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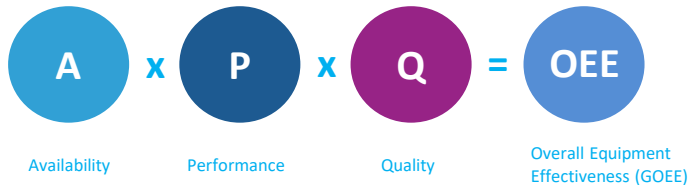
From conventional OEE to Green OEE



Key Drivers for Green OEE:

- 1.Environmental Regulations
- 2.Corporate Sustainability Goals
- 3.Energy Costs
- 4.Consumer Pressure

OEE Calculation (since 1970s → TPM 1990s)



Green OEE Calculation (since 2013 → I4.0)

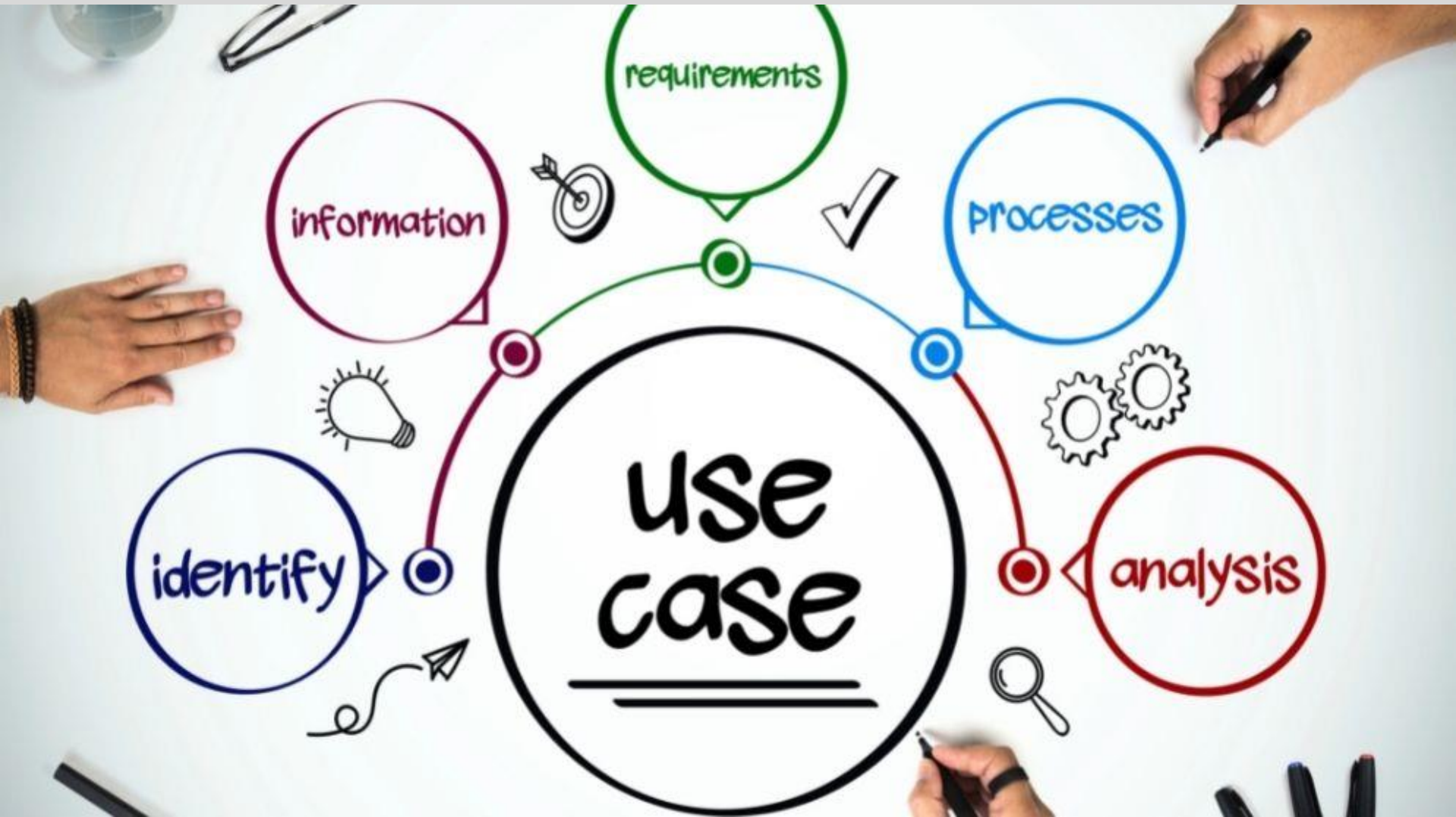


What is the link between Green OEE & I4.0?



Realtime Green OEE Calculation

$$\begin{array}{ccccccc}
 \text{A} & \times & \text{P} & \times & \text{Q} & \times & \text{E} & = & \text{Green OEE} \\
 \text{Availability} & & \text{Performance} & & \text{Quality} & & \text{Energy} & & \text{Green Overall Equipment Effectiveness (GOEE)}
 \end{array}$$



