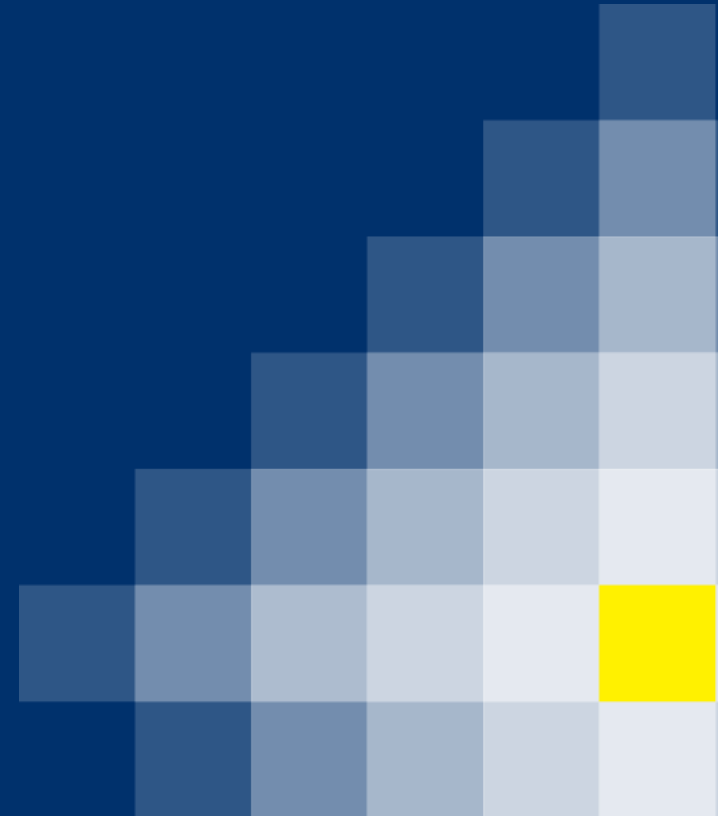
What failure mechanisms:

- Misalignment/unbalance
- Shaft problems
- Bearing problems
- Motor problems
- Cavitation

Dashboards: OEE



Just a few use cases....



Use case 1: predictive maintenance on pumps



Current situation: pumps without any sensor. Risk for incidents, process downtime, production loss, energy consumption and environmental spills



New situation: Sushi sensor is measuring vibration (3 axis), acceleration, velocity and surface temperature



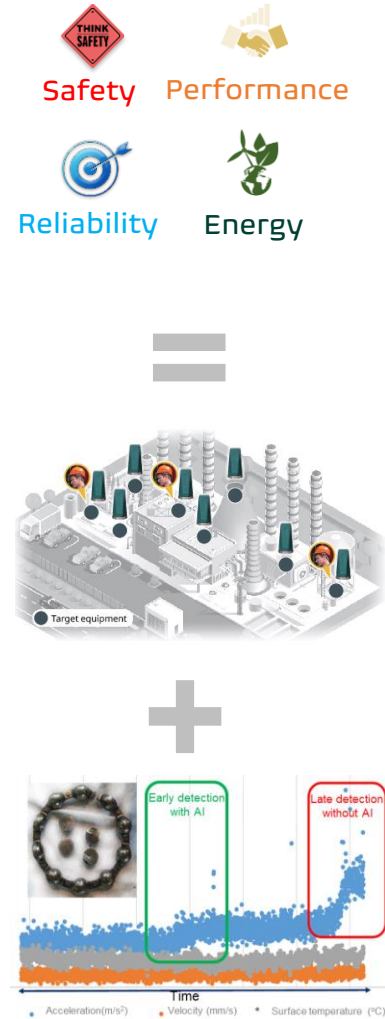
Near real-time measurement by using Sushi (instead of patrol round by field operator)



As result IIoT offers increased safety, performance, reliability and decrease of energy usage

No need to do patrol round and enter hazardous area's

Early detection of cavitation, wear & tear of bearings



Use case 2: real-time level measurement in tank yards



Current situation: remote assets like tank yards etc with hardly any sensors. For instance: no level device, power available but no multicores. New multicores too expensive. Cumbersome work to manually monitor and lot's of administration.



