

AI IN ACTION

ขับเคลื่อน [องค์กรอัจฉริยะ]
ด้วยพลังของ
IT และ OT



**Rockwell
Automation**



AI Innovations in Action: Energy Efficiency and Sustainability

Dr.Anukoon Asawachatroj, Business Manager - Software & Control
May, 2025



You need data to solve challenging problems

Reliability Engineers



“What were the root causes of an equipment fault that led to unplanned downtime and how can I predict it?”

Process / Manufacturing Engineers



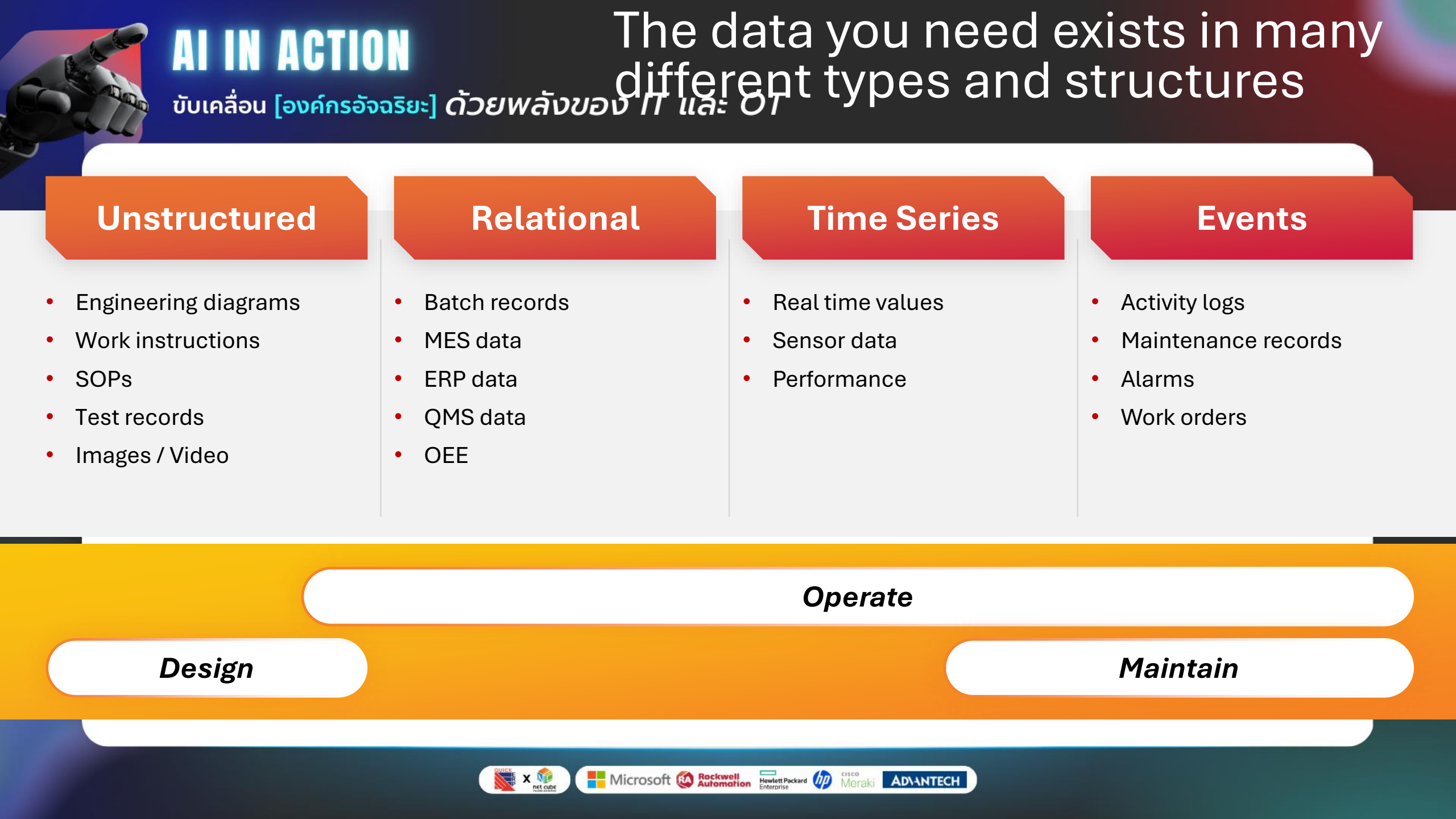
“What process variables or environmental factors contributed to lower-than-expected yields?”

Data Scientists



“What are the critical factors to include in a predictive model to anticipate and avoid an out-of-specification finished product?”

What tough problems are YOU trying to solve with data?



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The data you need exists in many different types and structures

Unstructured

- Engineering diagrams
- Work instructions
- SOPs
- Test records
- Images / Video

Relational

- Batch records
- MES data
- ERP data
- QMS data
- OEE

Time Series

- Real time values
- Sensor data
- Performance

Events

- Activity logs
- Maintenance records
- Alarms
- Work orders

Operate

Design

Maintain



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Better data management needed to fuel AI and empower

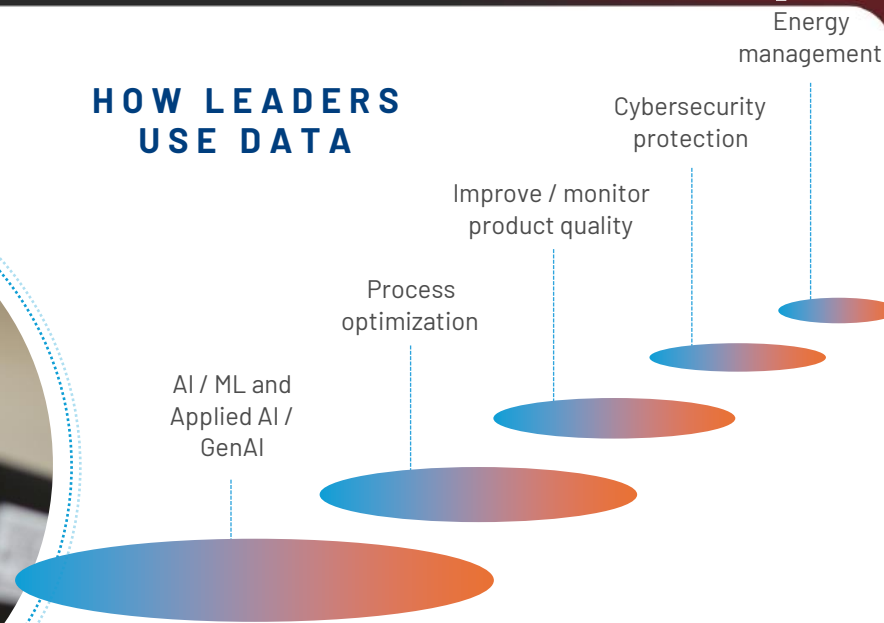
Respondents believe **those at the forefront of the manufacturing industry are using data to fuel AI / ML and optimize processes.**

However, those surveyed believe their own organizations use **less than half** of the collected data effectively.

Leaders in the industry are accessing contextualized data to drive informed, real-time decision-making.



HOW LEADERS USE DATA



Q. How do you perceive leaders in your industry are using the data collected from their currently employed technologies, processes, connected devices, etc.? Select all that apply. Base:1567

only 44% of data is being used effectively

As IT and OT worlds continue to integrate, and with subdued customer demand in many sectors, continuing above average historical rates of inflation, rising energy costs and a changing manufacturing workforce, the adoption of IT technology in OT environments together with new as a service offerings is key to competitive advantage."

Mark Watson | Senior Director, Government & Manufacturing, Omdia,
[Omdia Tech Trends to Watch 2024](#)



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Lack of open, contextualized, governed, scalable data approach

Challenges to getting value from complex industrial data



Data in Silos

IT, OT and ET (engineering) data live in silos and are difficult to use in combination



Data Lacks Context

Data lacks context, making it difficult to understand and use except by experts



Inadequate Data Governance

Data is poor quality, untimely and with no governance process, yielding untrusted insights



Non-scalable Point Solutions

Point solutions are useful for solving individual pain points but don't make it easier to build an additional application



Pilot Purgatory

Enterprise-wide value is not realized.
High total cost of ownership with point solutions.

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Why is it so hard?

When exploring solutions

Typically...only a few simple questions are asked

Visible

What am I trying to do?

What "data" is needed?

How do I use it to solve the problem?

How is the data collected?

How is the data stored and accessed?

How is the data secured and governed?

What context does the data need to be understood?

How do various applications use the data?

Many more...