1. Metal surface inspection



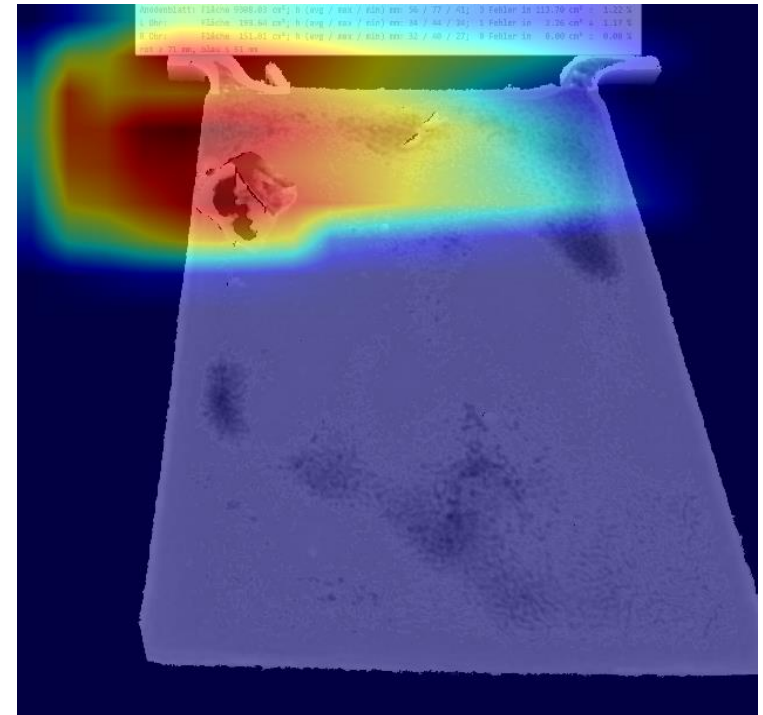
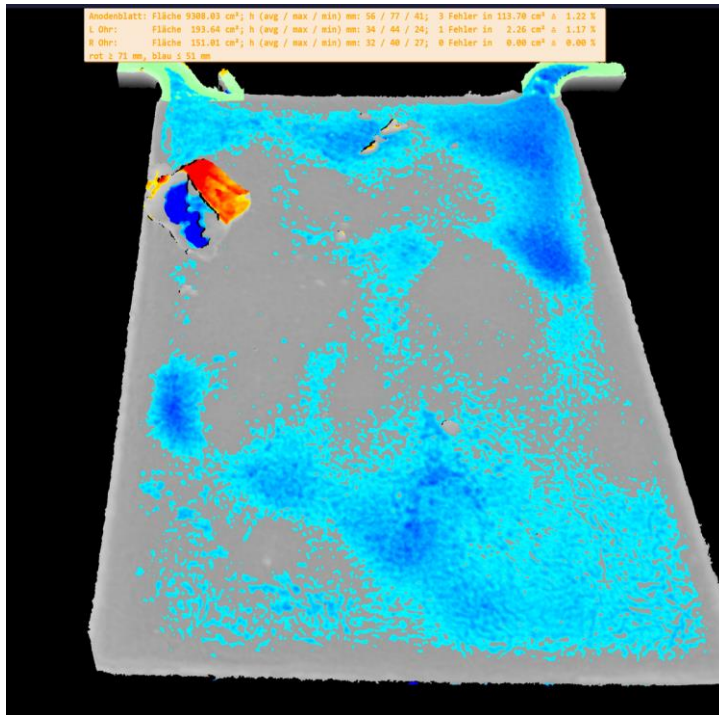
Customer Problem:
Several types of surface defects



Solution:
Smart Camera for surface inspection & finger printing

Automated, Explainable and Validated

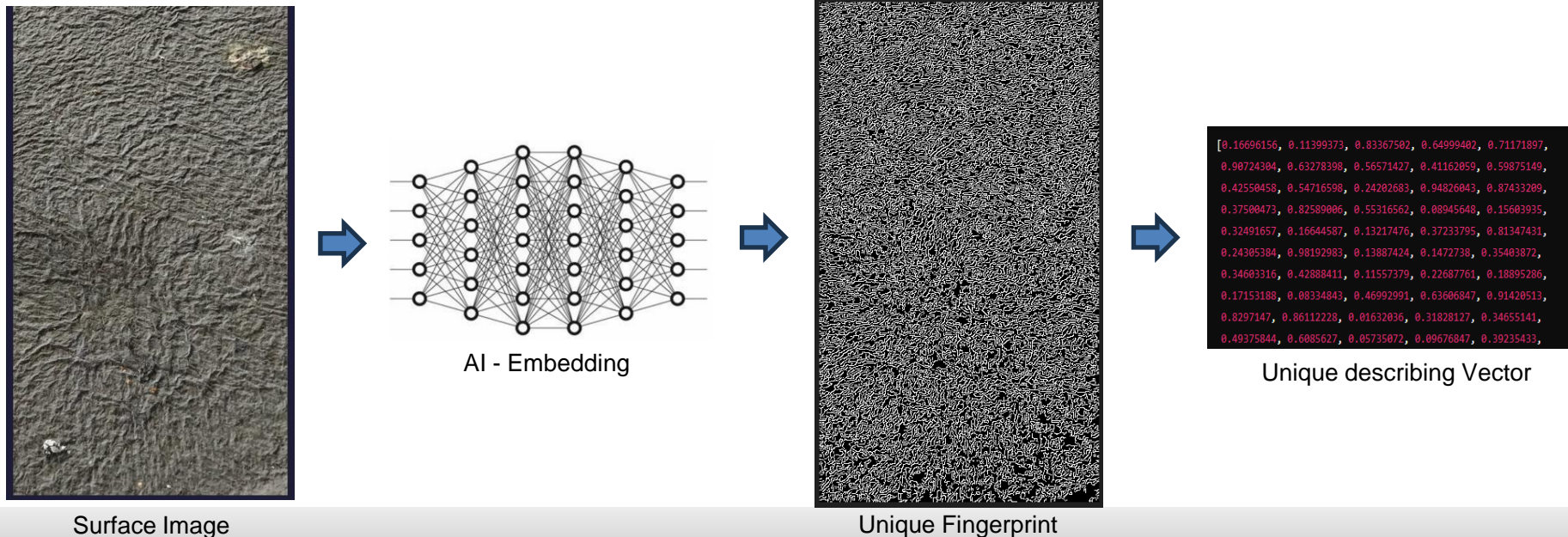
- What characteristics does the model use to make its decision?



Digital Fingerprint for individual tracking

- Production tracking and recognizing of individual surface characteristics (casted and other rough surfaces)
- Training of Case specific AI-Embedding
- Unique describing Vector per part (digital fingerprint) from image information
- Recognition of every part by reapplying DL-Embedding on surface image

→ Enabling Defect root cause Analysis by tracking all production steps conditions



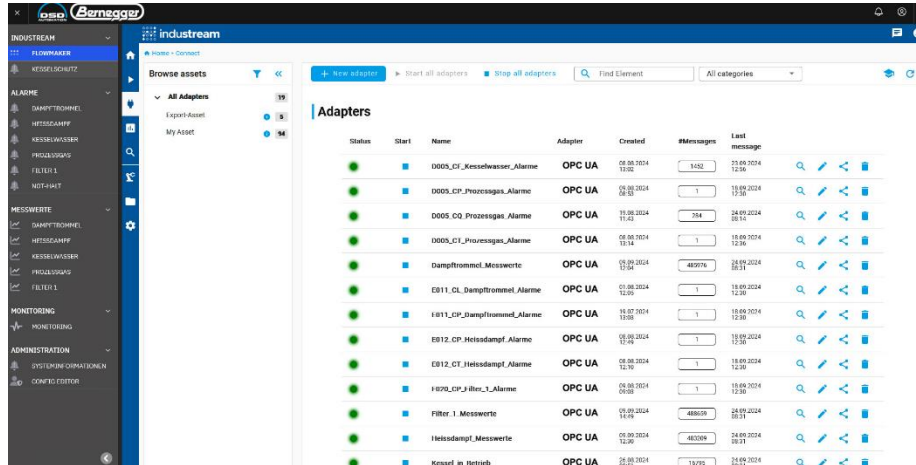
2. Austrian Waste Recycling: Emission & Alarms Reports



