

NOVEMBER 2022

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# The Roadmap to Operational Excellence

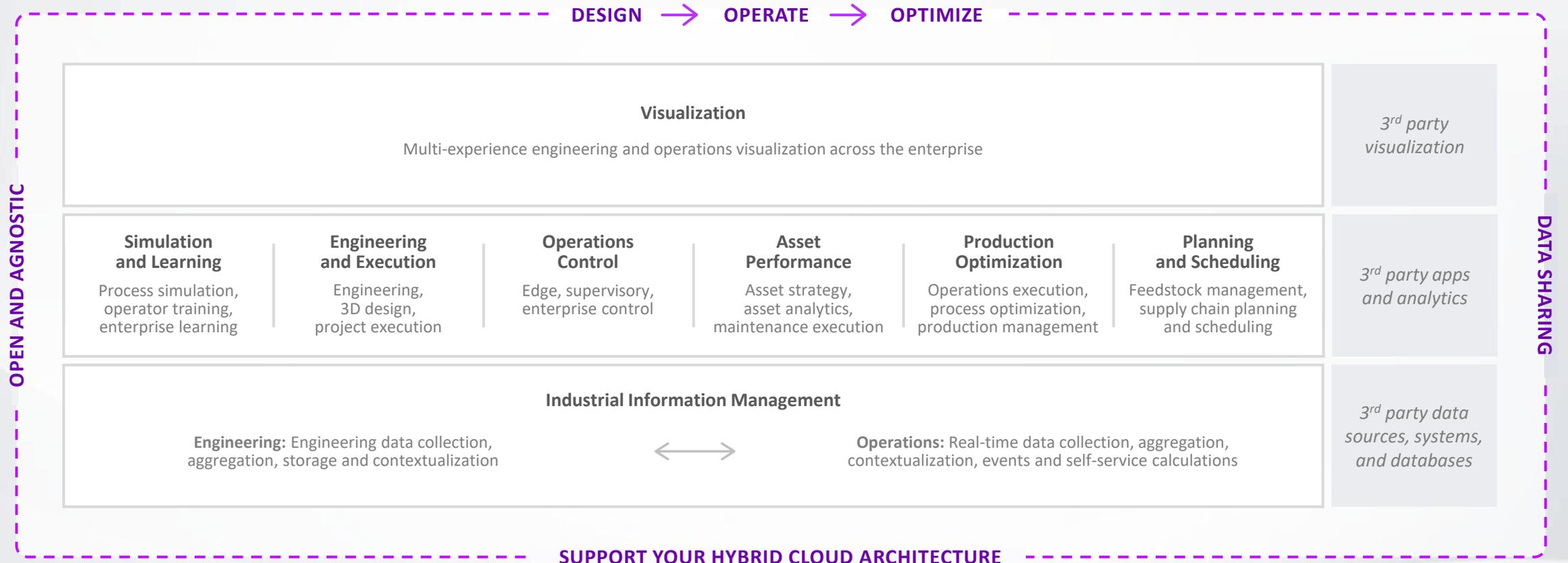
# AVEVA™ PI System™

Brian Bostwick, VP Portfolio Management, Operations

**AVEVA**

# Delivering a complete digital thread, purpose-built for industry

Accelerate time to value with flexible, scalable, and trusted industrial hybrid SaaS solutions



# Delivering a complete digital thread, purpose-built for industry

Accelerate time to value with flexible, scalable, and trusted industrial hybrid SaaS solutions

