Boost your Enterprise Visualization with Reliable and Structured Data

Vishal Mahna, Gonzalo Merciel
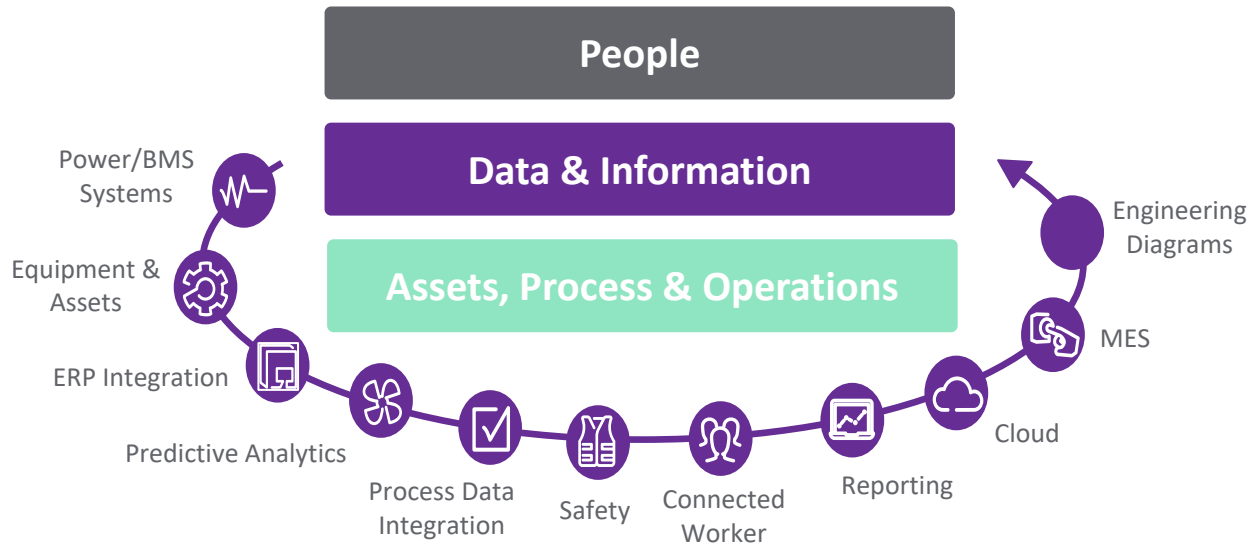
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Agenda

- Defining Enterprise Visualization

- Data Infrastructure needs

- Demo

- Success Stories

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Defining Enterprise Visualization

Why companies choose Enterprise Visualization

- People
- Data & Information
- Assets, Process & Operations

Power/BMS Systems
Equipment & Assets
ERP Integration
Predictive Analytics
Process Data Integration
Safety
Connected Worker
Reporting
Cloud
MES
Engineering Diagrams

- Optimize Performance of People, Assets, and Operations

- Faster Time to Value

- Enable collaborative teams and drive innovation

- Flexibility to market dynamics and quick response to changing customer demands

- Minimize Risk by Increasing Situational Awareness

- Reduce Energy and Operational Costs

- Accelerate Company Initiatives – Sustainability, Decarbonization

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Enterprise Visualization & Colloboration – Terminology, Market Trends

- **ROC, C&C, Nerve Center, NOC** – terms you will hear..more frequently to lead digital transformation

- Enable visibility of **key KPI's** derived from Systems (IT/OT), IOT, Data – Security, Camera, Weather, APM Analytics to make faster, better decision at enterprise is at highest priority

- **Remote and Virtual Control Rooms, Users Scalability**

- Drive towards **Autonomous operations, Global operations or supply chains optimization, APM Visibility or AI Center** has increased

- **Enterprise visibility** to drive optimization across global operations and supply chain has increased

- This is leading to major **digital transformation** initiatives across our customers in every Industry from MMM, O&G, INFRA etc.

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Meeting the needs of the Enterprise User

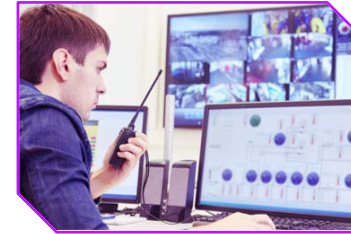| **Enterprise** | Long Term Focus (up to 1 Year) — Enterprise View — IT/OT Convergence | Command Center | Remote Operations Center | Casual User |
| **Supervisory** | Medium Term Focus (up to 1 Week) — Process View — OT Convergence | Control Room | Area Workstation | Mobile Supervisor |
| **Edge** | Short Term Focus (up to 1 Shift) — Work Cell View — Control Convergence | Panel-based Operations | Tablet-based Operations | Off-site Operations |

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AVEVA Unified Operations Center

- Hierarchy of linked KPIs
  - Global
  - Regional
  - Plant/Facility/Operations
  - Equipment
- Supervisory control
- Map-based / GIS content
- Cross-functional collaboration
- Connected workforces
- Contextualized 3D models
- Regulatory alerts

- Infuse AI and ML
- Workflow integration
- Reporting integration
- Maintenance integration
- Incident reporting & SOPs
- Revenue/financial
- PI Server & PI Vision integration
- Video surveillance
- Extensible apps

KPI Dashboards

Operations Overviews

Drill-down Metrics

Notifications & Trends
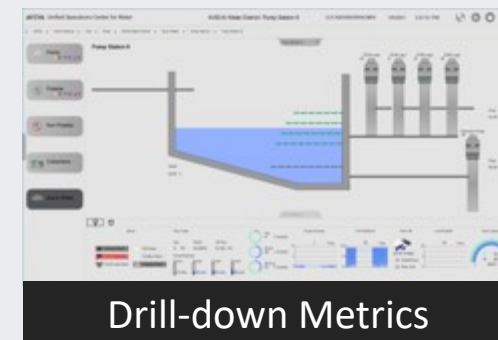
Converges IT, OT, ET, and IoT data systems into a single pane solution

Converges Features & Functionality; for Monitoring & Command\Control

Out-of-Box Industry Content; accelerate development and ensure scalability

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Enterprise operations performance visibility in real-time

Rich intelligence offers a high-level perspective

Drill down by site to individual assets using hierarchical navigation and intuitive visualization

Merge data types to understand deeper context between various aspects of operations

Real-time visibility to critical events as they occur, improving responsiveness

Detailed operational analysis to maximize efficiency and ensure resource availability

Holistic view of impacts from upstream and downstream operational disruptions or outages