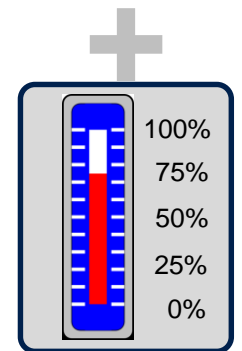
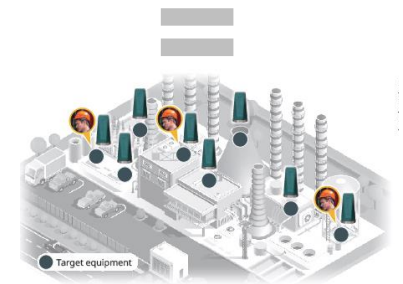
New situation: Industrial Tank level radar meters connect via 4-20 mA or Modbus to LoRa transceiver; no multicores required



As result IIoT offers increased safety, performance, reliability and sustainability

No need to do time consuming patrol round and administration

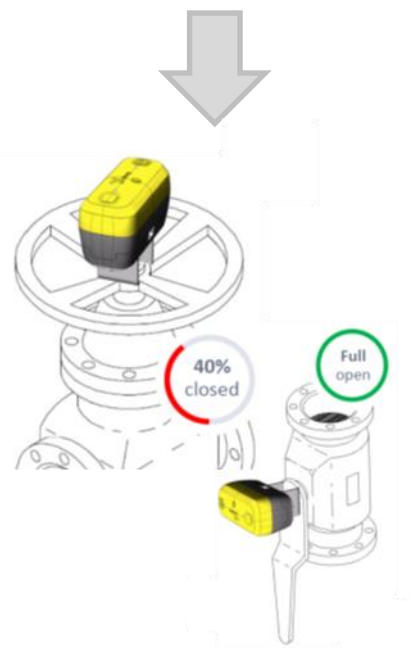
Near real-time level measurement by using Lora transceiver



Use case 3: manual valve position detection



Current situation: hand valves without any sensor. Risk for unauthorized usage and/or human failures causing incidents, process downtime, production loss and environmental spills



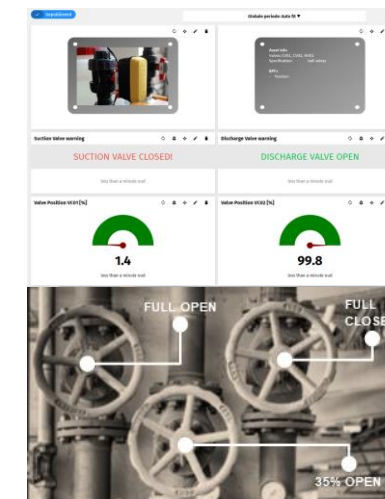
New situation: Manual valve positioning device measures exact position of any manual hand valve



As result IIoT offers increased safety, performance, reliability and sustainability



Near real-time operator feedback incl alerts when valves are manipulated wrongly and/or without authorization



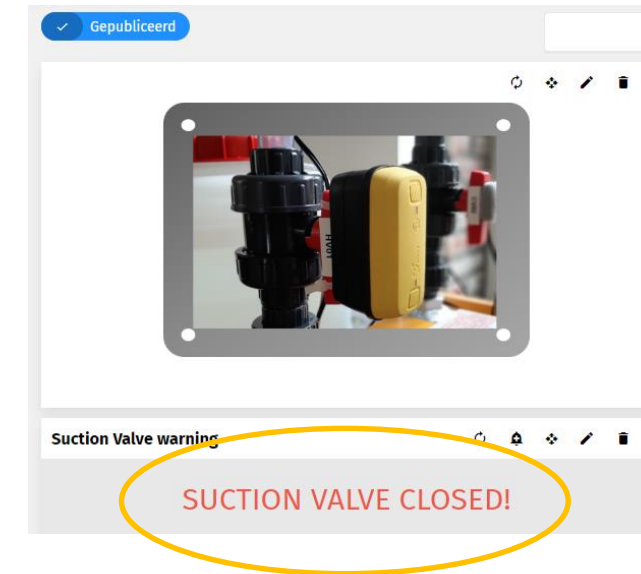
Use Case 3 - Lock Out & Tag Out

- Lock Out, Tag Out (LOTO) is a safety procedure to ensure that dangerous machines or process units are properly shut off and not able to be started up again prior to the completion of maintenance or repair work.
- Valve Lockout Devices are used to close off many kinds of pressured valves to ensure that the machinery that is valve operated remains switched off while workers carry out the maintenance work.
- Still, on average, > 75% of industrial accidents are caused wholly or partly by human actions.