DESIGN → OPERATE → OPTIMIZE

## Industrial Information Management

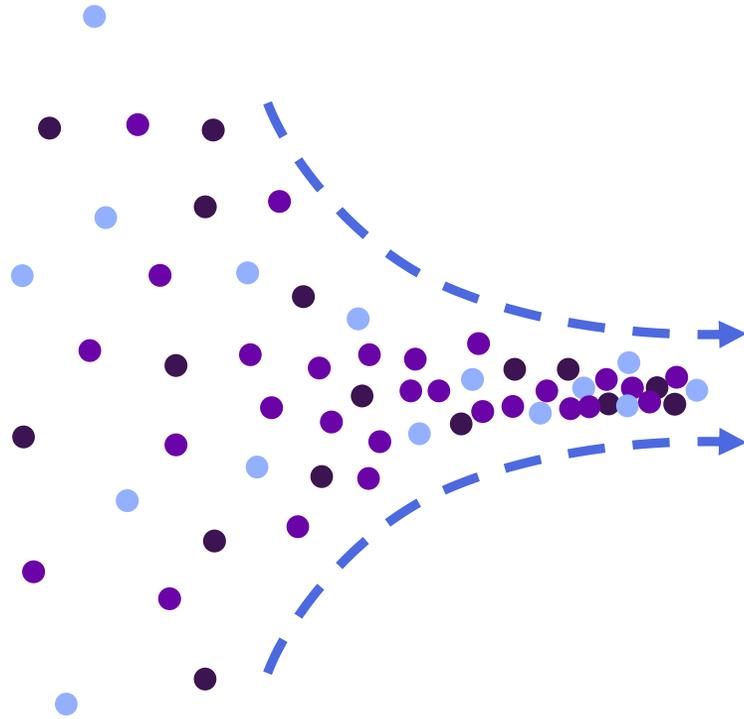
**Operations:** Real-time data collection, aggregation, contextualization, events and self-service calculations