Innovative approach to alarm management, emphasizing actionable alerts

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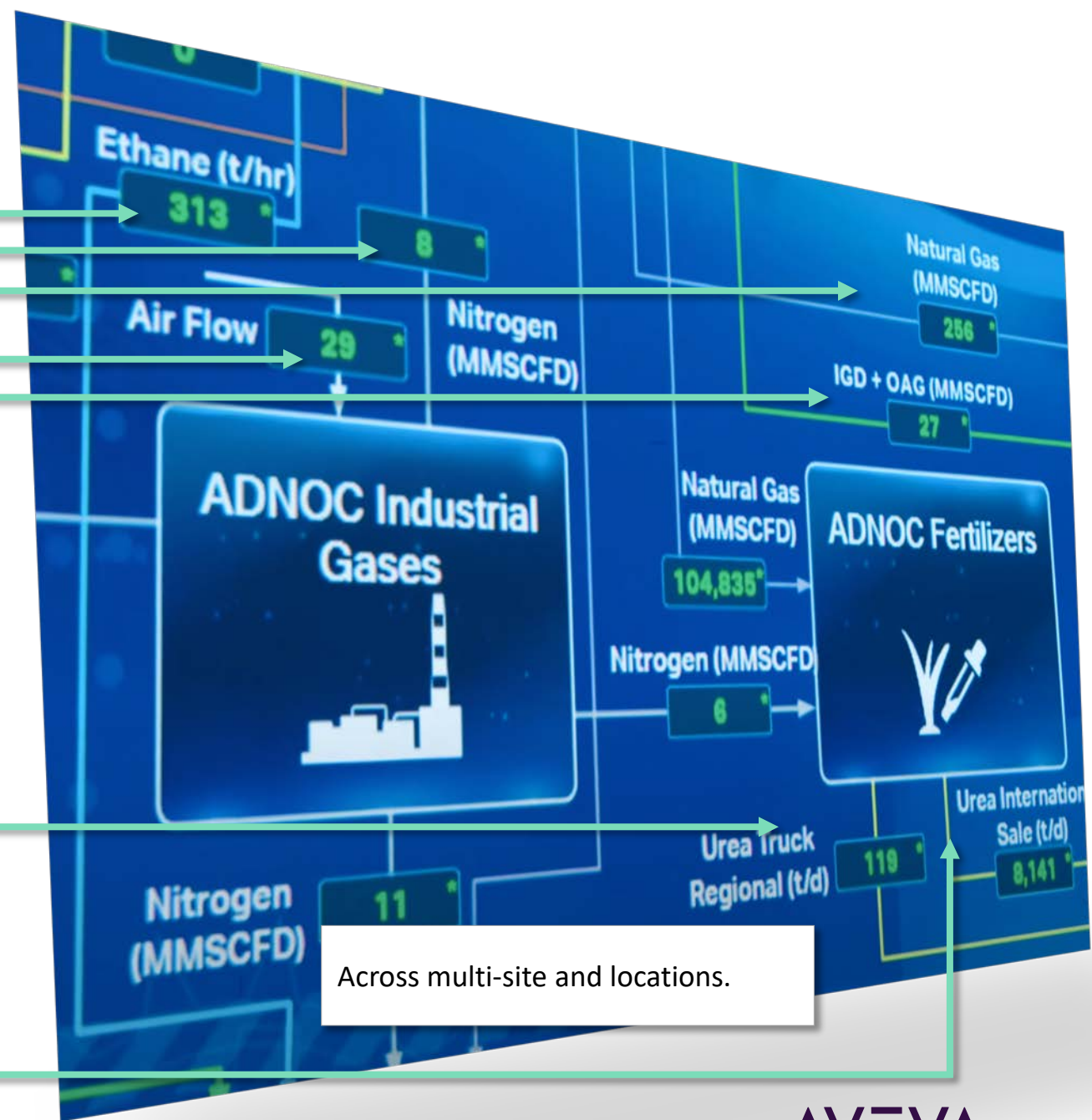Process data (historian server)

Process data (relational database)

Process data (third party vendor)
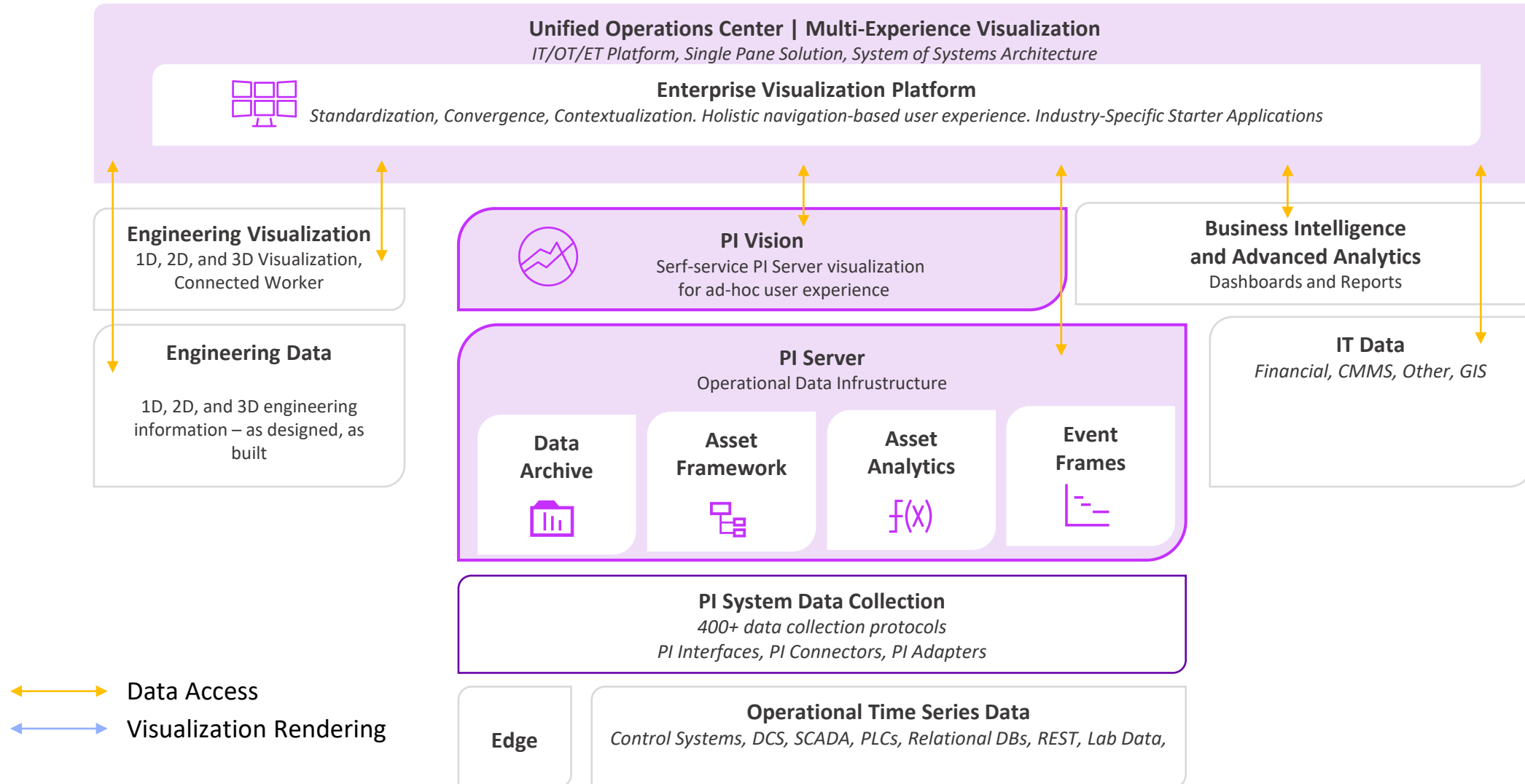
Manual entry data via mobile

Calculated tag from 2 data sources

Delivery System Record Data

Sales Record Data

Across multi-site and locations.