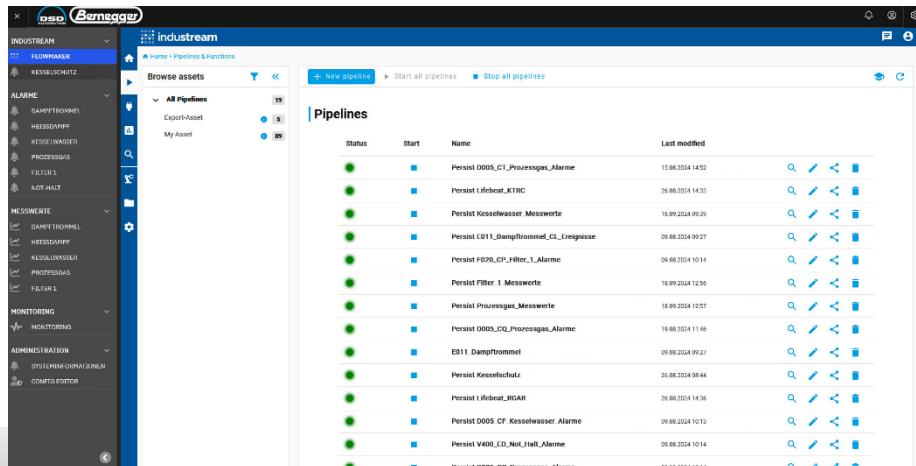
New Recycling Plant started in July 2024: Emissions & Alarms Reporting to TÜV

Data Acquisition & KPIs live processing

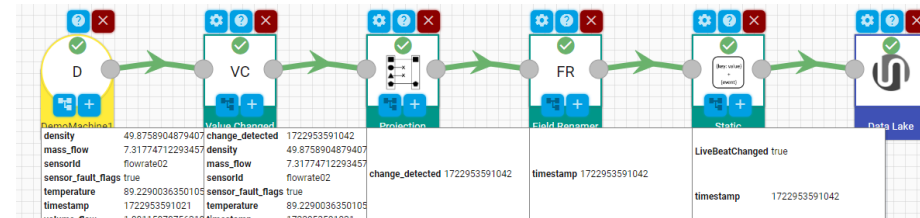
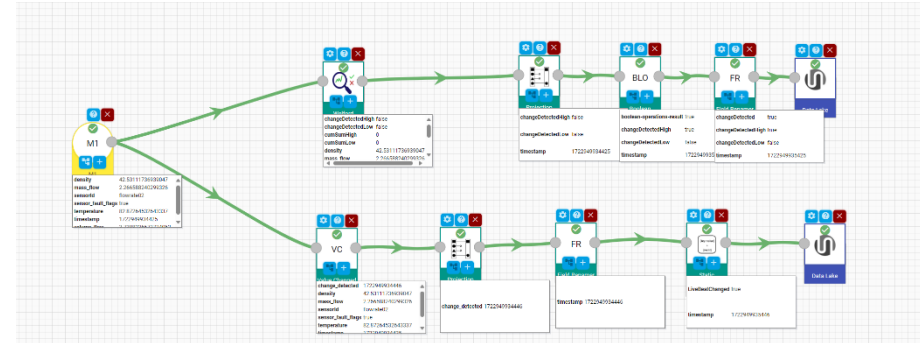
- Cyclic(1s) Data Acquisition of 200 tags
- 18 months Data History
- 11 Dashboards
- 2 automated reports to TÜV

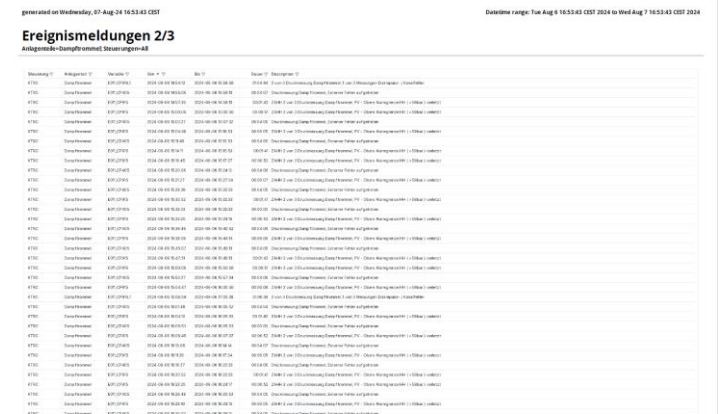
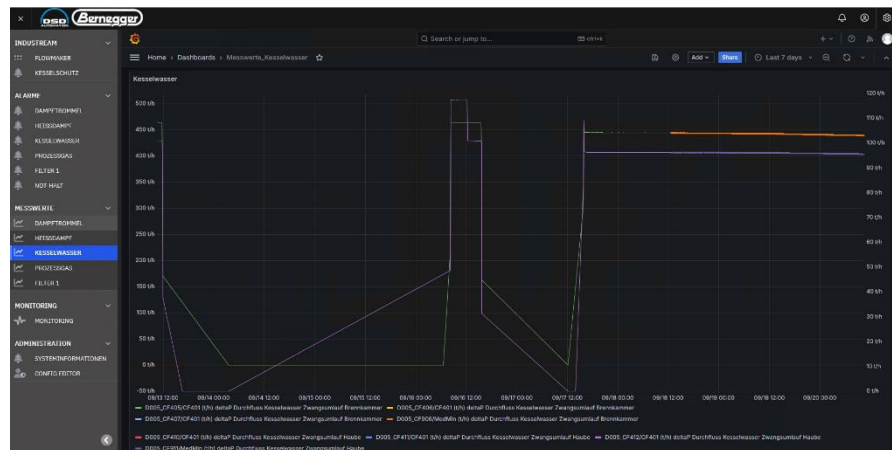