OPEN AND AGNOSTIC

DATA SHARING

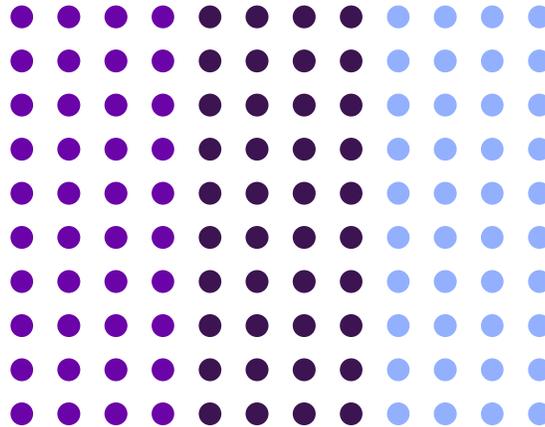
SUPPORT YOUR HYBRID CLOUD ARCHITECTURE

# AVEVA PI System, from data to intelligence



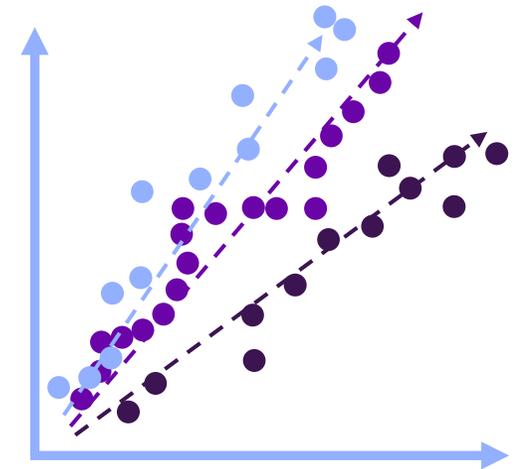
## Data

Raw data points,  
difficult to interpret