Enterprise Visualization powered by the PI System

Unified Operations Center | Multi-Experience Visualization
IT/OT/ET Platform, Single Pane Solution, System of Systems Architecture

Enterprise Visualization Platform
Standardization, Convergence, Contextualization. Holistic navigation-based user experience. Industry-Specific Starter Applications

Engineering Visualization
1D, 2D, and 3D Visualization,
Connected Worker

Engineering Data

1D, 2D, and 3D engineering
information – as designed, as
built

PI Vision
Serf-service PI Server visualization
for ad-hoc user experience

**Business Intelligence
and Advanced Analytics**
Dashboards and Reports

PI Server
Operational Data Infrustructure

Data Archive	Asset Framework	Asset Analytics	Event Frames

IT Data
Financial, CMMS, Other, GIS

PI System Data Collection
400+ data collection protocols
PI Interfaces, PI Connectors, PI Adapters

Edge

Operational Time Series Data
Control Systems, DCS, SCADA, PLCs, Relational DBs, REST, Lab Data,
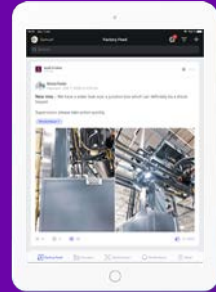
⟷ Data Access
⟷ Visualization Rendering

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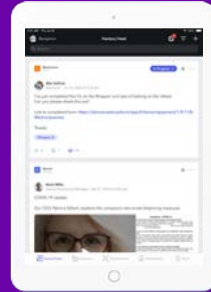# Collaboration : Teamwork Areas of Focus

Communication

Connect with workers across shifts and facilities to solve problems. Share insights in a logbook and continuously grow the archive of knowledge.

Digital Knowledge
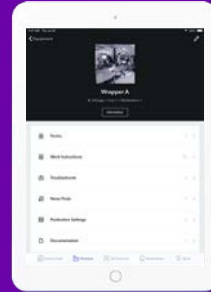
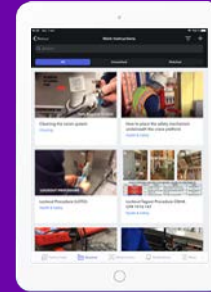Scan QR codes to quickly access a standardized library of instructions, videos and troubleshooting content.

Collaboration

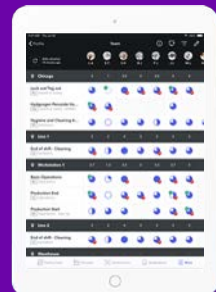Factory Feed

Equipment

Video Library

Users/Skills

Procedures
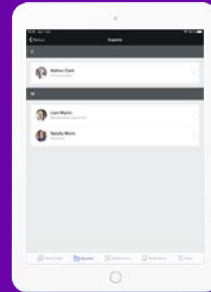
Subject Matter Experts

Call for Help

Skills Management

Deliver and track training for new hires, upskilling and certifications with a review pane to view pending and completed training.
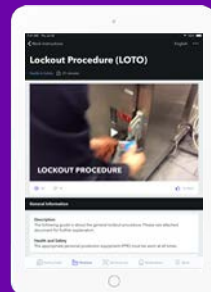
Issues Management

Capture, track and resolve problems through call for help escalation and collaboration with subject matter experts.

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Collaboration : Work Tasks - Key Capabilities

A Framework for Designing, Executing and Sustaining Industrial Work Processes & Procedures

Workflows/SOP	Forms	Mobile App
• Intuitive, visual workflow modeling environment and automation engine • Defining the sequence of activities to be performed across people, data and systems to accomplish a work task.	• User interfaces are modeled in a simple, easy to use forms layout environment with smart controls • Adaptive layout and responsive design supports browsers and mobile devices	• Native mobile app for executing work tasks and data collection procedures • Assigned work tasks are downloaded on to the mobile device to be executed on and offline
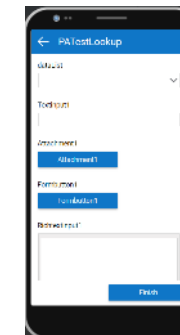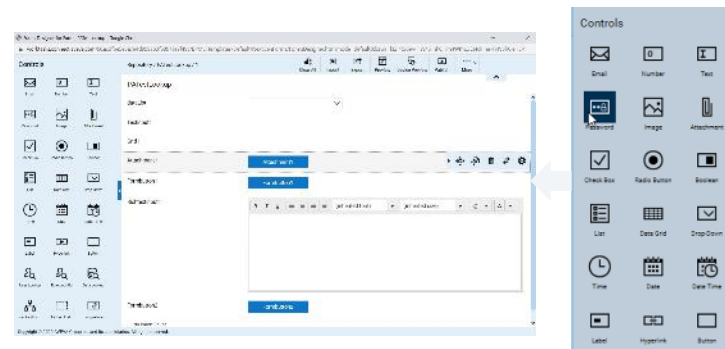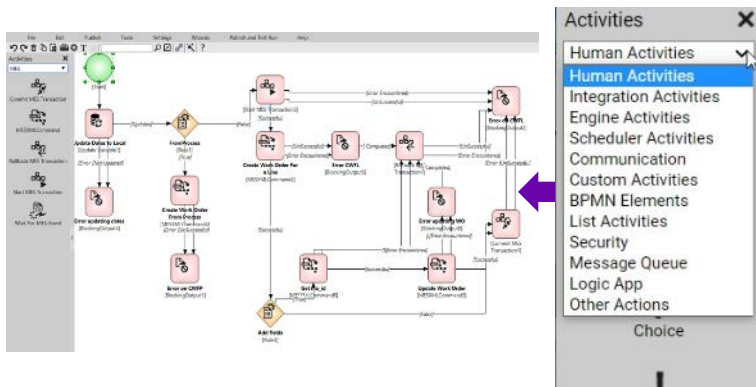
AVEVA Work Tasks Pro, a native Mobile device App available for iOS, Android and Windows