Underlying Details

When implementing the solutions

The tough challenges must be solved to succeed



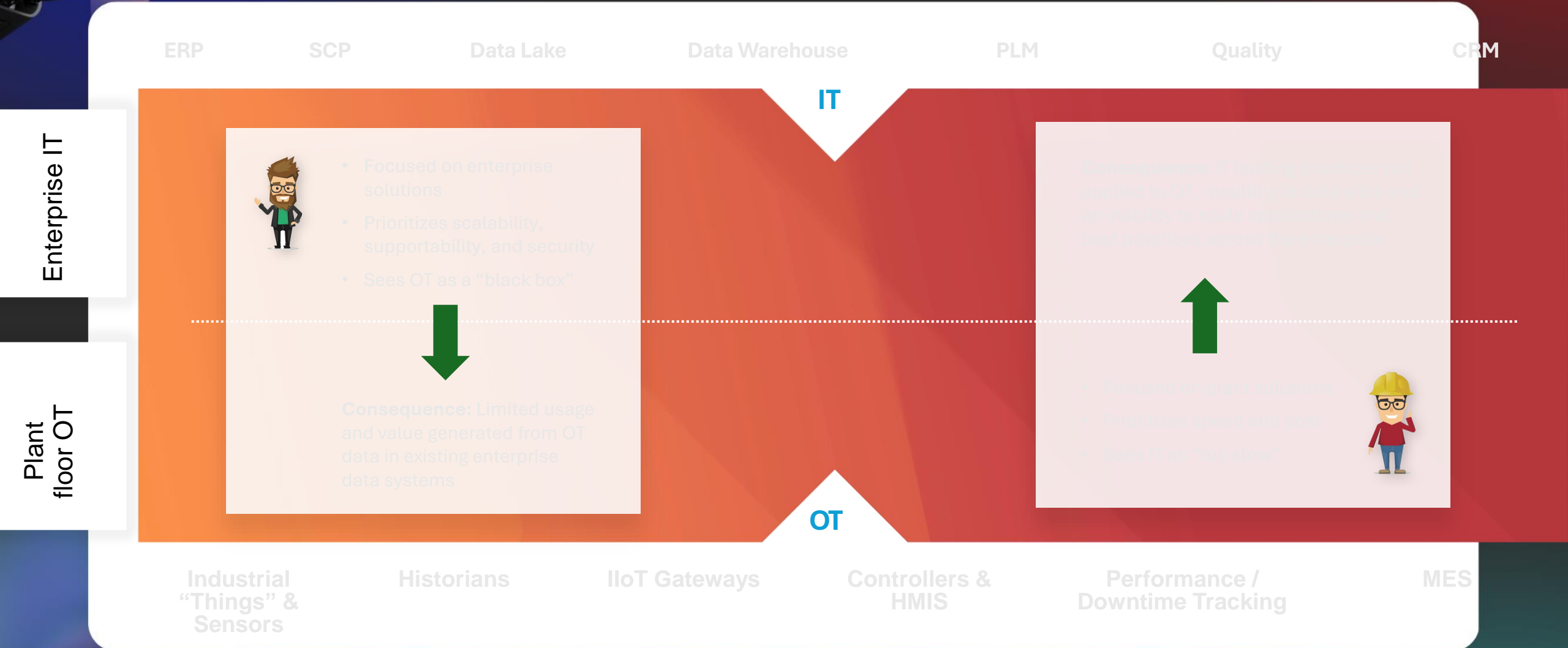


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The IT/OT divide

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Different perspectives, priorities and skills between IT and OT lead to the data and analytics challenges seen today.



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Make your data work for you

A new scalable approach to realize value from data



Available

Standard connectivity to OT/IT data from industrial data sources at scale.

Improve organizational productivity with all relevant data in one place.



Meaningful

Scalable contextualization of data across data sources with pre-built models and templates.

Enable data to be understood in the relevant business context.



Useful

Easy to search single source of information with full traceability for **unparalleled self-service data discovery, orchestration and solution development.**



Valuable

Real-time visualization and advanced analytics applications deployed at scale that drive **optimal decision-making and autonomous closed-loop actions.**

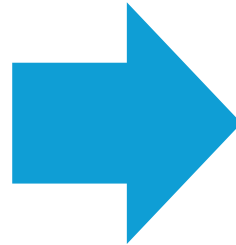
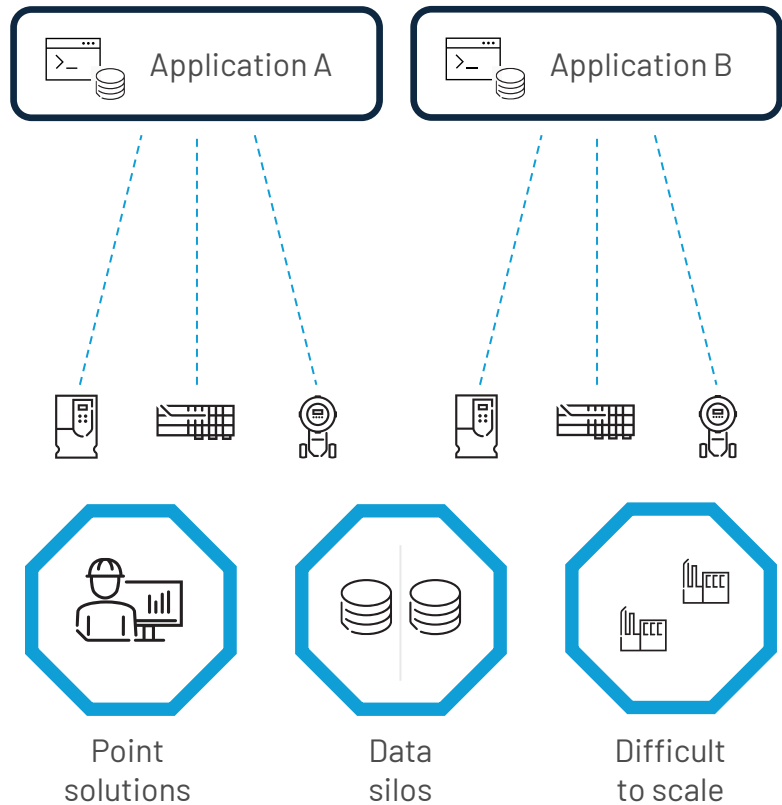


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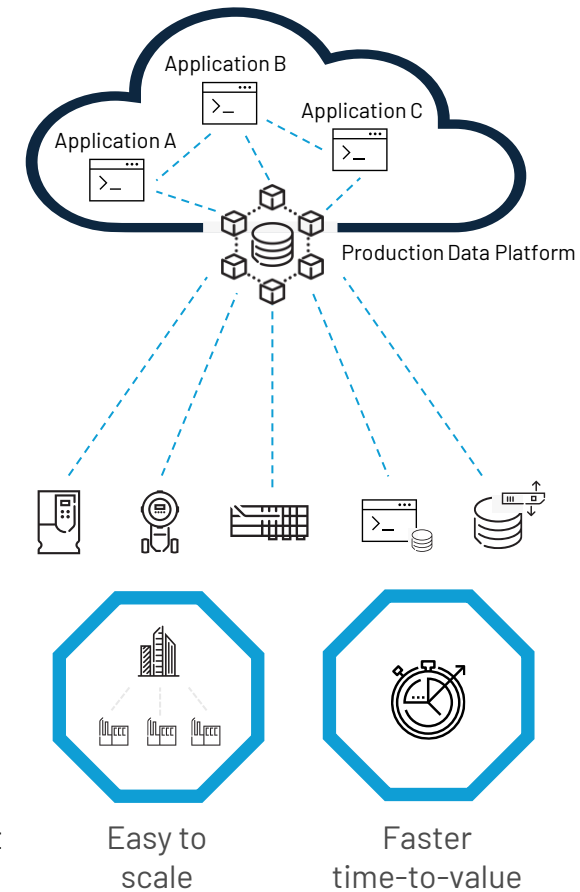
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Unify data silos to accelerate digital transformation

Traditional Approach



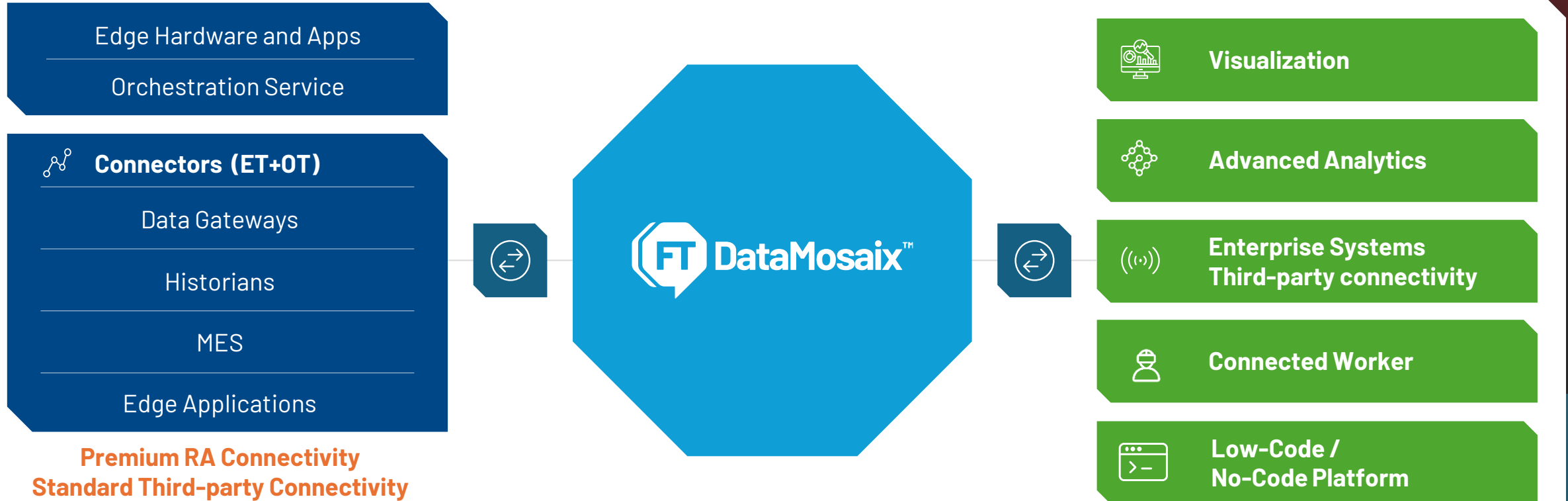
Connected Enterprise[®] (Scalable Digital Transformation)



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Transform your data into value faster than ever before

Introducing FactoryTalk® DataMosaix™



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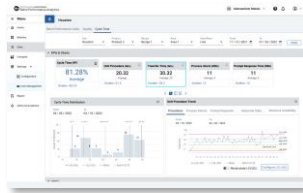
FactoryTalk® DataMosaix™ at the center of the solutions

Industrial Use Cases

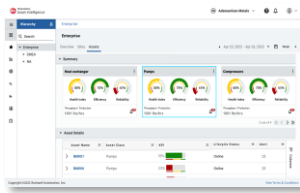
Energy Management & Sustainability



Yield Optimization



Asset Analytics



Production Performance Management



...custom apps



Maximize long-term value and scalability with a common manufacturing data foundation.



Use case focused applications **reduce time to value**.



Accelerate advanced **data science capabilities** with a single source of trusted and contextualized data.



Simplify a converged manufacturing data architecture at a **lower TCO**.



Standard and flexible **data extractors** connect to existing automation and software systems.