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●	08.08.2024 13:02	0005_CP_Prozessgas_Alarme	OPC UA	08.08.2024 13:02	1	18.09.2024 12:30
●	11.08.2024 11:43	0005_CO_Prozessgas_Alarme	OPC UA	11.08.2024 11:43	104	24.09.2024 08:14
●	08.08.2024 13:04	0005_C1_Prozessgas_Alarme	OPC UA	08.08.2024 13:04	1	18.09.2024 12:30
●	08.08.2024 13:04	Dampftrommel_Messwerte	OPC UA	08.08.2024 13:04	48978	24.09.2024 08:11
●	01.08.2024 12:30	EB11_CL_Dampftrommel_Alarme	OPC UA	01.08.2024 12:30	1	18.09.2024 12:30
●	18.07.2024 13:03	EB11_CP_Dampftrommel_Alarme	OPC UA	18.07.2024 13:03	1	18.09.2024 12:30
●	08.08.2024 13:04	EB12_CP_Heissdampf_Alarme	OPC UA	08.08.2024 13:04	1	18.09.2024 12:30
●	08.08.2024 13:04	EB12_C1_Heissdampf_Alarme	OPC UA	08.08.2024 13:04	1	18.09.2024 12:30
●	08.08.2024 09:09	F020_CP_Filber_1_Alarme	OPC UA	08.08.2024 09:09	1	18.09.2024 12:30
●	01.08.2024 12:30	Filter 1 Messwerte	OPC UA	01.08.2024 12:30	48928	24.09.2024 08:11
●	08.08.2024 12:30	Heissdampf_Messwerte	OPC UA	08.08.2024 12:30	40309	24.09.2024 08:11
●	25.08.2024 13:03	Kessel_R_Lieferieb	OPC UA	25.08.2024 13:03	13795	24.09.2024 08:11

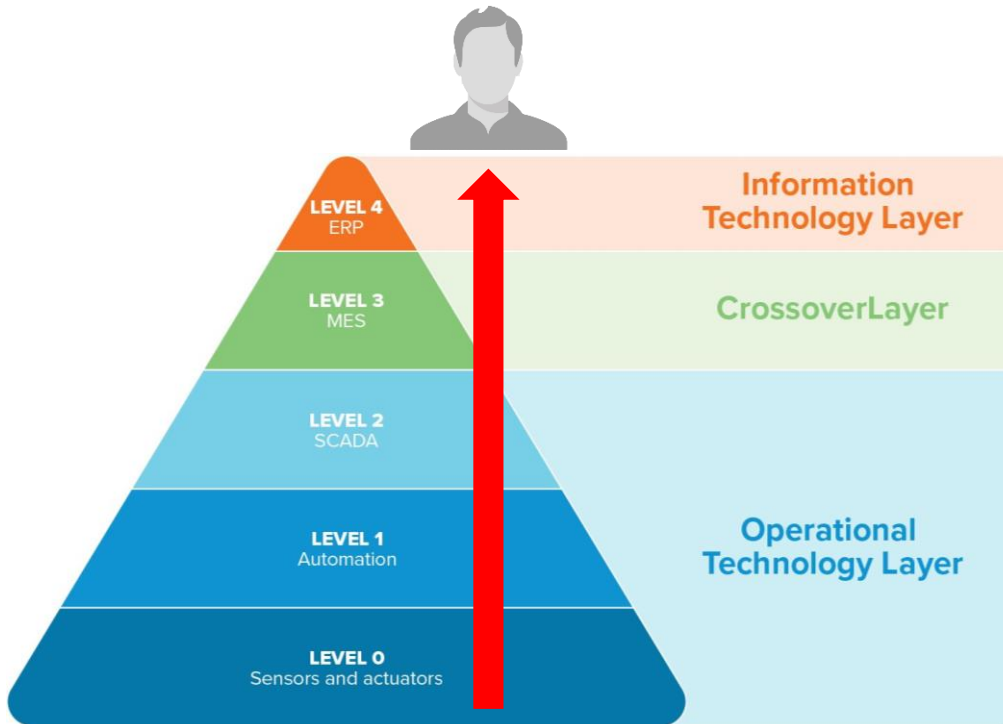


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●	18.09.2024 09:29	Persist Kesselwasser_Messwerte	18.09.2024 09:29
●	08.08.2024 09:27	Persist EB11_Dampftrommel_C1_Langzeits	08.08.2024 09:27
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●	25.08.2024 08:44	Persist Kesselwasser	25.08.2024 08:44
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●	08.08.2024 10:14	Persist V400_L0_Nol_Hall_Alarme	08.08.2024 10:14
●	08.08.2024 10:14	Persist 0005_CP_Prozessgas_Alarme	08.08.2024 10:14



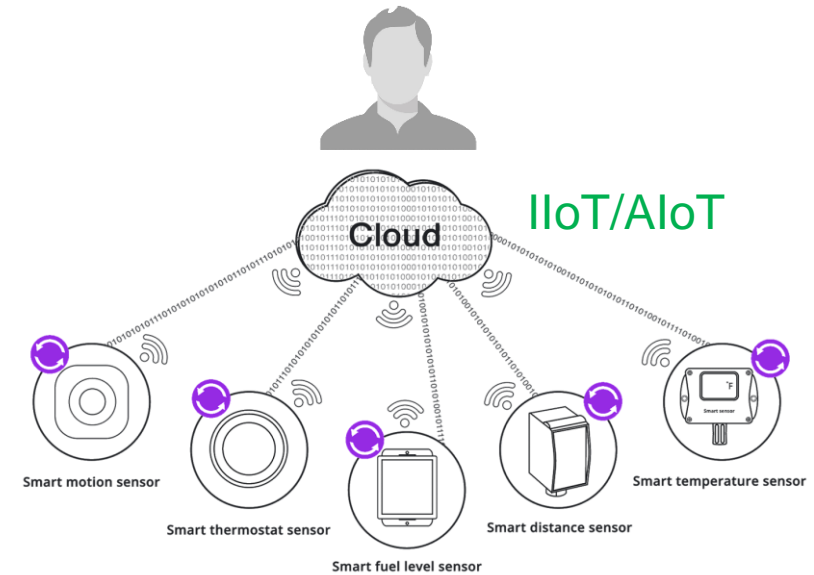


What can Smart sensors & IoT bring?



New control sensor

- Modification of all layers
 - Cabling
- High installation costs & time



New monitoring sensor:

- Wireless
 - Battery/Energy Harvesting
- Quick installation & low cost

Step by step approach toward digitalization

05

Predictive(AI) & Prescriptive Operation
(Maintenance, Process, Quality, Energy)



industream
Suite

04

Operational Know how Digitalization



03

BI & Reporting: KPIs & Analytics



02

Online Data Warehouse



01

Data Acquisition & validation



InduStream Digital IIoT/AIoT Platform



- › No-code Platform for: Predictive Maintenance, Process , Quality, & Energy Optimization
- › Captures Know-How from experts and data (Deep Learning)
- › Applicable for any industry
- › Predefined content for different Iron & steel assets
- › Modular & scalable
- › Hybrid Deployment

→ Combination of timeseries and video data!