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Power of AVEVA

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Harnessing the power of information, AI and human insight

Two world class industrial software experts combine to deliver integrated value

AVEVA's end-to-end industrial software to optimize engineering and operations

+

PI System is the industry standard for industrial information management

1 Run **agile, continuously optimized** operations to protect the bottom line

2 Increase **asset reliability and safety** with reduced manual supervision

3 Provide remote teams rich data and **decision support** to **collaborate** and work efficiently

4 Maximize CapEx and drive the highest levels of **engineering efficiency**

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OSIsoft
is now part of AVEVA

OPERATIONS

PERFORMANCE INTELLIGENCE

ENGINEERING

Automation/ Control Systems

New Sensor Tech

Remote + Mobile Assets

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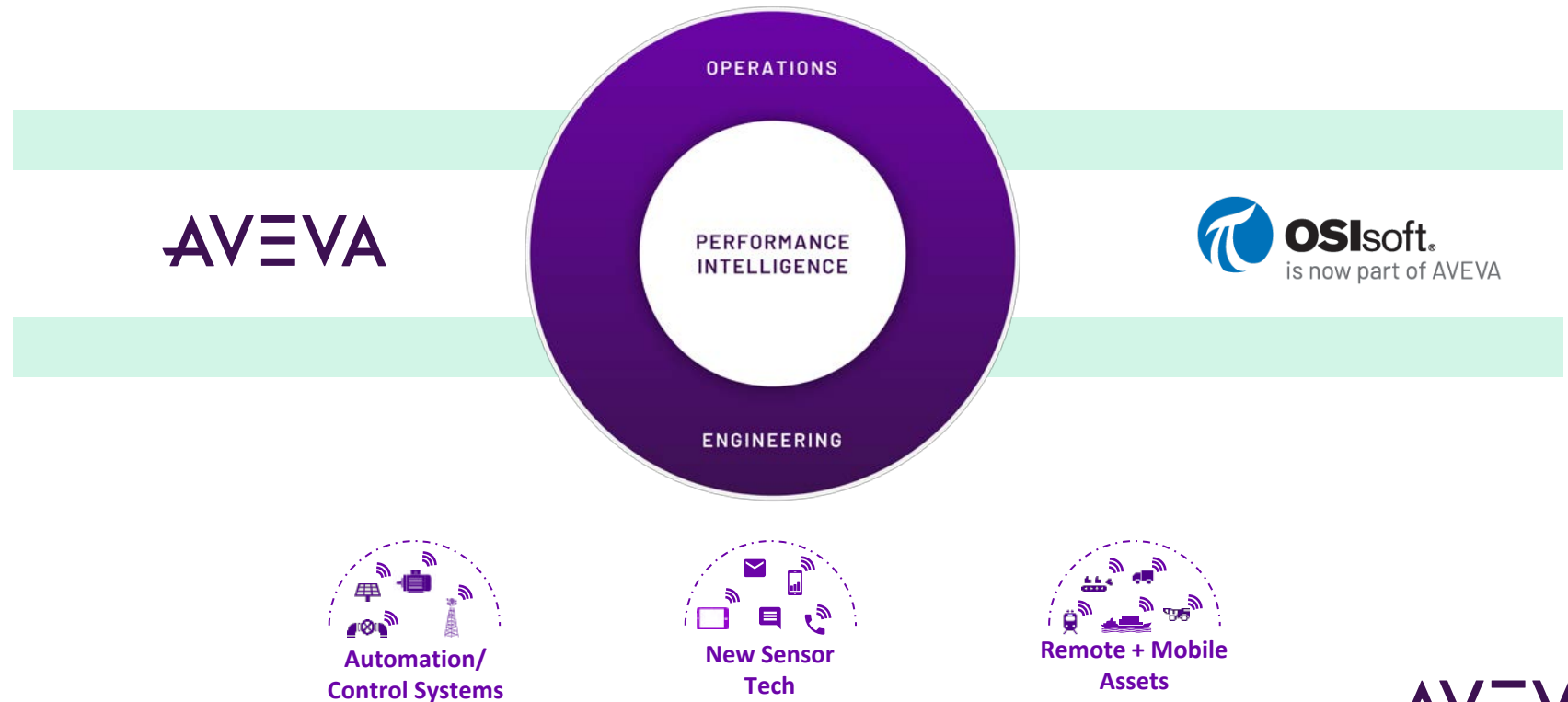
Combining world-class software to drive Performance Intelligence

Accelerating digital transformation of the industrial world with complementary product offerings
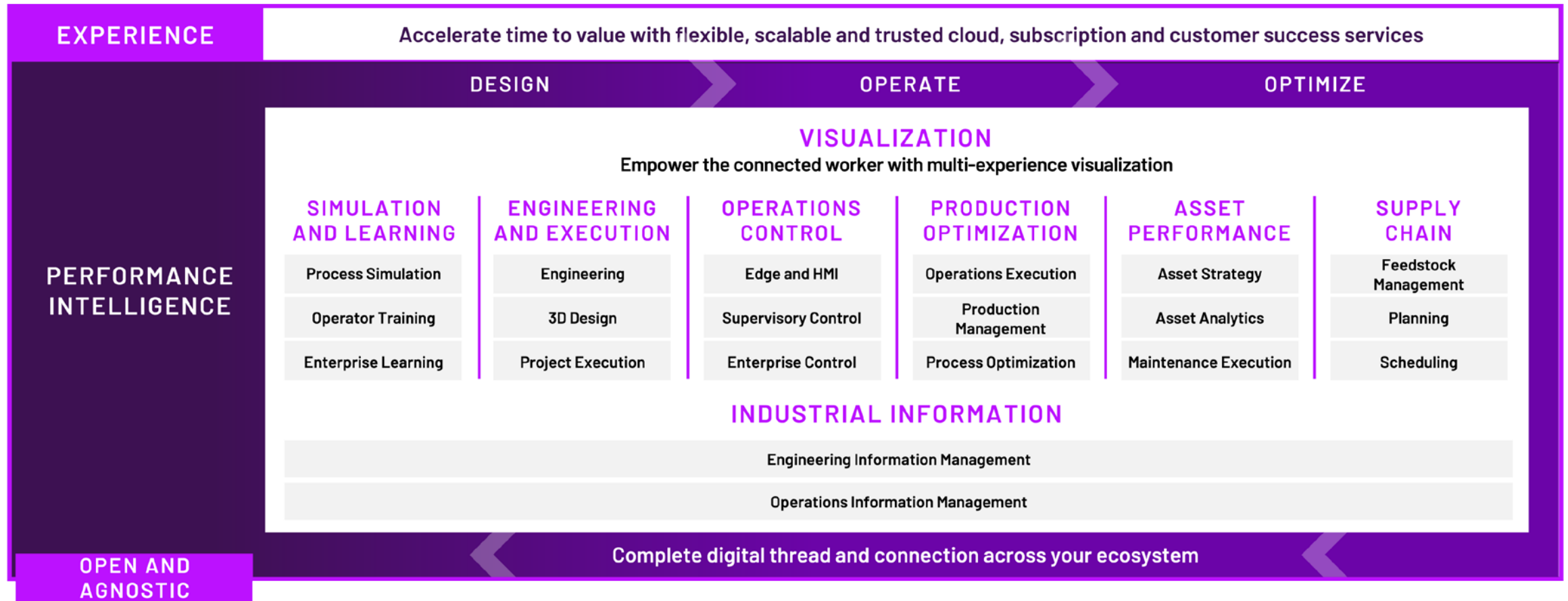
A common digital thread from engineering to operations