Data Platform



Edge Management



Governance, access control, APIs, SDKs

Low/no code application development, visualizations, analytics

Data discovery, exploration, and cataloging

Data integration, transformation, and contextualization



Historians



Sensor & Devices



PLC



Edge Applications



MES



QMS



ERP



CMMS



Documents

Operational (OT) Data

Conventional (IT) Data

Engineering (ET) Data



Historian SE



Linux Gateway



Optix



ProductionCentre



Rockwell Automation



Plex



Siemens



Aix

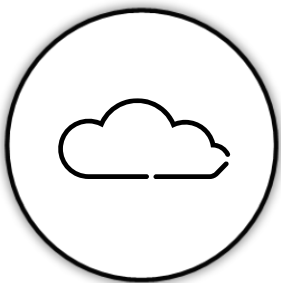


Flix



Flix

Infrastructure options



Multi-tenant SaaS

FactoryTalk® DataMosaix™ SaaS



Public/Private Cloud

FactoryTalk® DataMosaix™ Private Cloud



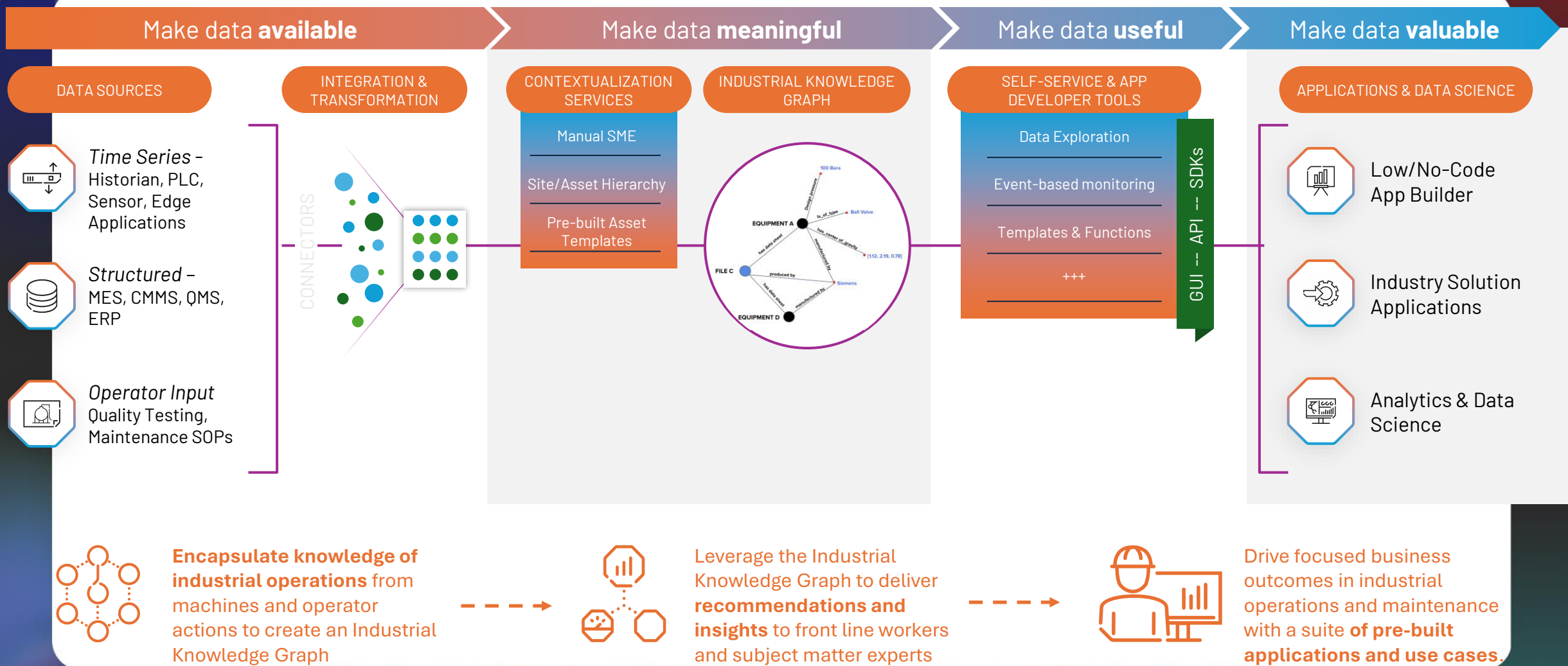
On-prem



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Expose industrial data to realize value through apps and analytics

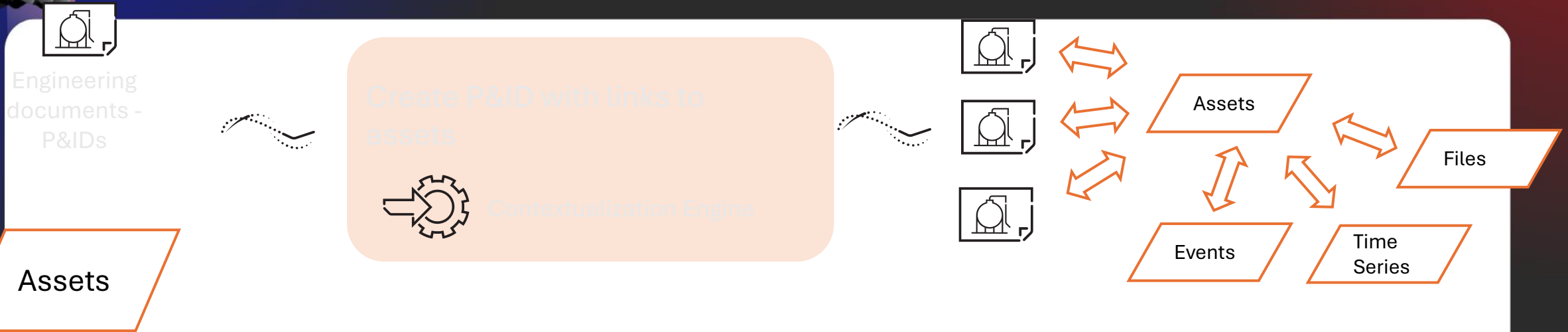
FactoryTalk® DataMosaix™ Private Cloud overview



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P&ID contextualization



Example

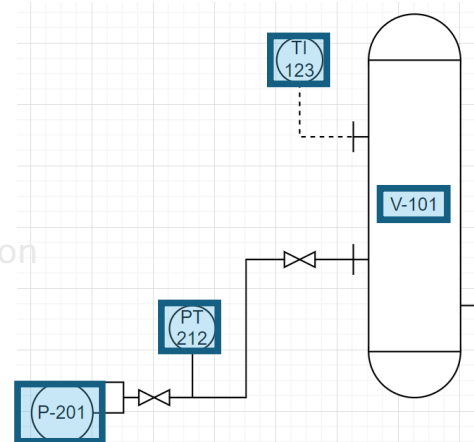
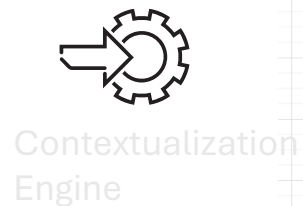
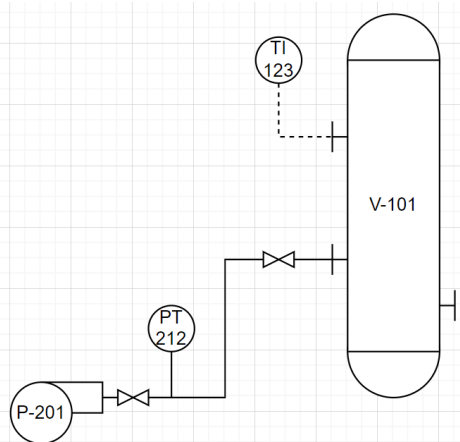
Asset Name

V-101

P-201

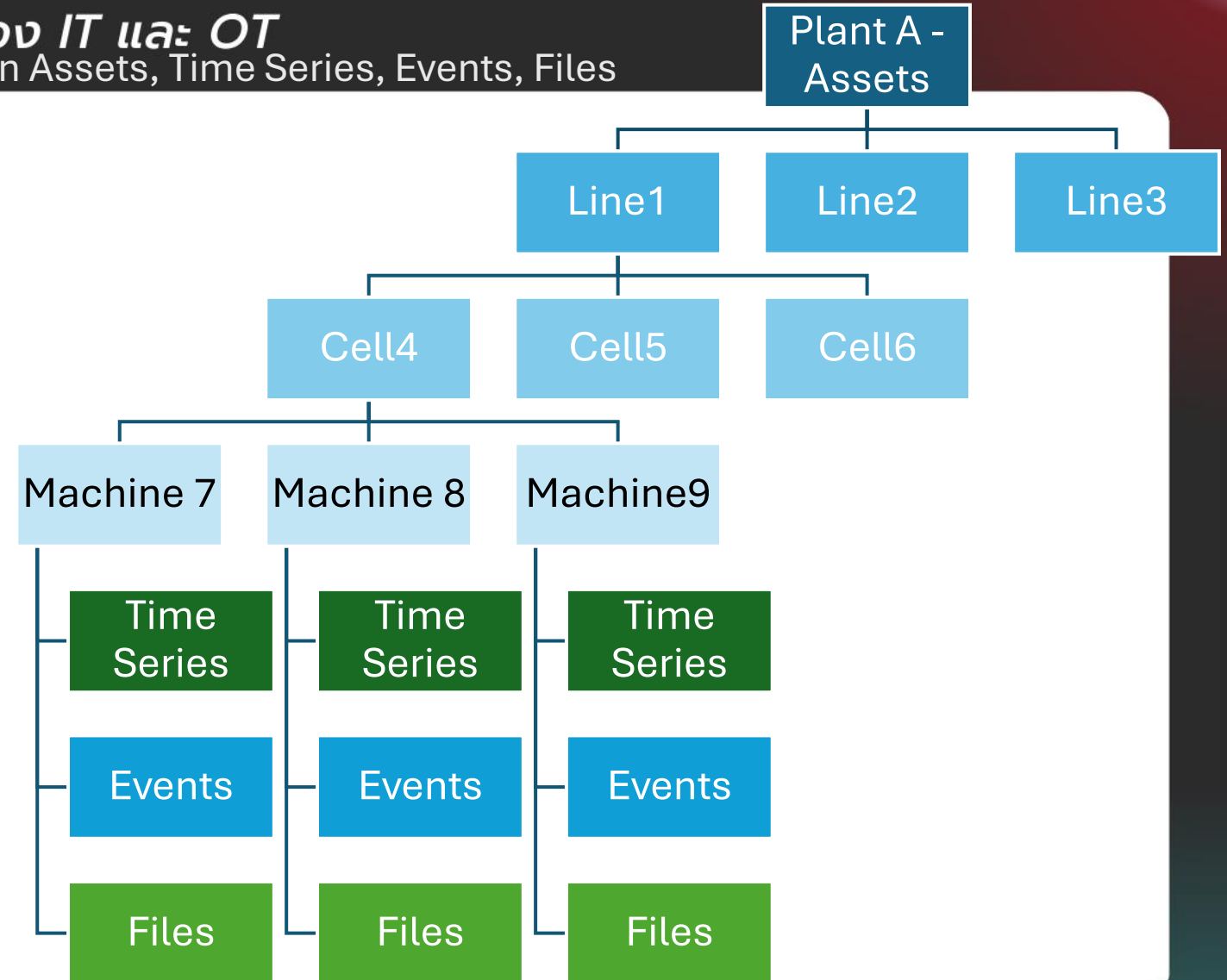
PT-212

TI-123



Asset: V101
Capacity: X L
Area: 51
Time series: T degF
Time series: pH
Event: Level Alarm
Event: Valve Open