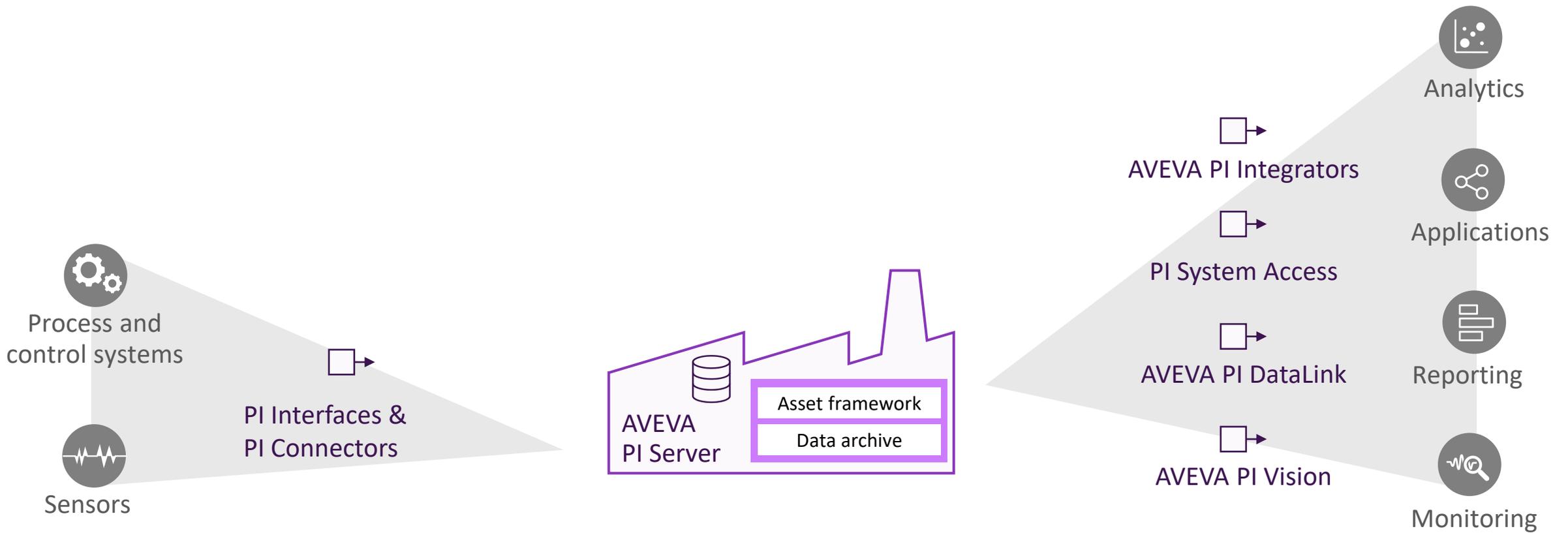
## Information

Contextualized, real-time  
decision support



## Intelligence

Business/operation  
analytics



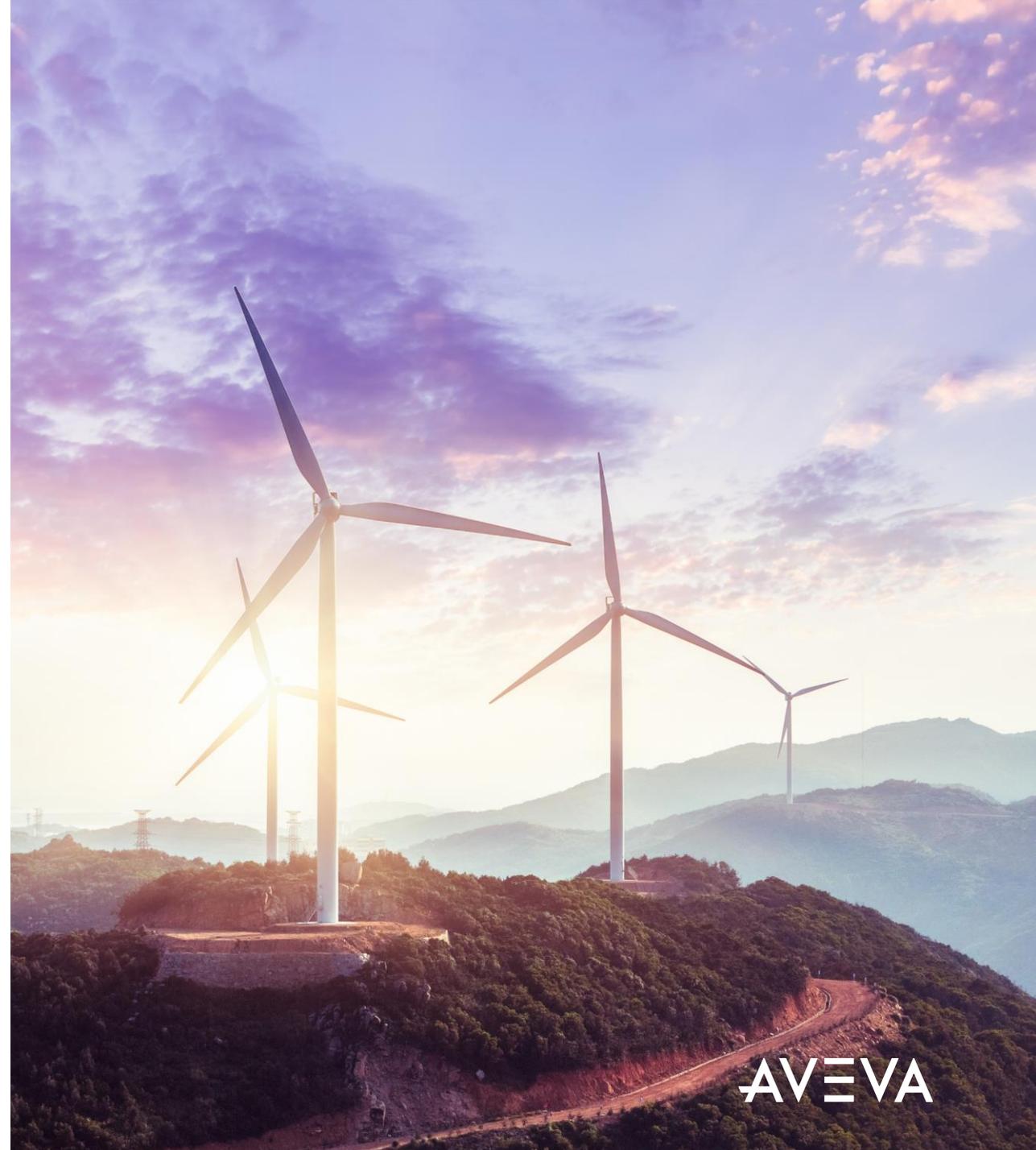
AVEVA PI System: collect, enrich, visualize