Artificial Intelligence

Cloud

Big Data

Industrial IoT/Edge

Extended Reality

OPERATIONS

OPERATE

OPTIMIZE

Production Optimization

Asset Performance

Operations Control

INDUSTRIAL INFORMATION

Supply Chain

Engineering and Execution

Simulation and Learning

DESIGN

ENGINEERING

CONNECTED WORKER

Collaboration

Learning

Multi-experience Visualization

DIGITAL TWIN

Data Sources

Models and Analytics

Guidance

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Data Infrastructure needs

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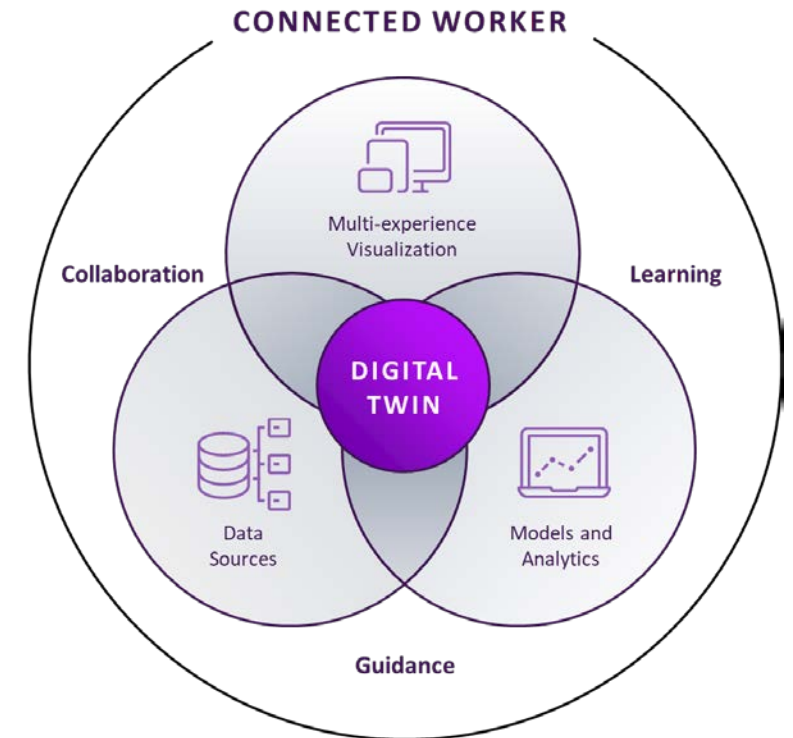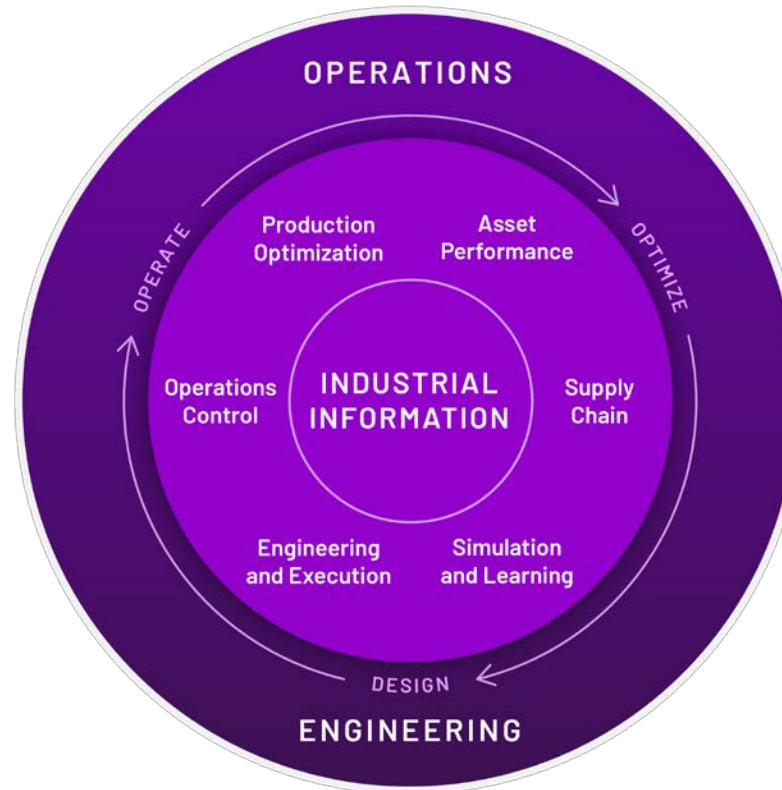
Operations Control to Enterprise Visualization

Plant/Field (Equipment-centric)		Control Room (Site-centric)		Enterprise (Global / Regional)	
	Execution	LIMS	Scheduling	Financial	Supply Chain
Dashboards & KPIs	Predictive Analytics	Energy	MES	Energy	ERP
	Mobile Rounds	Dashboards & KPIs	Predictive Analytics	Dashboards & KPIs	Predictive Analytics
Training	Tasks	3D Models	Work Orders	3D Models	Maintenance
Extended Reality	Collaboration Tools	Training	Workflow		Workflow
GIS	Reporting	Extended Reality	Collaboration Tools		Collaboration Tools
Process Screens	Historical Analytics	GIS	Reporting	GIS	Reporting
		Process Screens	Historical Analytics	Process Screens	Data Modelling

Real-time → Near Real-time →

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Decision Making Needs for Data

Real-time

Near Real-time

Plant/Field
(Equipment-centric)

Control Room
(Site-centric)

Enterprise
(Global / Regional)

Total Amount of Data

Information
Necessary for decision-making

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Converting Raw Data to Decision-Ready Information