→ Combination of Open Source & in-house development to keep affordable pricing for SMEs!



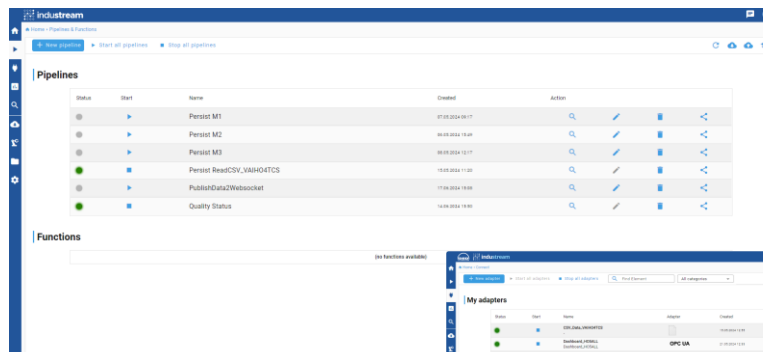
No-code Live & Batch Flows

Flow Designer:

- Configure graphically streaming flows
- Configure graphically Batch flows

Flows Execution Management:

- Deploy and execute Live (Streaming) & batch Flows

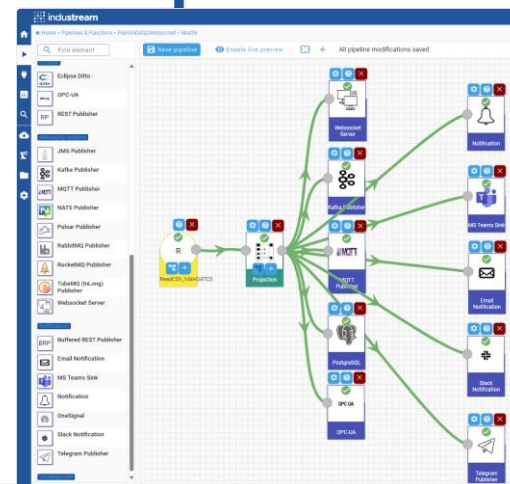
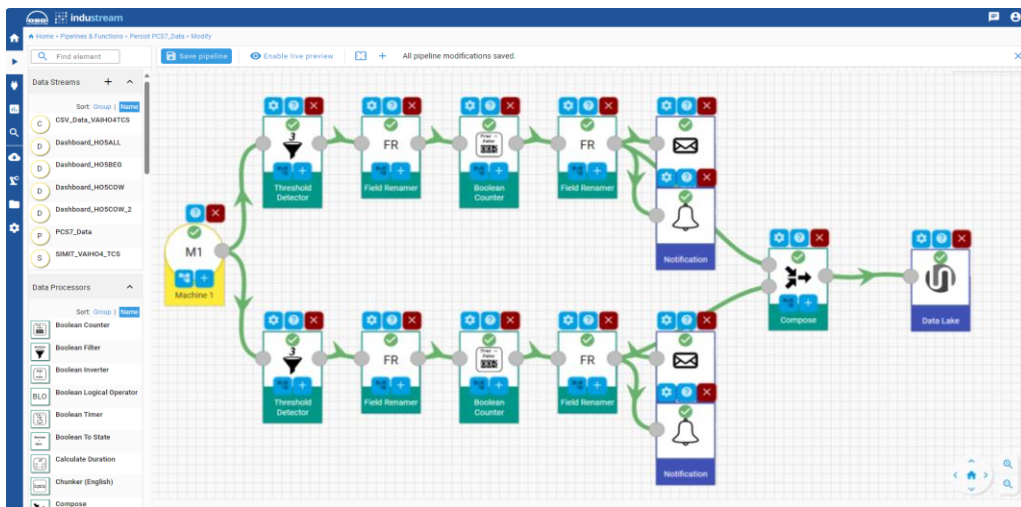


Pipelines

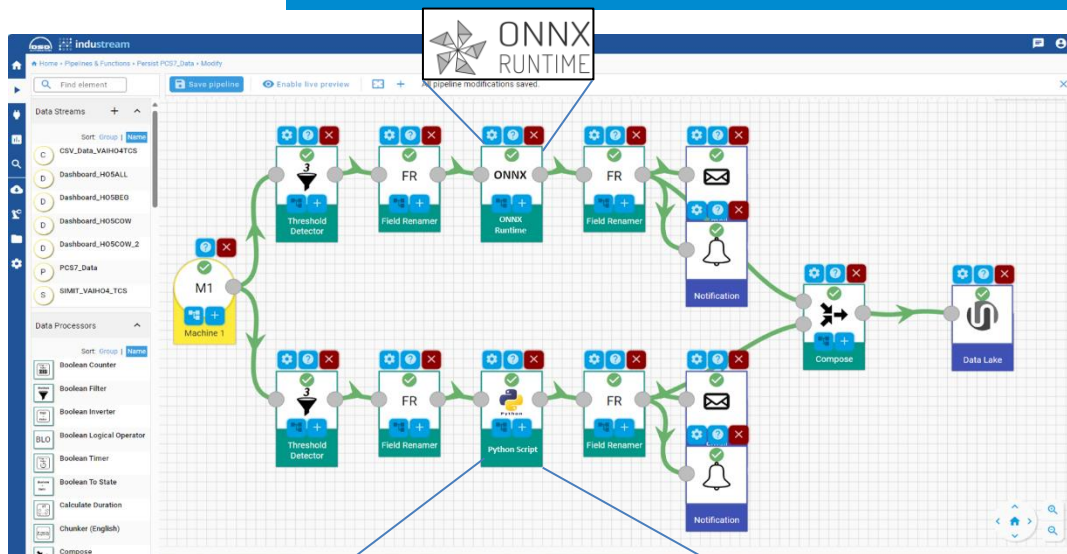
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●	▶	Persist M2	09/03/2024 15:49	
●	▶	Persist M3	09/03/2024 15:17	
●	▶	Persist RedisCV_VAH04TCS	10/03/2024 11:08	
●	▶	PublishDataWebsocket	17/03/2024 15:06	
●	▶	Quality Status	16/03/2024 15:06	

Functions

(No functions available)