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# Roadmap themes

## AVEVA PI System information management

- Seamless infrastructure from edge to cloud
- Manageable software and systems
- Increased value and scope of data



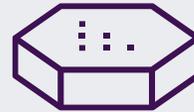
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# Seamless data infrastructure, to the edge

## Challenges at the edge



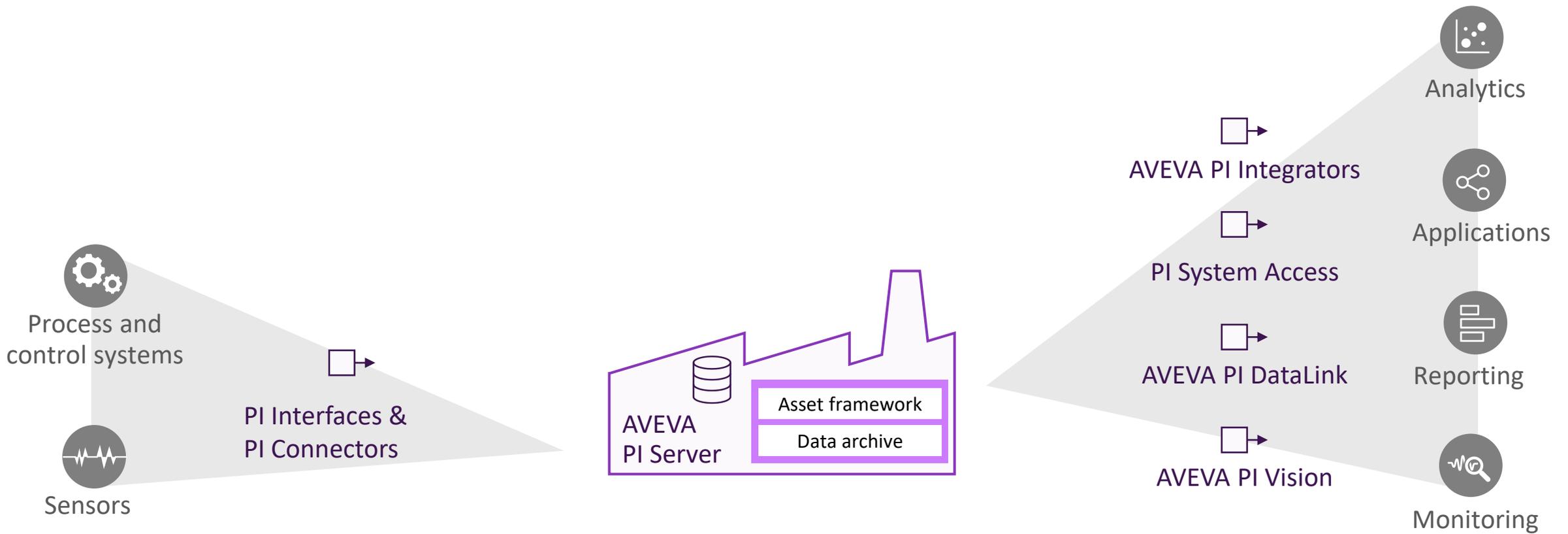
**Data from remote  
sources**



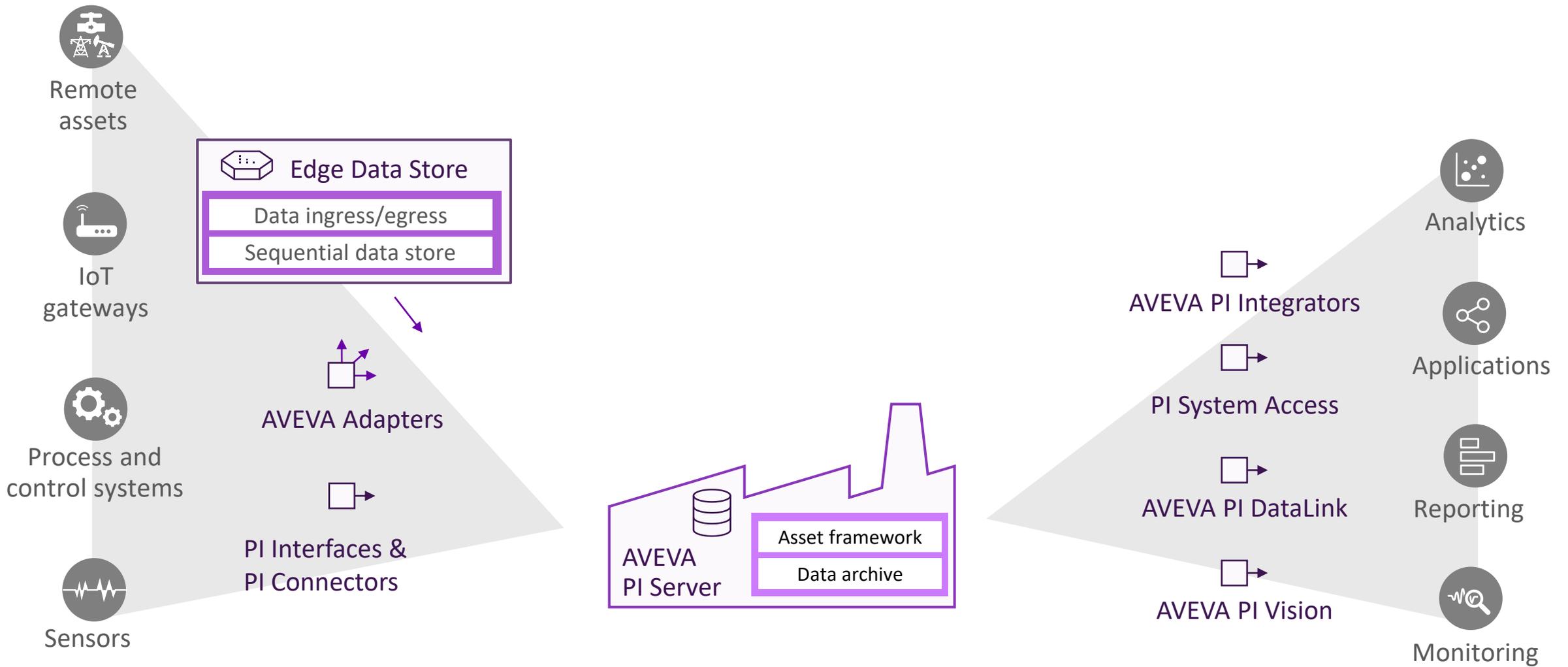
**Local history  
for applications**



**Linux or Windows  
platform**



# AVEVA PI System: extending at the edge



# AVEVA PI System: extending at the edge

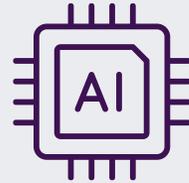
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# Seamless data infrastructure, to the cloud.