Reliable Storage

Contextualization

Quality Checks

Intermediate Aggregations and KPI Generation

Filtering and Conditions

Total Amount of Data

Information
Necessary for decision-making

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Converting Raw Data to Decision-Ready Information

Reliable Storage   **Contextualization**   **Quality Checks**   **Intermediate Aggregations and KPI Generation**   **Filtering and Conditions**

Asset 97: Springfield

Asset 42: Springfield

Corrected Measurement

Average uptime

Total energy usage

Underperforming asset

Data Archive   **Asset Framework**   **Asset Analytics**   **Event Frames**
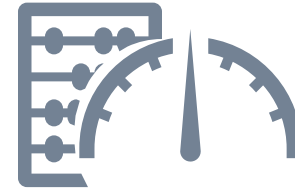
AVEVA
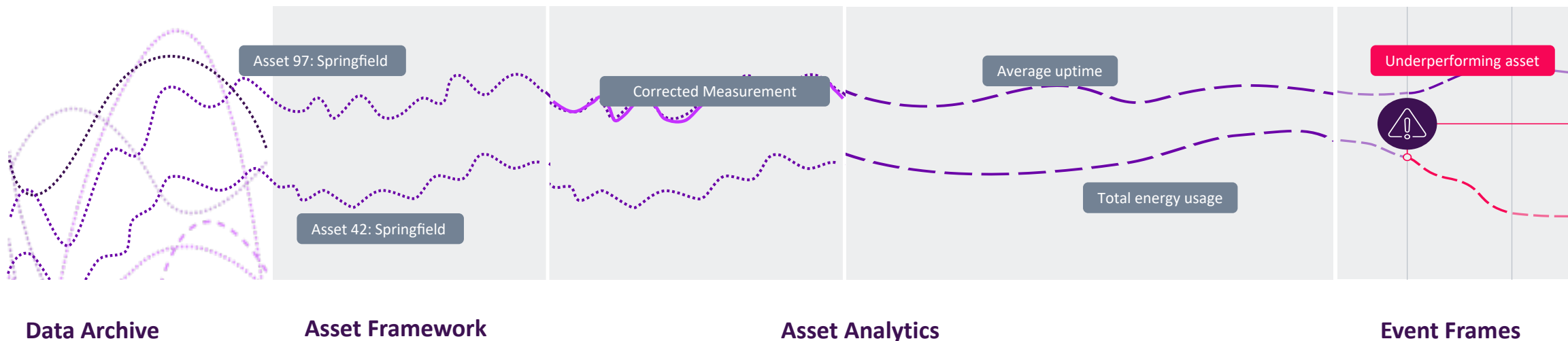
Converting Raw Data to Decision-Ready Information

Reliable Storage

Contextualization

Quality Checks
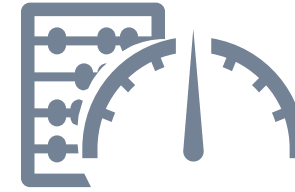
Intermediate Aggregations and KPI Generation

Filtering and Conditions

Asset Framework: adds context to raw data streams

- Label data with human-friendly names
- Group related data into assets
- Add metadata and context manually or from external systems
- Standardize groupings, labels, and units with templates
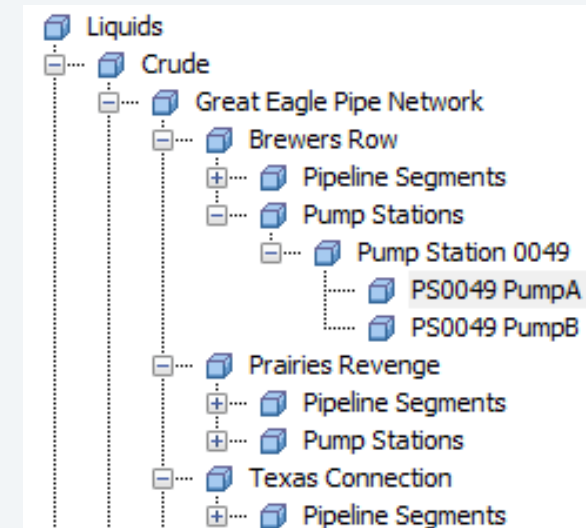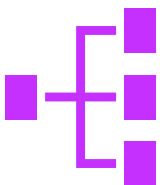
- Liquids
  - Crude
    - Great Eagle Pipe Network
      - Brewers Row
        - Pipeline Segments
        - Pump Stations
          - Pump Station 0049
            - PS0049 PumpA
            - PS0049 PumpB
      - Prairies Revenge
        - Pipeline Segments
        - Pump Stations
      - Texas Connection
        - Pipeline Segments

Converting Raw Data to Decision-Ready Information

Reliable Storage

Contextualization

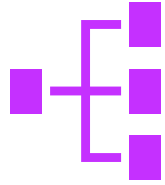**Quality Checks**

Intermediate Aggregations and KPI Generation

Filtering and Conditions

Bring data from external sources to support Calculations

- **From Maintenance Systems:**
  - Last Installation/Service Dates
  - Manufacturer/Model
- **Location information for GIS Integration**
  - Latitude/Longitude/GIS coordinates for complex shapes
- **Specifications**
  - Rated parameters
  - Performance curves as tables

Category: Equipment		
Installation Date		12/31/2016 10:00:00 PM
Last Serviced Date		6/14/2020 3:00:00 PM
Location		Pump Station 0049
Manufacturer		Bravo
Model		BoostPlus
Name		PS0049 PumpA
Pump Milepost		49
Rated Power		2500 hp
Serial Number		47306-89436