Use Case 3 - Lock Out & Tag Out

- By using an IIoT hand valve positioner, the status and exact position of the hand valve is monitored continuously. In case of any turn/movement of the handwheel or the lever, the hand valve positioner wakes up and transmits its exact position in 30 seconds.
- Interface with (amongst others) ICSS, electronic SOP and Permit to Work systems possible*



The IIoT solution can be seen as additional protection layer preventing for instance accidental startup of a machine or process unit while it is in a hazardous state or while a worker is in direct contact with it.

Use Case 3: Dashboard - Lock Out & Tag Out

The dashboard interface includes a top navigation bar with 'GRAPHS', 'TASKS', and 'PLAN' tabs. A left sidebar contains the 'JOIN' logo and a navigation tree under 'ASSETS'. The 'VALVES' category is highlighted with a red box. The main content area features a 'Published' filter, a 'Time window' selector, a central image of a valve, and two gauge charts. The 'Suction Valve Position (%)' gauge shows a value of 86, and the 'Discharge Valve Position (%)' gauge shows a value of 95. Both gauges indicate that the last measurement was received 4 months ago.

- ASSETS
 - COLUMNS
 - COMPRESSORS
 - HEAT EXCHANGERS
 - PUMPS
 - LINEAR
 - RECIPROCATING
 - 20PA001
 - SSJOIN05
 - SSJOIN06
 - SSJOIN07
 - SSJOIN08
 - 20PA002
 - 20PA004
 - 20PA005
 - ROTARY
 - REACTORS
 - TURBINES
 - VALVES**
 - VESSELS
 - PROCESS

Published

Time window

Suction Valve Position (%)

86

last measurement received 4 months ago

Discharge Valve Position (%)

95

last measurement received 4 months ago

Use case 4: pressure & temperature measurement



Current situation: many temperature and pressure gauges in the plant. Need to be checked regularly. Sometimes in unsafe zones. Cumbersome administration.



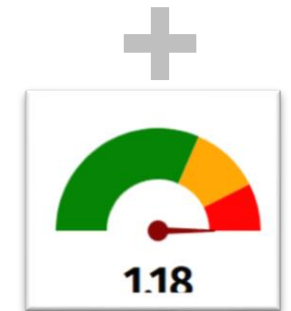
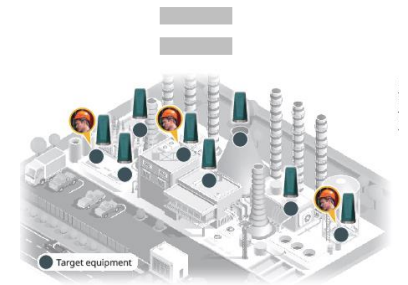
New situation: Near real-time measurement by using Sushi (instead of once every 8 hours via patrol round by field operator)



As result IIoT offers increased safety, performance, reliability and sustainability

No need to do patrol round and enter hazardous area's

Early detection of abnormal values



Applications: Examples

Typical IIoT use-cases are related to the following assets:

- Rotating
- Static (heat exchanger etc)
- Valves and fittings
- Pipelines, manifolds & vessels
- Facilities/Utilities

... and support RBM (Risk Based Management), RBI (Risk-based Inspection), RCM (Reliability Centred Maintenance) decision making processes.



Safety & Emissions

Performance & Quality

Reliability & Costs

Energy usage & footprint



Q&A

Further questions? Contact me directly!



Martijn Kramer

Senior Solution Consultant Yokogawa

[**`martijn.kramer@nl.yokogawa.com`**](mailto:martijn.kramer@nl.yokogawa.com)

+31 88 464 1613

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