- Show me the Temperature trend for Machine 8 when the Alarm event occurred yesterday
- What alarms occurred when Machine 7 was producing Product X over the last week
- Show images/video feed of Machine 7 in the last 2 minutes before the Alarm event last night

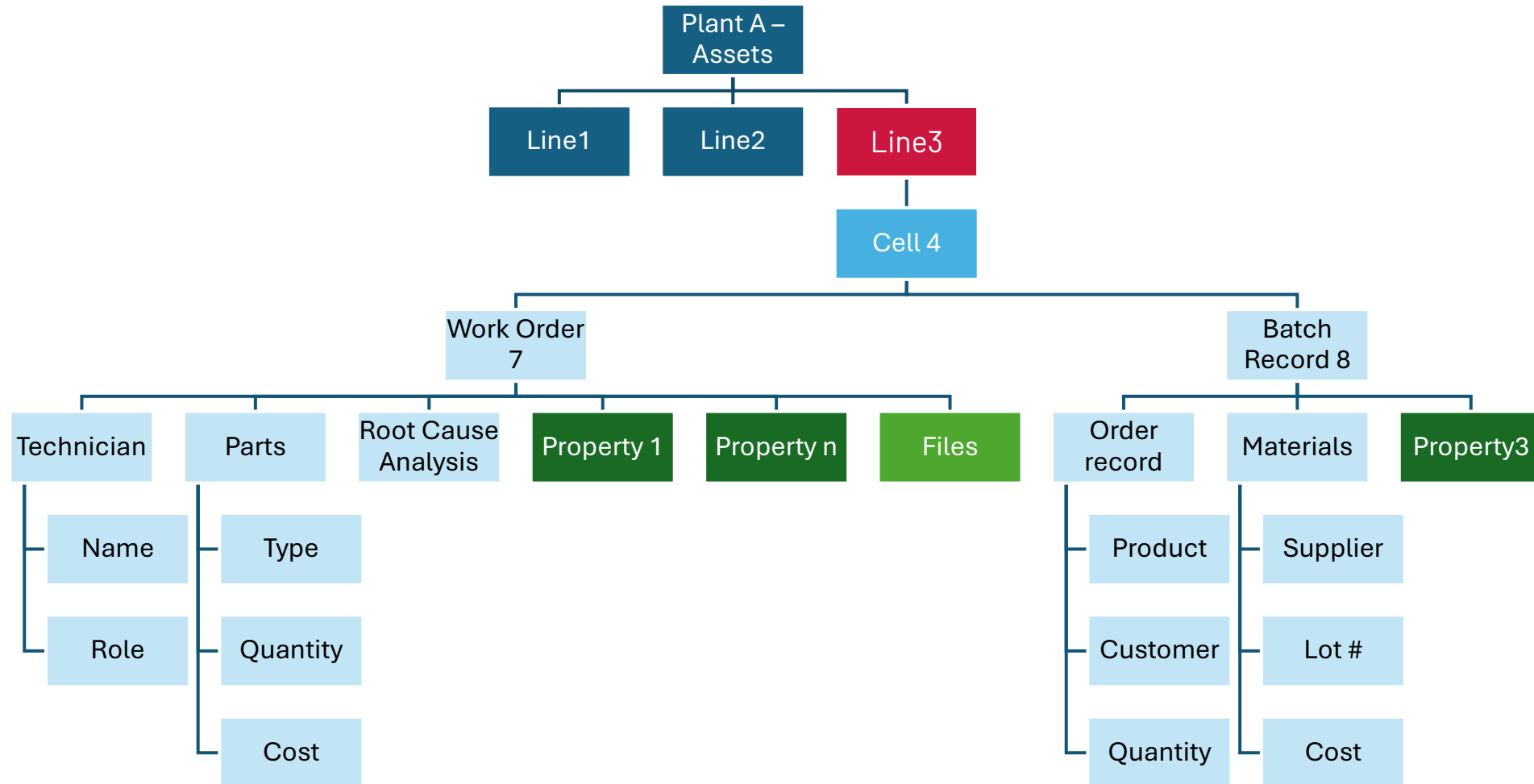




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Model any structure

Knowledge graph – flexible modeling

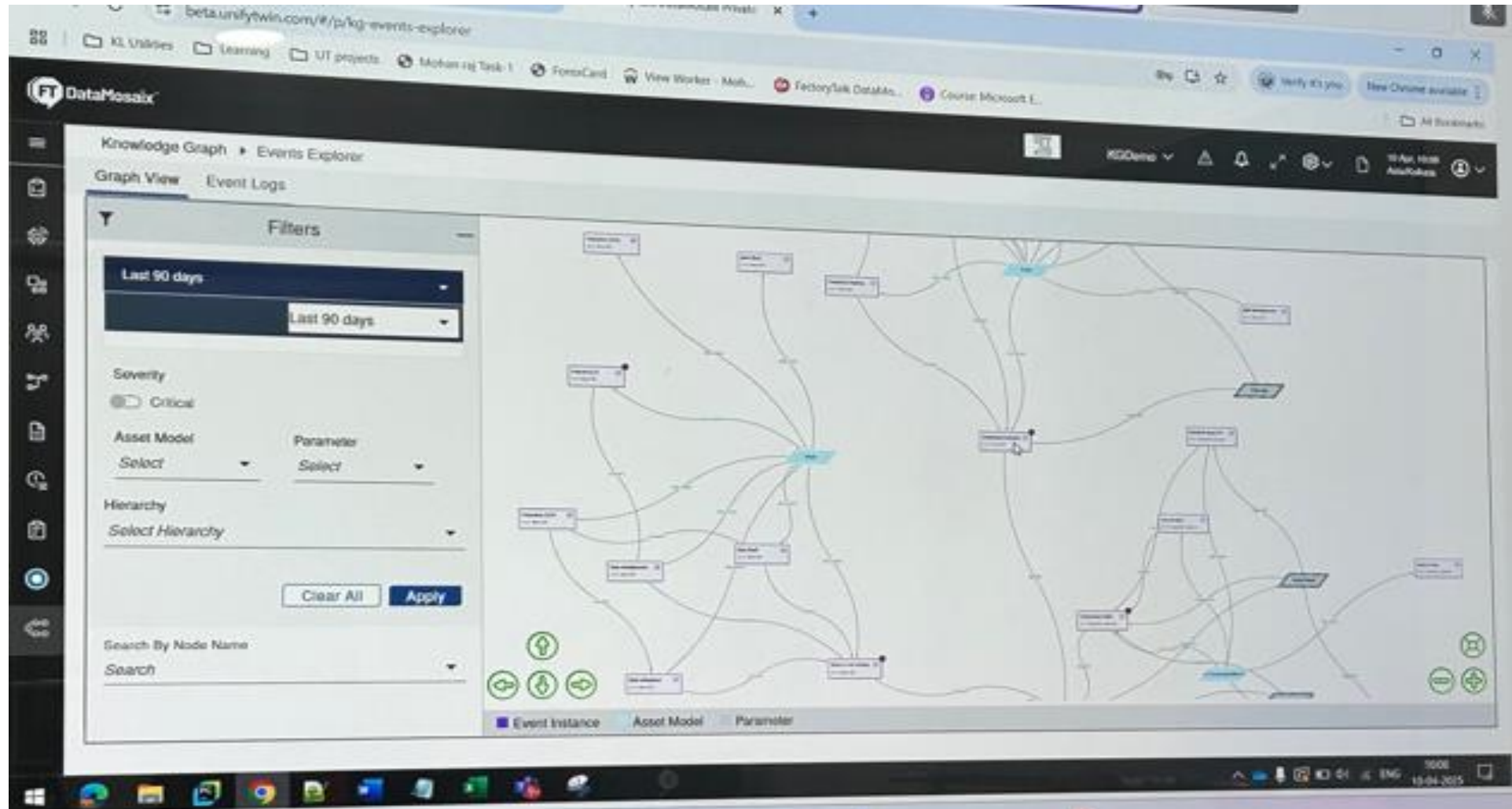




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Knowledge Graph Tools – Event Explorer