Converting Raw Data to Decision-Ready Information

Reliable Storage

Contextualization

Quality Checks

Intermediate Aggregations and KPI Generation

Filtering and Conditions

- Easy-to-use interface and a rich set of built-in functions

- Migrate equations from Excel or other tools

- Templatize and roll out calculations across multiple assets in bulk

- Backfill calculation results as far back as you have source data

- Gross error detection

- Limit comparison
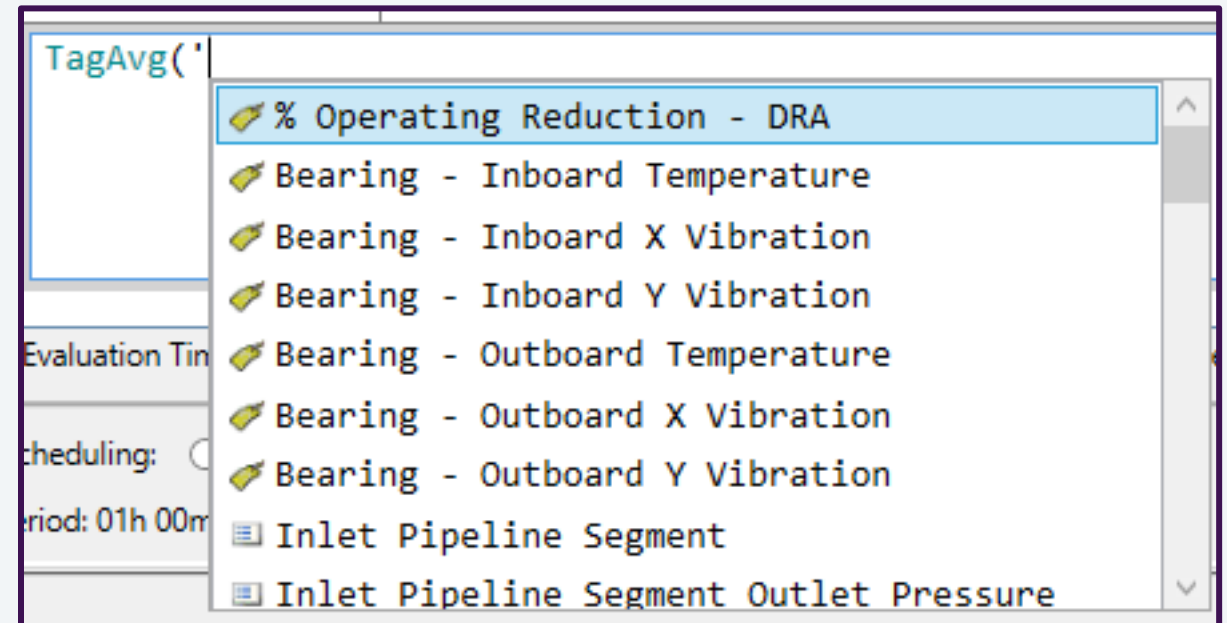

```
TagAvg('|
```

| % Operating Reduction - DRA |
| Bearing - Inboard Temperature |
| Bearing - Inboard X Vibration |
| Bearing - Inboard Y Vibration |
| Bearing - Outboard Temperature |
| Bearing - Outboard X Vibration |
| Bearing - Outboard Y Vibration |
| Inlet Pipeline Segment |
| Inlet Pipeline Segment Outlet Pressure |

Evaluation Tim

cheduling:

riod: 01h 00m

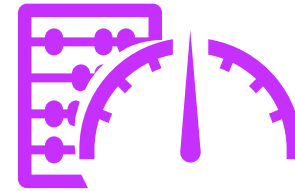# Converting Raw Data to Decision-Ready Information
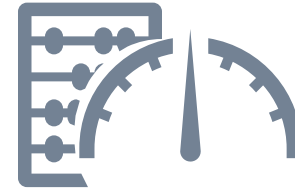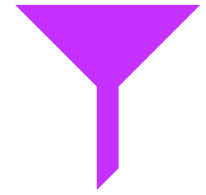
Reliable Storage   **Contextualization**   **Quality Checks**   **Intermediate Aggregations and KPI Generation**   **Filtering and Conditions**

- Specify Trigger logic to track:
  - Anomalies, Failures, KPI change
  - Downtime
  - Repeating Events: Startups, Shifts
- Measure KPIs over duration of events

Name	Expression
⊟ Variables	
InTemp	'Bearing - Inboard Temperature'>'Bearing - Inboard Temperature|Hi'
OutTemp	'Bearing - Outboard Temperature'>'Bearing - Outboard Temperature|Hi'
⊟ Start triggers	
Bearing Temperature	if InTemp or OutTemp then true else false

Risks of not having reliable data

- Lack of trust from end users

- Risk of making wrong decisions

- Increased time to value

- Lost opportunities for optimization and innovation

- Lack of flexibility to market dynamics

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Demo

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Execution and Success Stories

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Leverage a holistic portfolio purpose-built for industry

Connected industrial economy

Convergence
IT/OT/ET

ENTERPRISE VISUALIZATION

3rd party ERP, CRM, PLM

Applications and analytics

SIMULATION & LEARNING	ENGINEERING & EXECUTION	PRODUCTION OPTIMIZATION	ASSET PERFORMANCE	SUPPLY CHAIN	DATA SHARING

3rd-party applications and analytics

Information management

ENGINEERING INFORMATION	OPERATIONS INFORMATION

3rd-party systems and databases

Automation integration and control

OPERATIONS CONTROL	3rd-party sensor data & other data sources

SCADA   *MMS*   *Historian*

PLCs   *DCSs*   *Edge/IIOT*

Digital Transformation: Our Program and Practice approach

People

Process

Devices

Data

Apps

Workshop + BVC	Use cases and Priority + Industry Template	Initial Project Scope Selection	Feedback and Success Criteria	Roll out

New Applications

New use cases
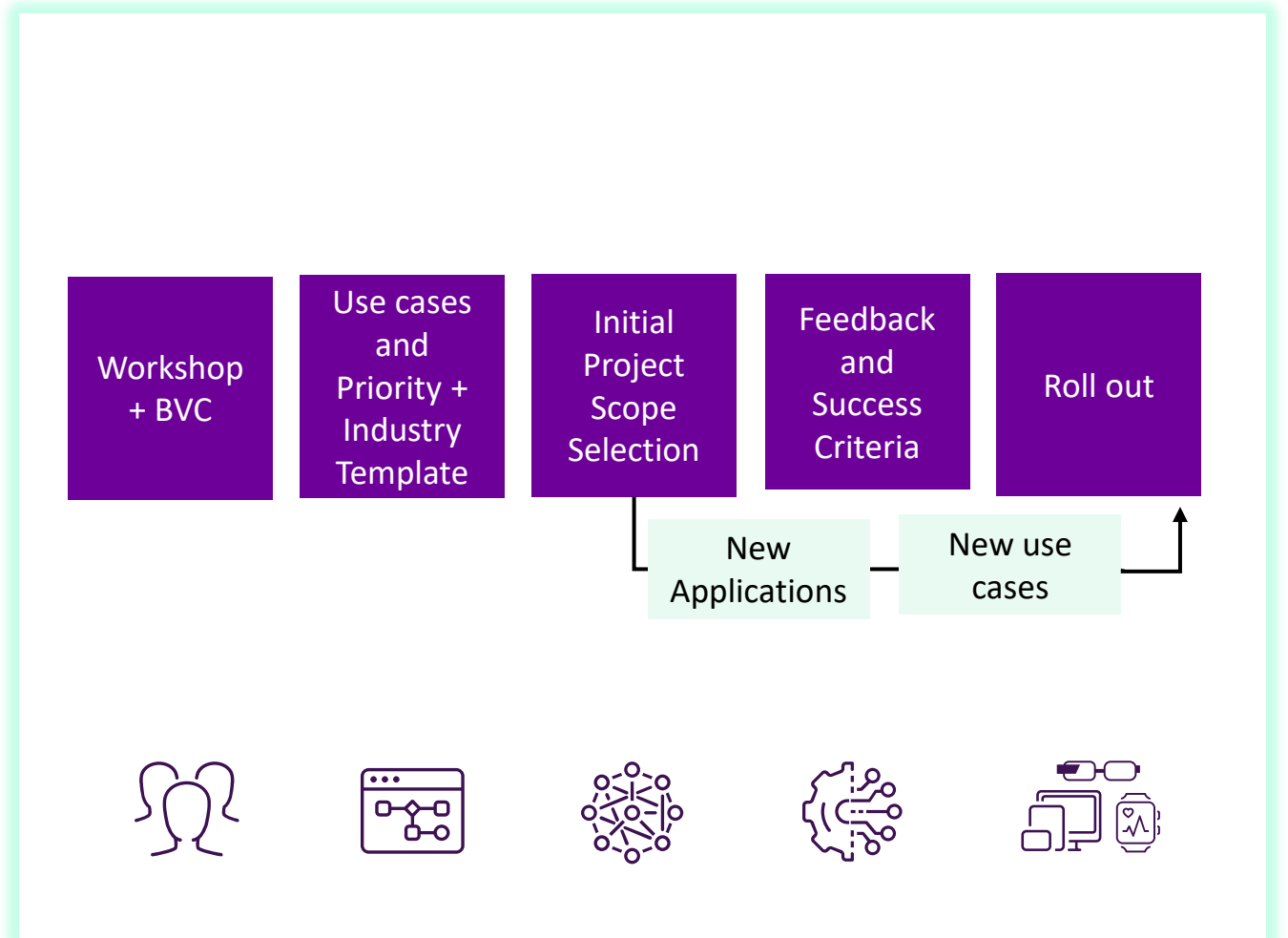
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System of Systems Approach