AI Capabilities



Customize Simple Python Editor

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1 # Import what python code here
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99 # Import what python code here
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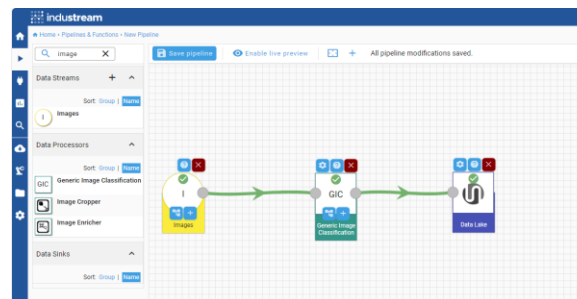
Select output

› Configurable AI:

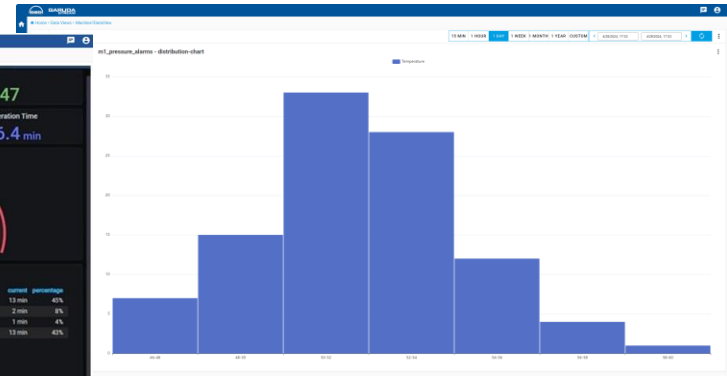
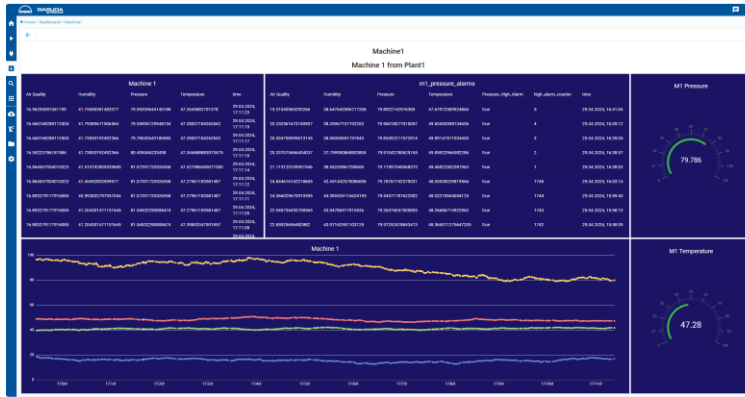
- Import and infer ONNX & PMML models
- Use collection of pre-optimized model
- Import Python & Julia models
- Combine Process Knowledge with AI capabilities
- Use No code blocks for features engineering
- Validate and use AI model predictions to trigger actions
- Combine images & process time-series data

› Deploy & Infer AI models:

- On the Edge Box
- In the Live Streaming layer
- In the Batch Streaming layer above Data Lake



Dashboards, Data Analytics & BI

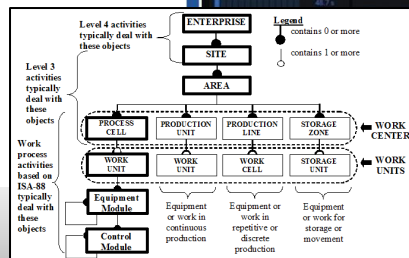


Grafana Extensions:

› Industrial Panels

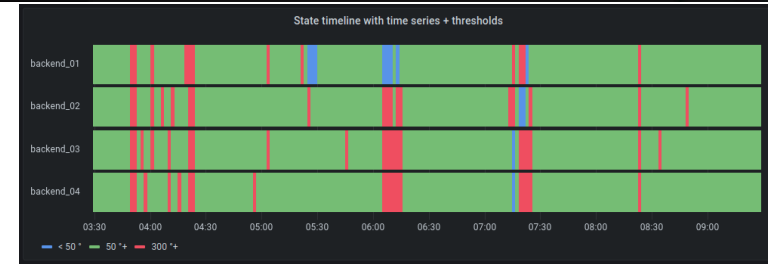
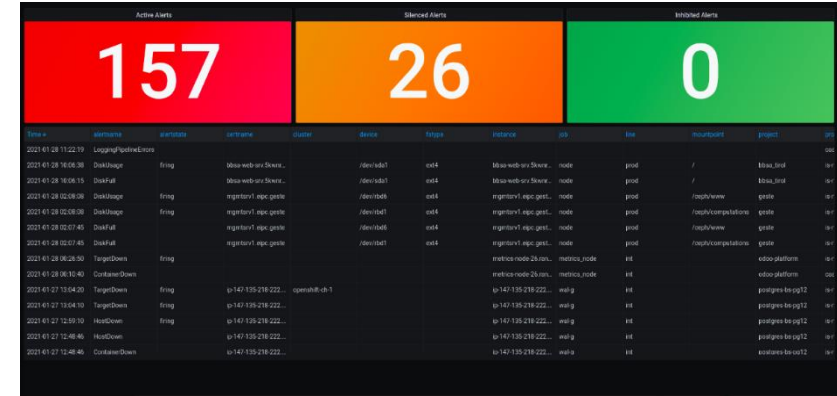
› No-Code:

- Graphical query builder
- Assets Tree view (ISA S95) navigation for variable selection