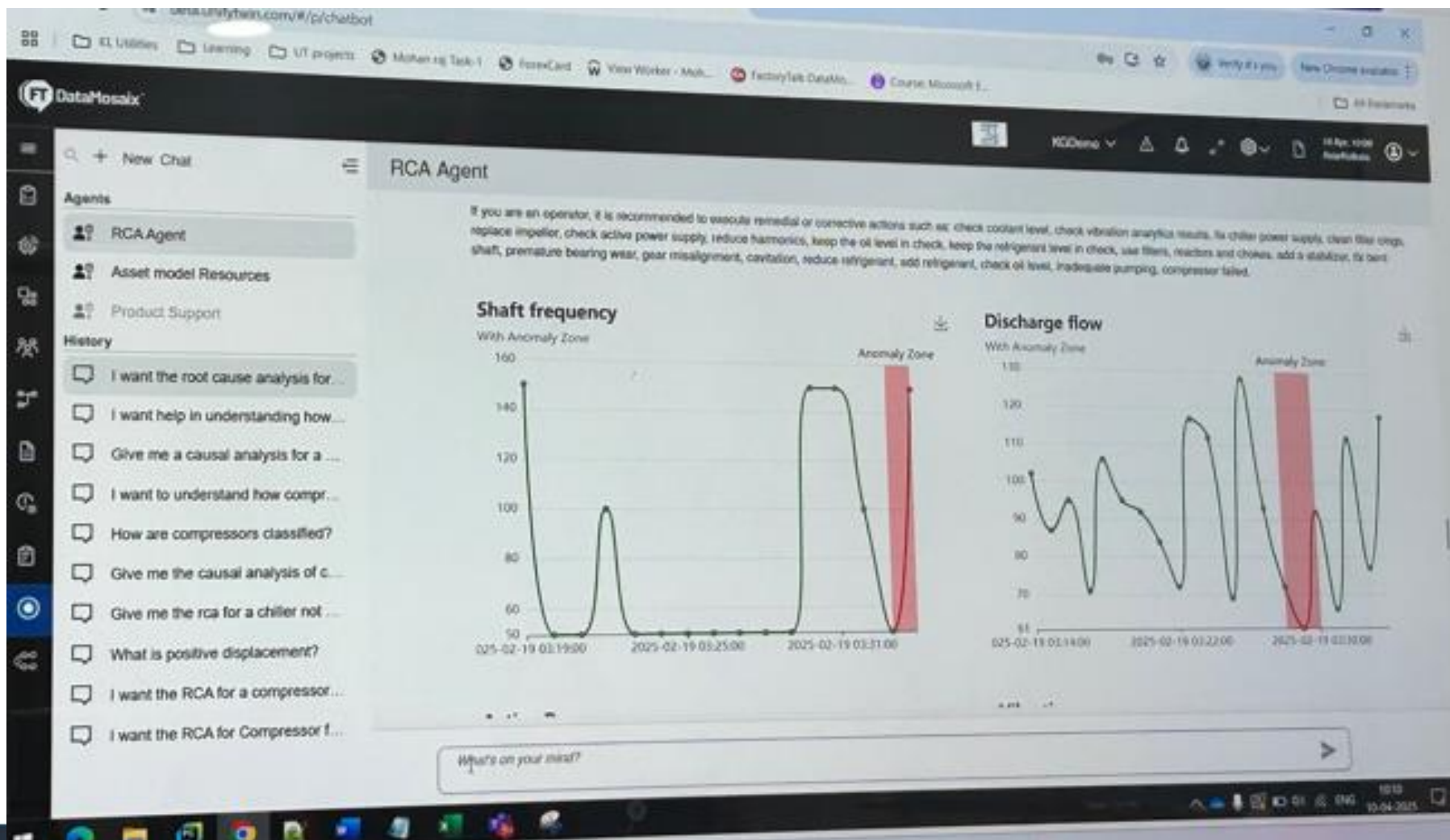




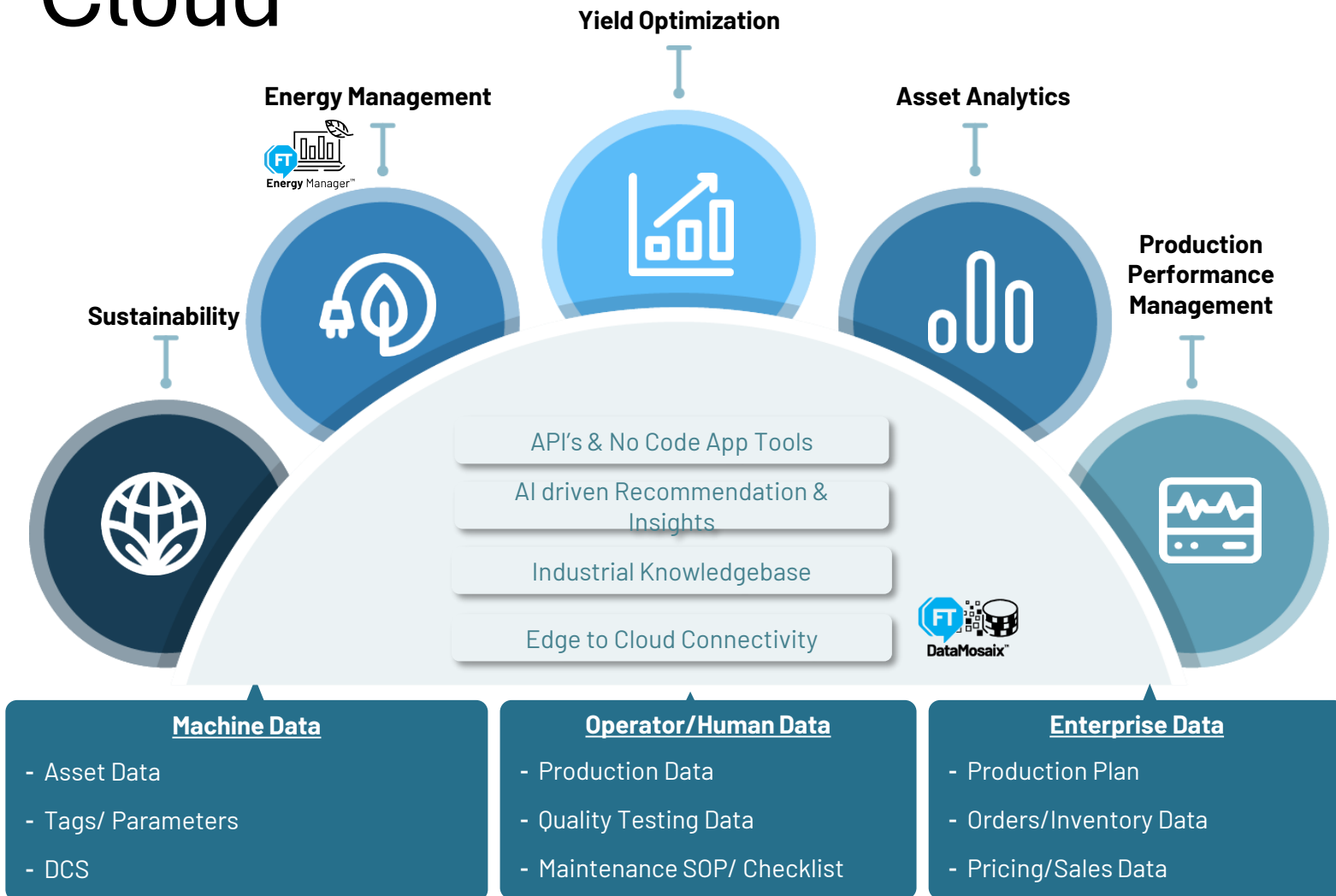
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Root Cause Analysis (RCA) Agent



Use cases on FactoryTalk® DataMosaix™ Private Cloud



Automated contextualization of **human and machine data** to deliver business outcomes

Seamless discovery of **industrial operations knowledge** from machine events and human actions to create the **Industrial Knowledge Graph**

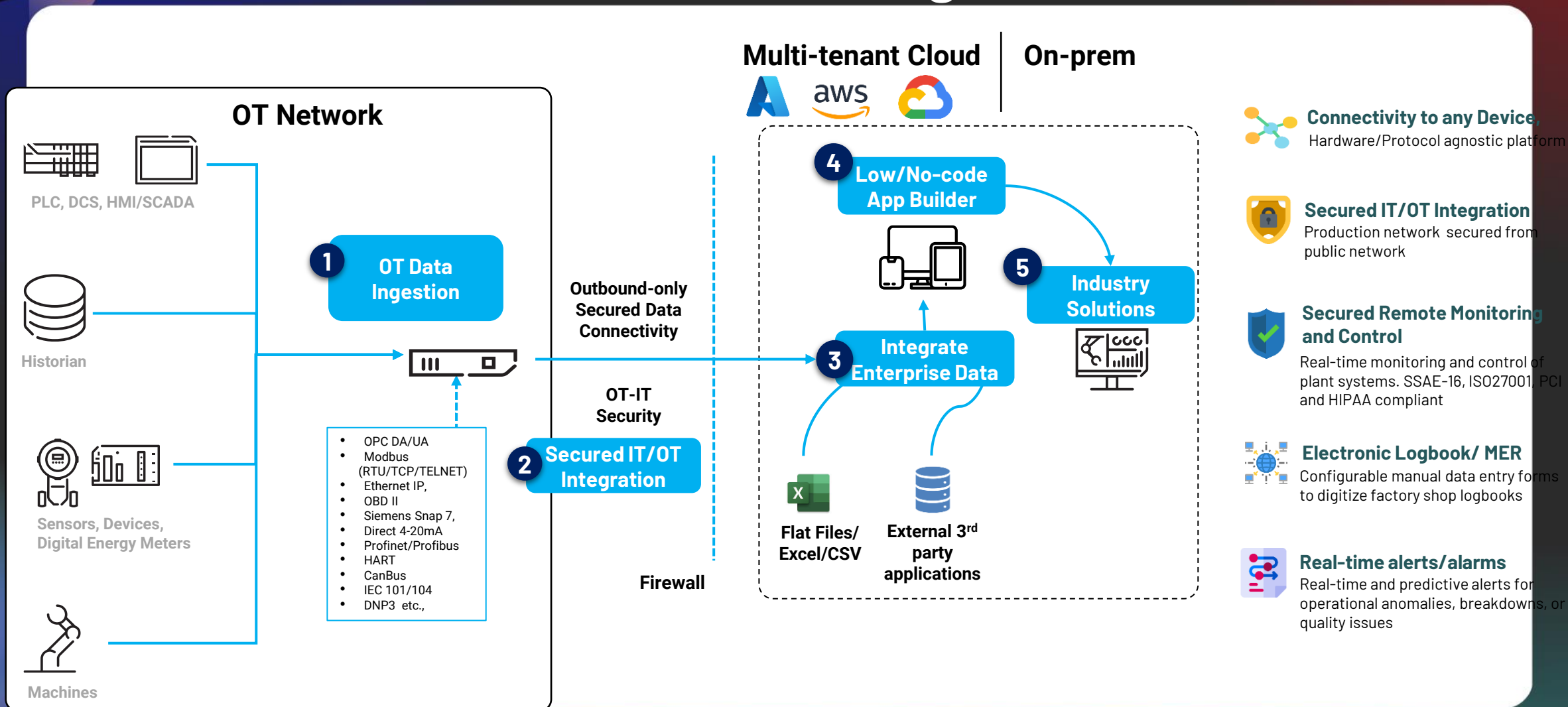
AI-driven recommendations and insights to front-line workers leveraging the Industrial Knowledge Graph