Hardware
Agnostic, Industrial, Connected, Smart

Comm
Local, Wide, Public Network, Private Network, High-Speed, Low Bandwidth

OT Connectors
200+ Library of Industrial Protocols

Unified Operations Center | Digital Twin
OT\IT Convergence Platform, Single Pane Solution; System of System Architecture.

UOC Core Platform
*Standardization, Convergence, Contextualization.
Collect, Process, Historize and Visualize Real-Time Data, KPIs, and Command\Control. Industry Content Libraries. Alarm Management.*

Engineering

Engineering design 1D, 2D, and 3D information.

Performance

Asset Management. Predictive Analytics and Condition Based Monitoring.

Operations

Local, Regional, Enterprise-wide Visualization. Single-Site, Multi-Site, Command & Control

Software
Industrial, Financial, Data Storage, On-Premise, Cloud Hosted, Private Cloud

IT Connectors
Internet Protocol and 160+ Plugins

PI Server
Data Archive, Asset Framework

PI Vision / Aveva Insight
Web and Mobile visualization for ad-hoc experience

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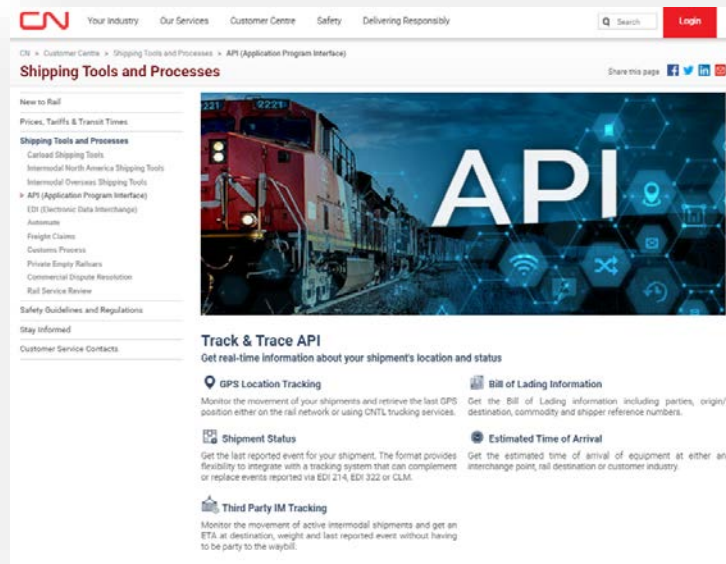
OT & IT Connectors | APIs

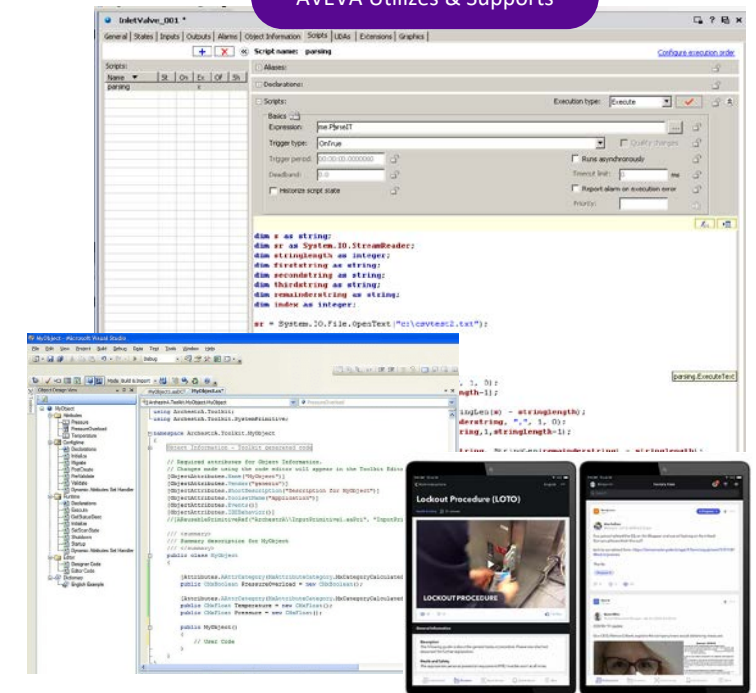## Open Platform, Web Services, Integration Through APIs

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3rd Party APIs

AVEVA Utilizes & Supports

Nutrien

Improved efficiency using operational data and insight from the PI System and AVEVA Unified Operations Center

Real-time data empowers the team to proactively troubleshoot and problem solve operational challenges in nitrate production

Better cross-team collaboration using shared data

Streamlined data-transfer between teams and plants

Abu Dhabi National Oil Company (ADNOC) implemented the Panorama Command Center

Early savings of $80M per run from value chain optimization

Improved visibility for faster decision making

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Saudi Aramco remotely implemented AVEVA Unified Operations Center

Early value chain optimization using 3D engineering model

Improved visibility for faster decision making

Installation completed remotely securely & to time, during lockdown

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