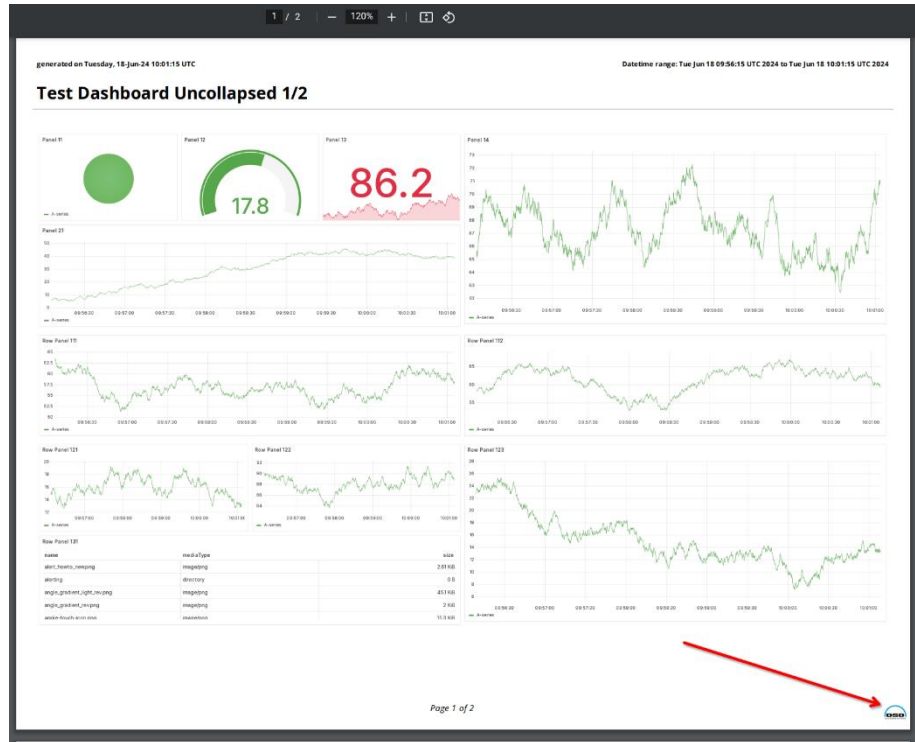


Alarms & Trends

- › Create complex Trending visualizations
- › Acquire & visualize Automation alarms
- › Enrich alarms with custom process alarms designed in FlowMaker



Configurable Reporting



- › Configurable reporting:

- Configure report from Dashboarding module
- Configure report from MS Excel

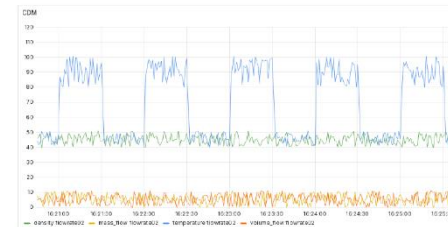
› Reporting Scheduler:

- Generate, print/send fix schedule reports
- On-demand report generation from the Dashboarding environment
- On event reports from the FlowMaker module

cdm

Wed Jun 12 16:20:44 UTC 2024

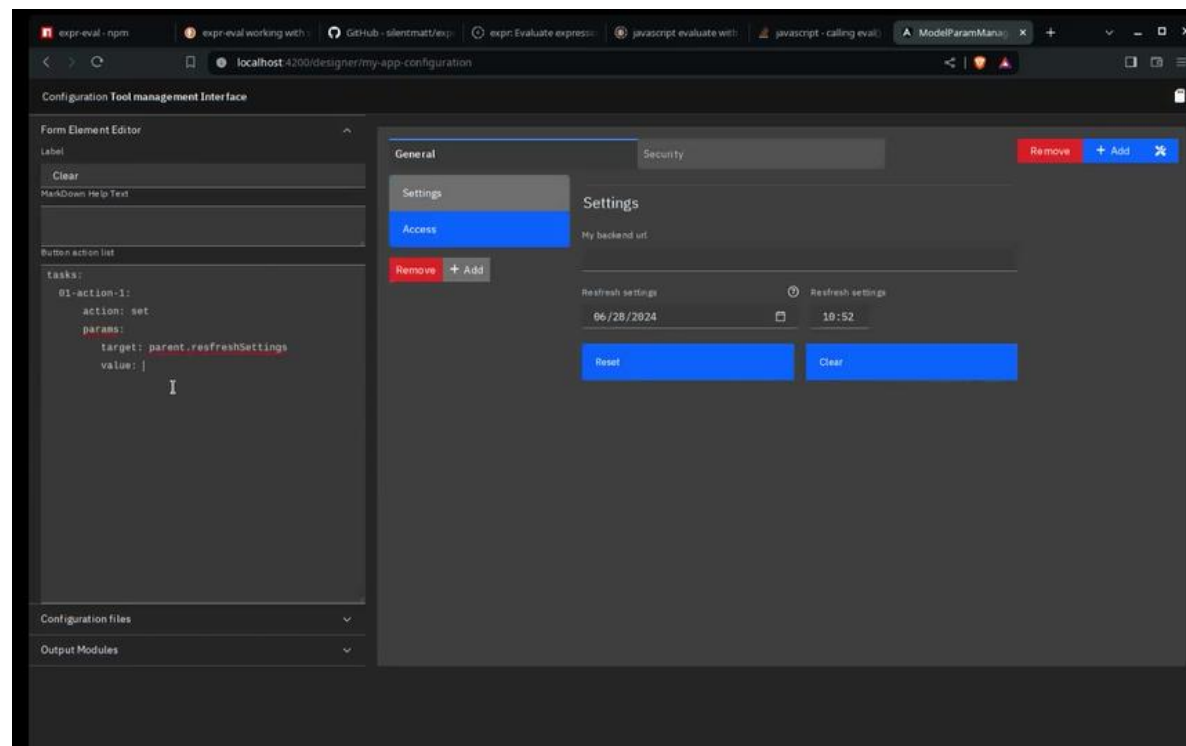
to
Wed Jun 12 16:25:44 UTC 2024





Configurable Web UI & Configuration

- › Create complex Web UIs by drag & dropping predefined components
- › Exposes events & parameters to Live & Batch FlowMaker through specific Data Adapters.
- › Gets notifications and values from FlowMaker through specific Data Sink.