Intelligent applications that deliver business value seamlessly across Edge to Cloud

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Integrated and highly secure edge to cloud solution

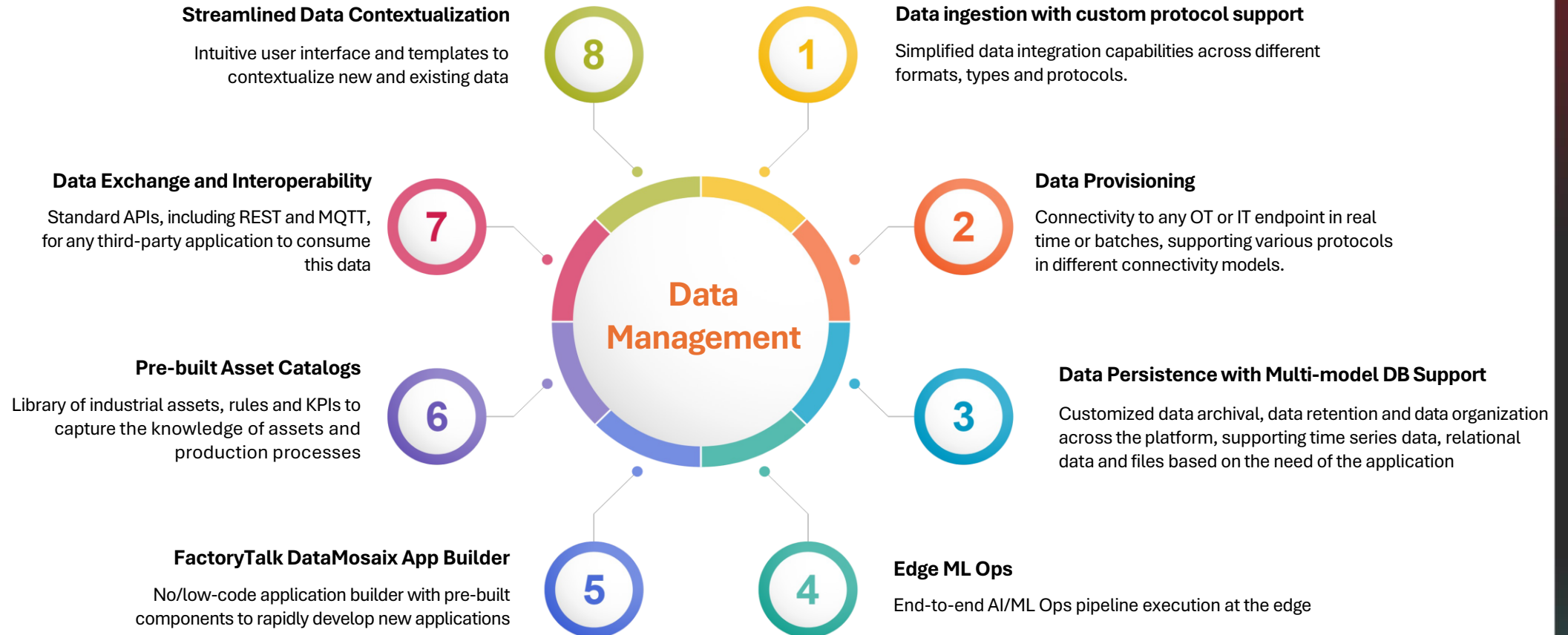




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FactoryTalk® DataMosaix™ Private Cloud Key Capabilities



FactoryTalk® DataMosaix™ App Builder

Dashboard Editor

Easily and quickly configure new dashboards with a variety of pre-defined visualization tools in a drag-and-drop interface.

- Render content on desktop or mobile devices
- Easily select contextualized data from FactoryTalk DataMosaix Private Cloud

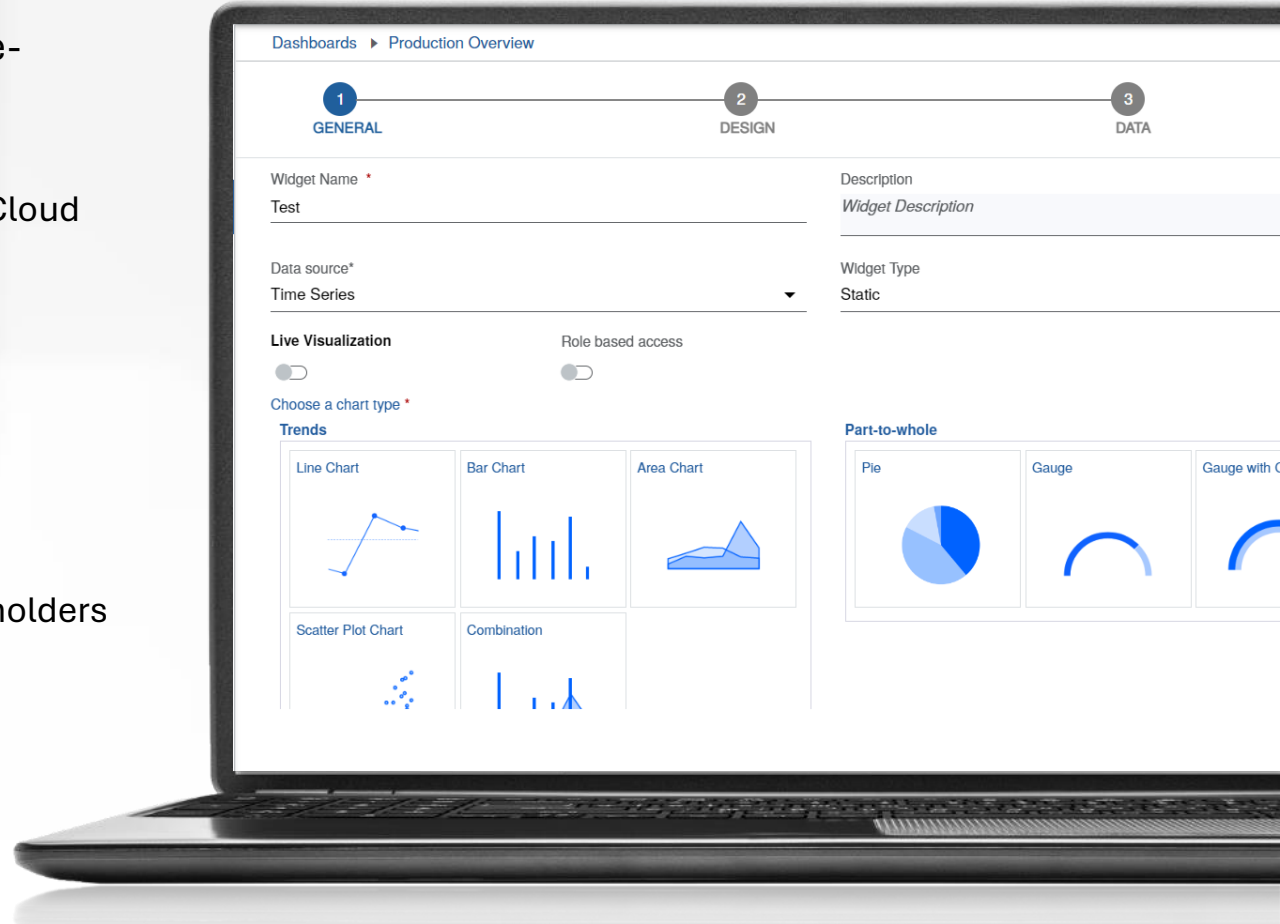
Reporting

Rapidly build static reports that are automatically generated and shared with your team.

- Schedule automated report generation based on a defined frequency
- Export static reports as a PDF
- Set up email distribution lists to automatically share reports with stakeholders

On-the-fly Visualization

Quickly view data in charts without creating or changing existing dashboards and visualizations.



FactoryTalk® DataMosaix™ App Builder

Rules Engine

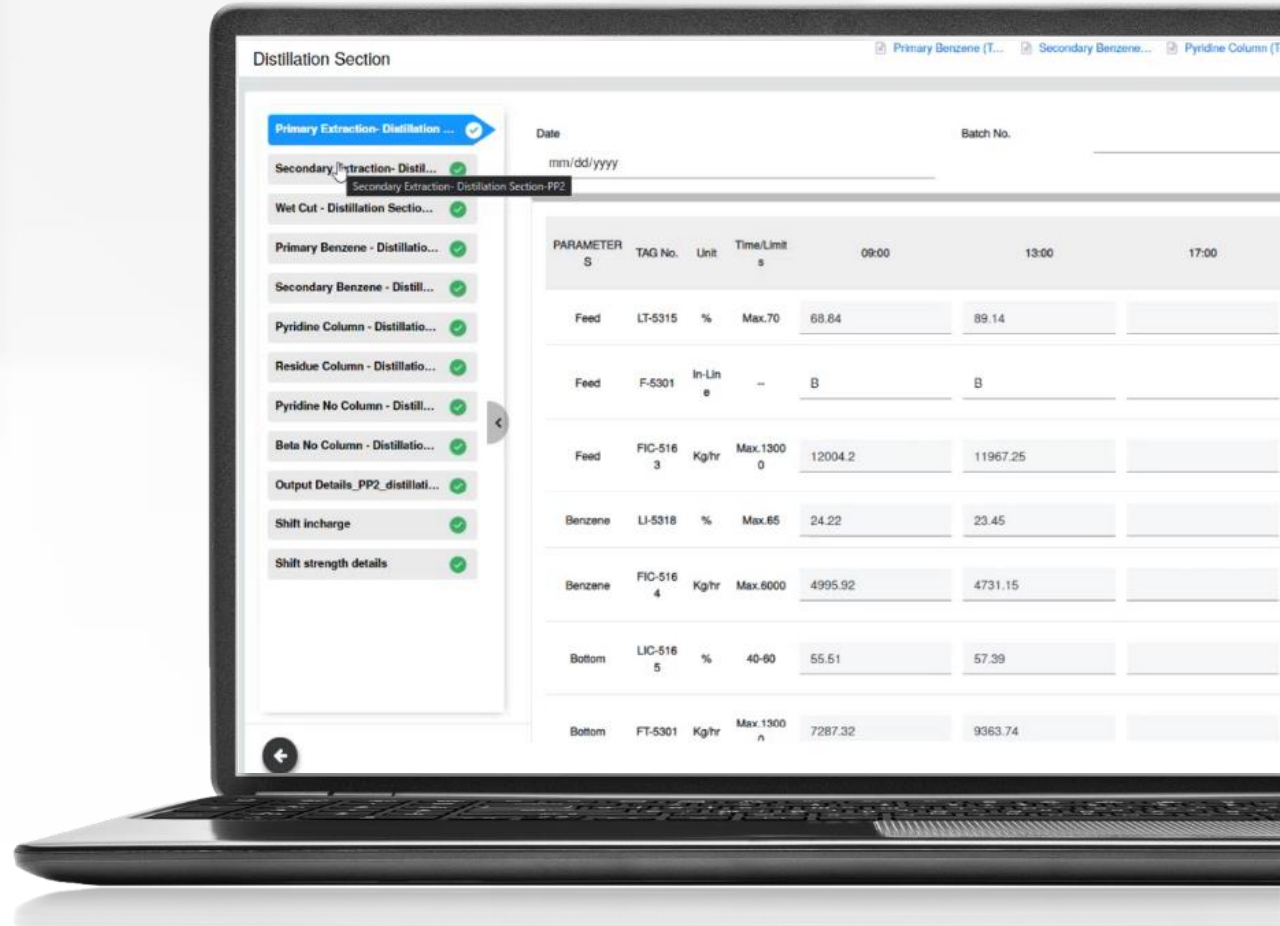
Automate arithmetic or logical calculations, based on a live or batch-scheduled basis, with a simple integrated design environment.

Rules can be used for:

- Alerting and notifications
- Data calculations and aggregations
- Event creation (downtime, deviation, etc.)
- Implementation of business rules

Electronic Logbooks

Configure forms with a drag-and-drop interface to implement digital workflows.





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Applications and Use Cases



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FactoryTalk® Energy Manager overview

The industrial energy management and optimization solution built on an industrial DataOps platform

Capabilities (out-of-the-box)

- Integration of electric or non-electric resource types
- Live parameter monitoring and data acquisition
- Pre-built dashboards for consumption, demand, costs, energy intensity and emission
- Correlation of energy and operational (OT) data from disparate sources
- Chart Explorer to create your own insights
- Customizable energy model hierarchy
- Alerts and notifications



Additional customizations

Scalability

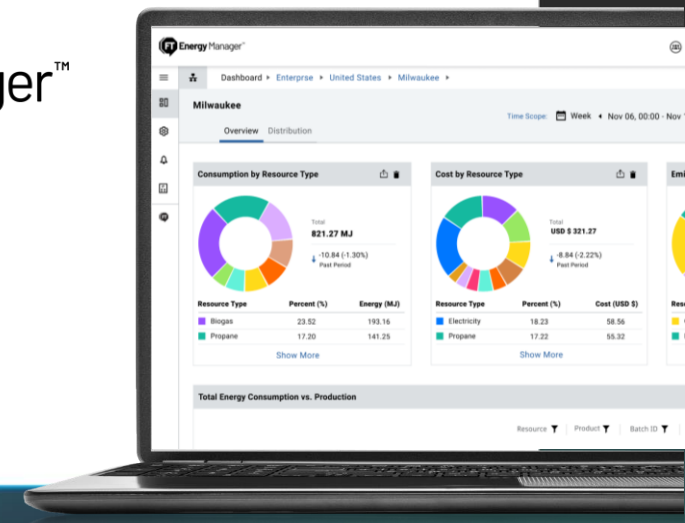
- Single Site, Multi-Site or Enterprise

Infrastructure

- SaaS, Private Cloud or On-prem



Accelerate Your Digital Transformation with Industrial DataOps and Achieve Sustainability Goals



Additional customizations

➡ Professional Services delivered

- Single-line diagram (SLD)
- Power quality insights
- Baseload identification, forecasting of consumption and demand
- Demand management
- Consolidated view of energy generation (DG, Solar, Wind), consumption and losses or unmetered energy
- Analyze performance and efficiency through rated load analysis
- Energy efficiency, performance and failure prediction of utilities
- Create custom KPI's
- Anomaly detection
- Energy recommendations and ROI calculator



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FactoryTalk® Energy Manager™ Private Cloud - Case Study

Textile & Carpet Manufacturer

Problem Statement

- No real-time visibility on energy consumption or various energy losses in the plant
- Energy efficiency solutions only implemented reactively after a yearly audit
- No real-time alerts on potential problems in critical assets, contributing to wasted energy.

What we provided

- Real-time energy consumption monitoring
- Identification of power system overloading above rated capacity and equipment inefficiencies
- Identification of high losses across distribution network, switch gears, transformers and low power factor machines
- Automatic detection and notification to operators of abnormal conditions
- Energy forecast of power consumption
- Workflow e-logbook to assign and track immediate recommendations

Business Outcomes

4.5%
Utility savings

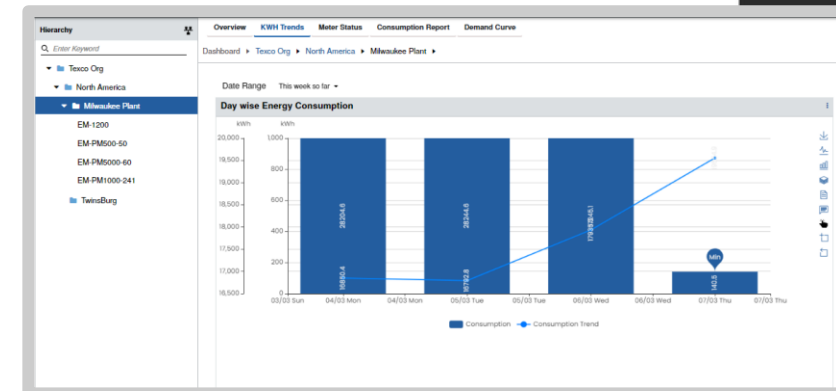
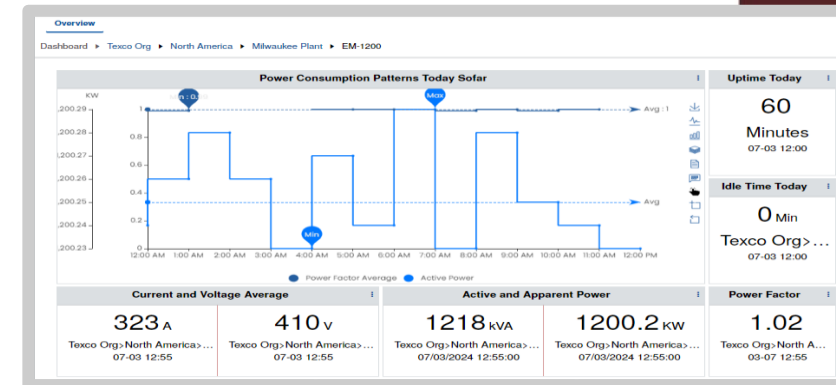
12%
Reduction of energy losses

4
Month payback period

Scalability

- The solution is repeatable and scaled to 15+ plants

The solution combined standard capabilities and services-led customizations.





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Sustainability Services Offering

Solution Description

Sustainability is for Emissions Monitoring and Sustainability Analytics. It consists of 2 modules- the DAHS (Data Acquisition and Handling Systems) and the Sustainability.

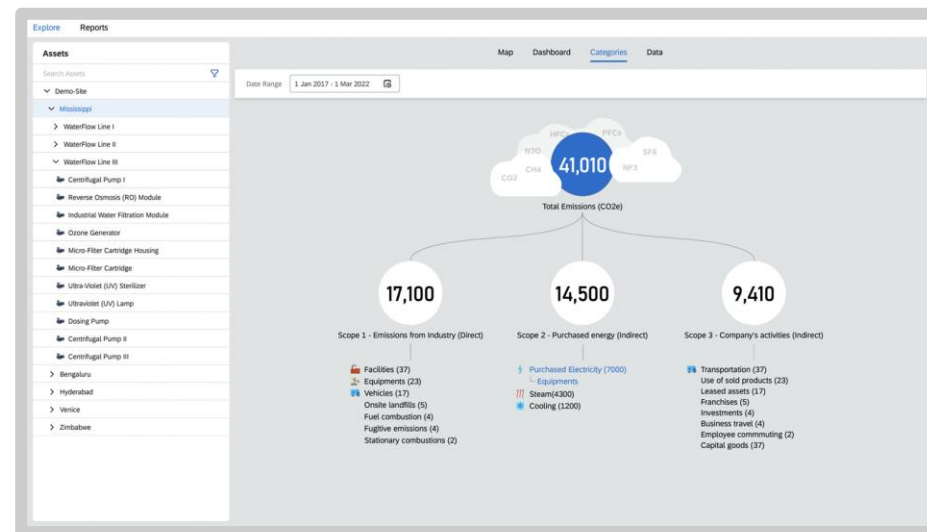
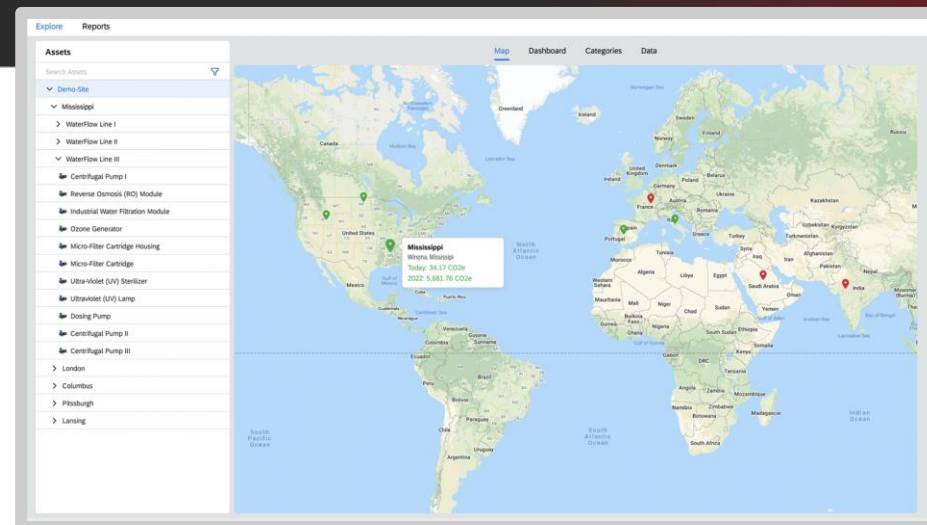
Example Capabilities