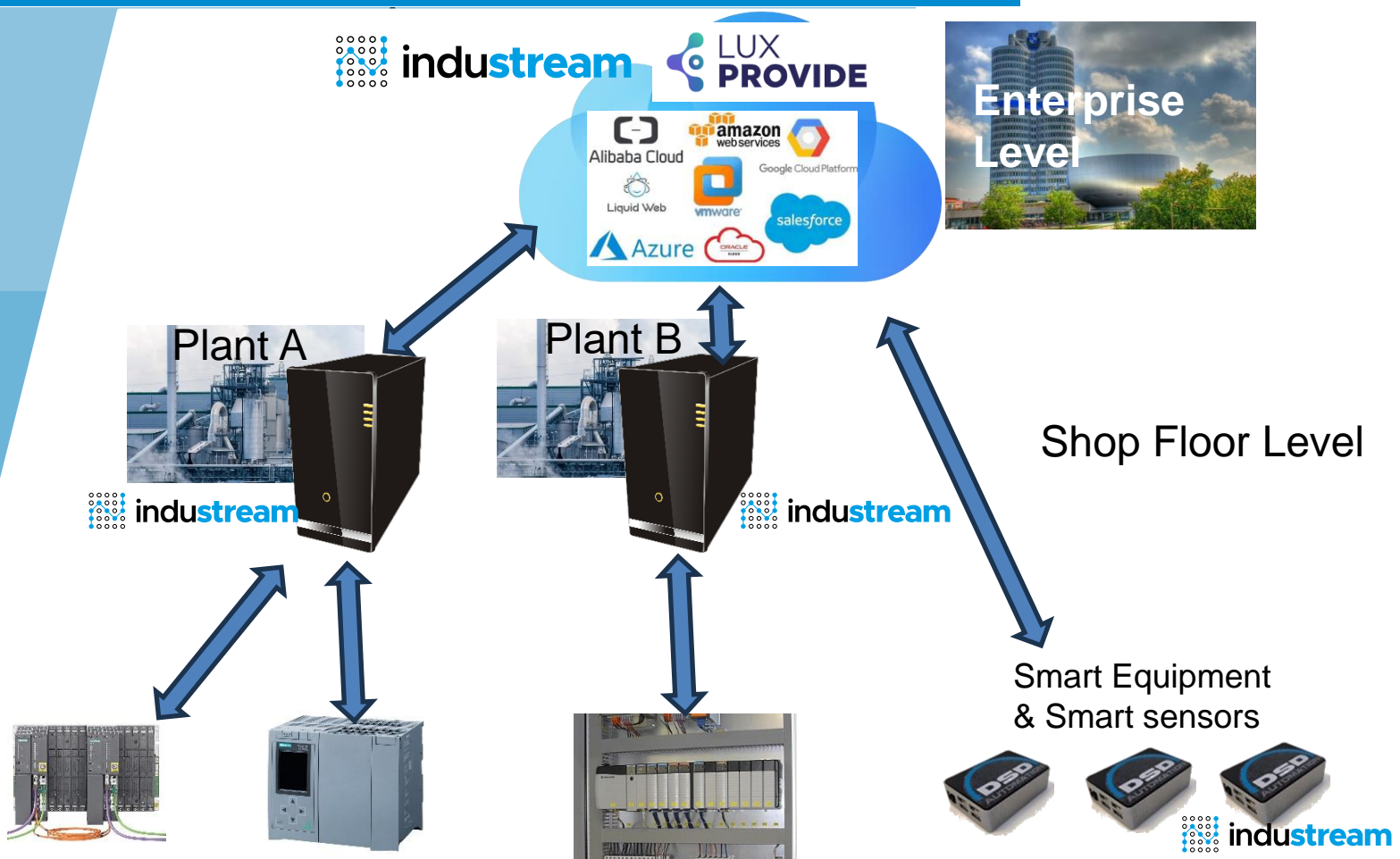


Network Structure & Hybrid deployment

CLOUD
Data Centers
Thousands

FOG
Nodes
Millions

EDGE
Devices
Billions



The Platform can be deployed & synchronised over the different levels.

Platform Edge Devices

Compute Edge



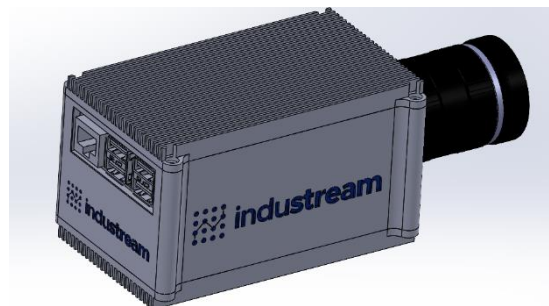
Compute
Edge

Compute AIoT



Compute
AIoT

Smart Camera



Vision & timeseries Data

Integrated Industrial IOs



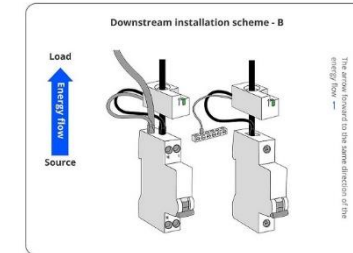
IO-Link Gateway



Zigbee Gateway



Zigbee Vibration
& Temperature monitoring



Zigbee Energy monitoring

Directly integrated into

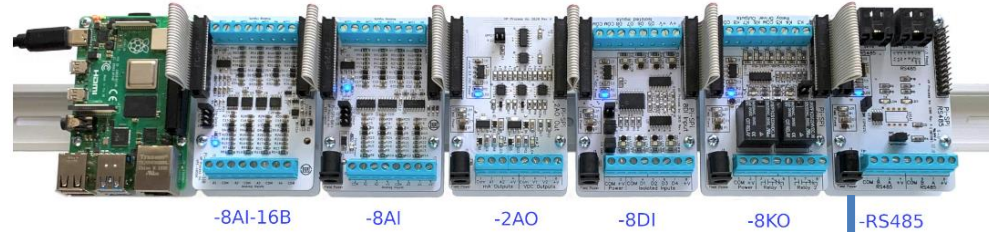


Edge Devices extensions

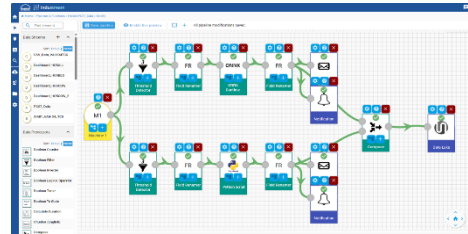



DIN Rail GPIO extensions

The PI-SPI Product Group



Raspberry Pi Input/Output I/O Modules
Analog Input, Analog Output
Digital Input, Relay Output
RS485



All I/Os directly controlled
in NRT flows in  **industream**
FlowMaker



RS485 IO extensions
i.e. energy monitoring

Platform Business Model & services



› InduStream SaaS:

- Free version to start quickly with POCs and small Use Cases
- Scalable Subscription pricing to cover small use cases till complete plants scale-up
- White-Labeling possibilities for OEMs
- Integrators program

› InduStream Services:

- Training on InduStream Platform
- Use Case studies & implementation
- Data Analytics & Data Science support
- Custom extensions of InduStream functionalities



- ✓ Unleash your data potential
- ✓ 'Think Big, Start Small' → Small but scalable Use Cases
- ✓ Single No-Code platform → integration
- ✓ Quick POCs & OPEX business model
- ✓ Not AI only! Trust & Digitize your domain expertise first!
- ✓ Transparency → better future heavier investment decisions
- ✓ Decreasing Defects is an obvious path toward green production
- ✓ An optimized Process is the key to all improvements

Contact Details

Thank you for your kind attention

Danke für Ihre Aufmerksamkeit

Merci de votre attention



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