DAHS:

- ✓ **MCERTS Certified Emission Compliance Reporting:** Includes Part 60 and Part 75 as per US EPA regulations and NESHAP (National Emission Standards for Hazardous Air Pollutants) compliance
- ✓ **Broad Protocol Support:** Implemented across 3000+ customers for various sensors and analyzers relevant to GHG emissions
- ✓ **Emissions Trending and Visualization:** Continuous and real-time insights, reports and dashboards

Sustainability Analytics:

- ✓ **Carbon Accounting and Net Zero Reporting:** Includes Scope 1, Scope 2 and Scope 3 emissions
- ✓ **Integration with DAHS or third-party software:** Contextualizes emissions, energy and production data and supports manual data entry required
- ✓ **Standard reports:** Complies with industry standard reporting frameworks like GRI, SASB, TCFD



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Sustainability - Case Study

Sustainable Global Building Solutions

Problem Statement

- Existing on-prem solutions were not able to scale or standardize
- The local DAHS system was not able to forecast NESHAP compliance
- Scenario modeling tools using local excel sheets were manual and inaccurate

What we provided

- Cloud DAHS for visibility across plants
- Standardized accurate NESHAP compliance forecast using real time data from DAHS
- Scenario modeling tool using IoT data to perform what-if analysis

Business Outcomes

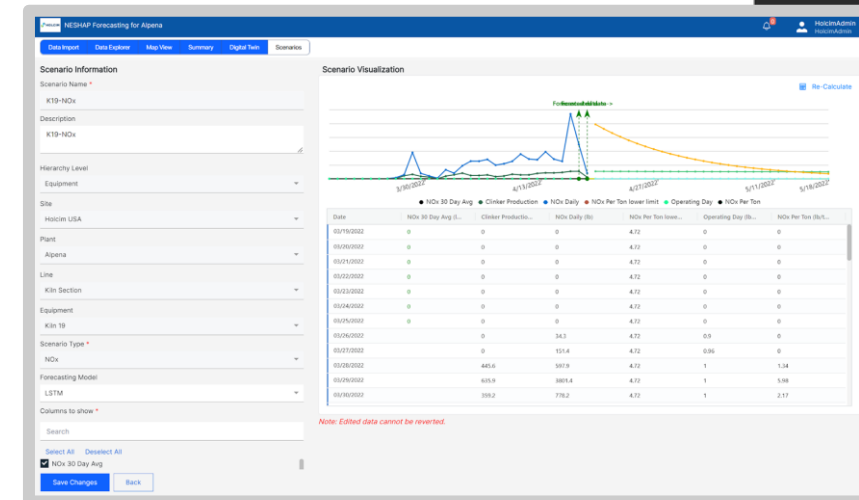
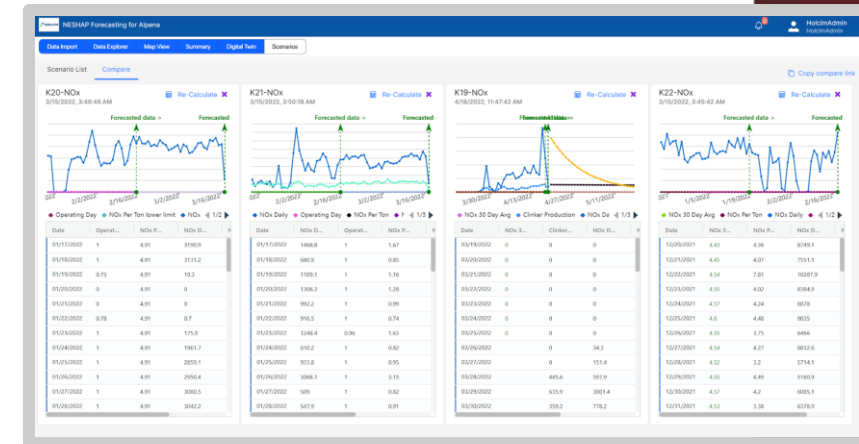
100%
NESHAP
compliance

99%
Manual effort
reduction

< 6
Month
payback
period

Scalability

- The solution is repeatable and scaled to 20+ large critical assets within the large manufacturing facility.





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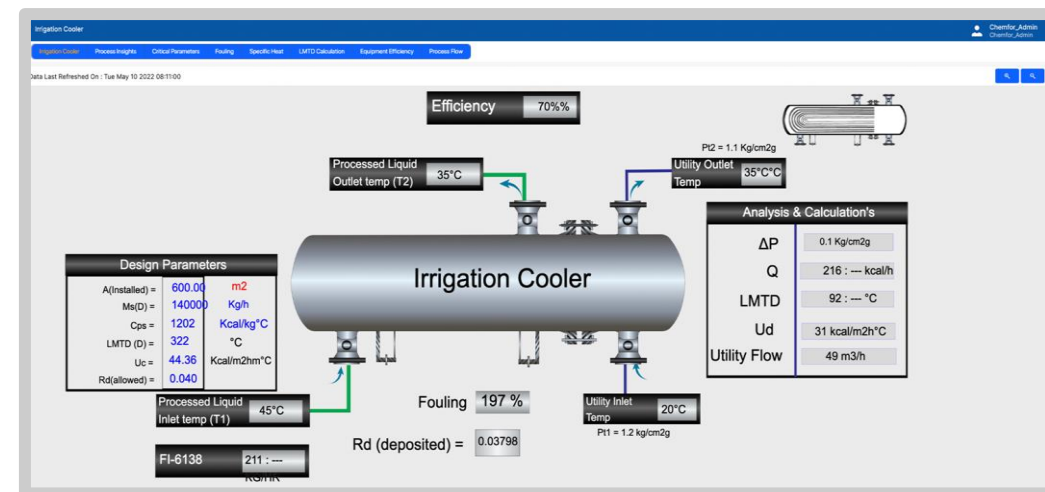
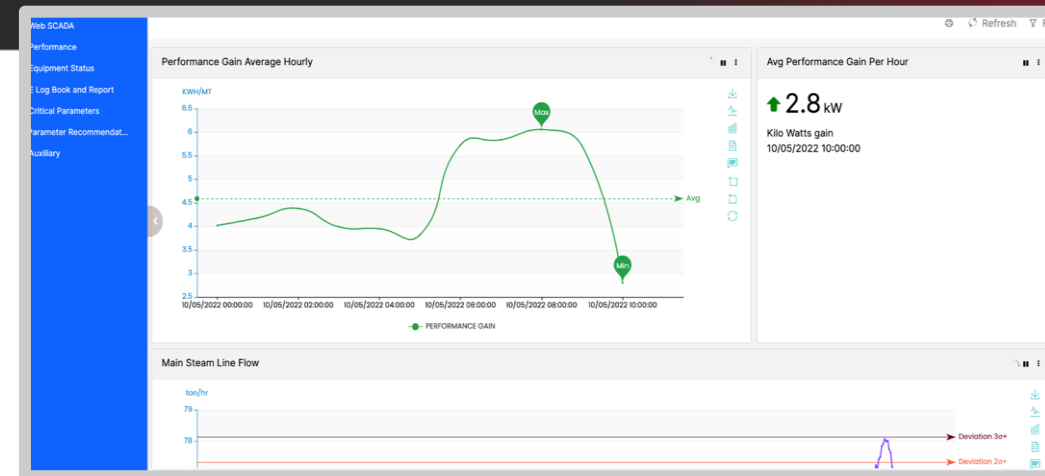
Asset Analytics Services Offering

Solution Description

Asset Analytics provides model-driven asset analytics for real time efficiency recommendations and predictive maintenance of critical assets.

Example Capabilities

- ✓ **Global Catalog of Asset Models:** 100+ predefined asset models (templates) including parameters, KPIs and business rules related to efficiency and maintenance of assets
- ✓ **Real-time Analytics on Asset Operating Profiles:** Self-service analytics on critical parameters related to the asset, including KPIs like asset efficiency and deviations between normal and anomalous operating profiles
- ✓ **Anomaly Detection and Alert Generation:** AI model-based anomaly detection based on unsupervised learning and rule-based alert triggers
- ✓ **Integration with SAP and other enterprise maintenance systems:** Standard connectors and APIs to integrate with SAP or other EAM/CMMS systems that manage maintenance records
- ✓ **Predictive Maintenance:** A suite of AI models for predicting Remaining Useful Life (RUL) based on historical fault data available for the asset
- ✓ **Mobile App for KPIs and Ticket Monitoring:** Mobile user experience to monitor KPIs and service ticket history





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expanding **human possibility**®



Allen-Bradley

by ROCKWELL AUTOMATION



LIFECYCLE IQ[™] Services

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Hewlett Packard
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CISCO
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ADVANTECH