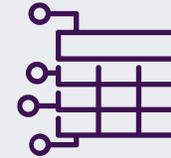
Challenges from innovative uses of data



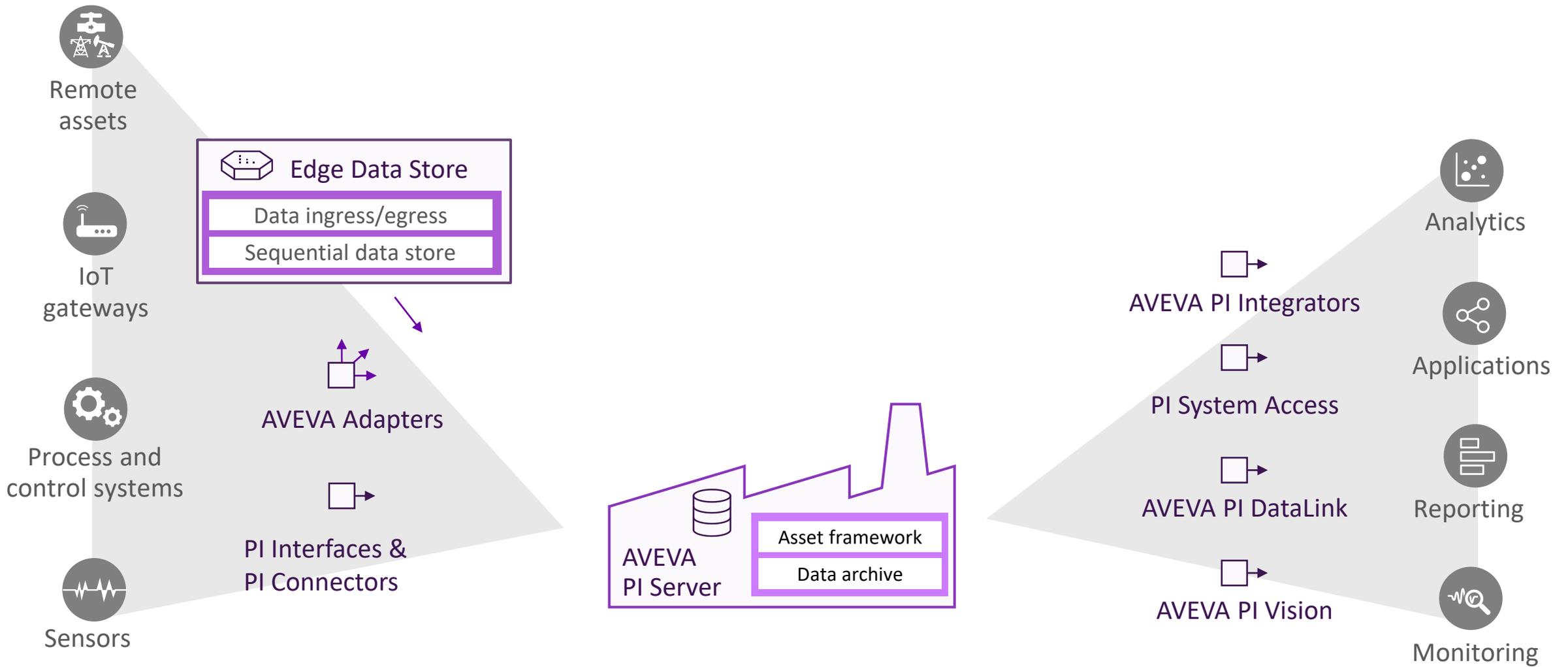
**Business  
Intelligence**



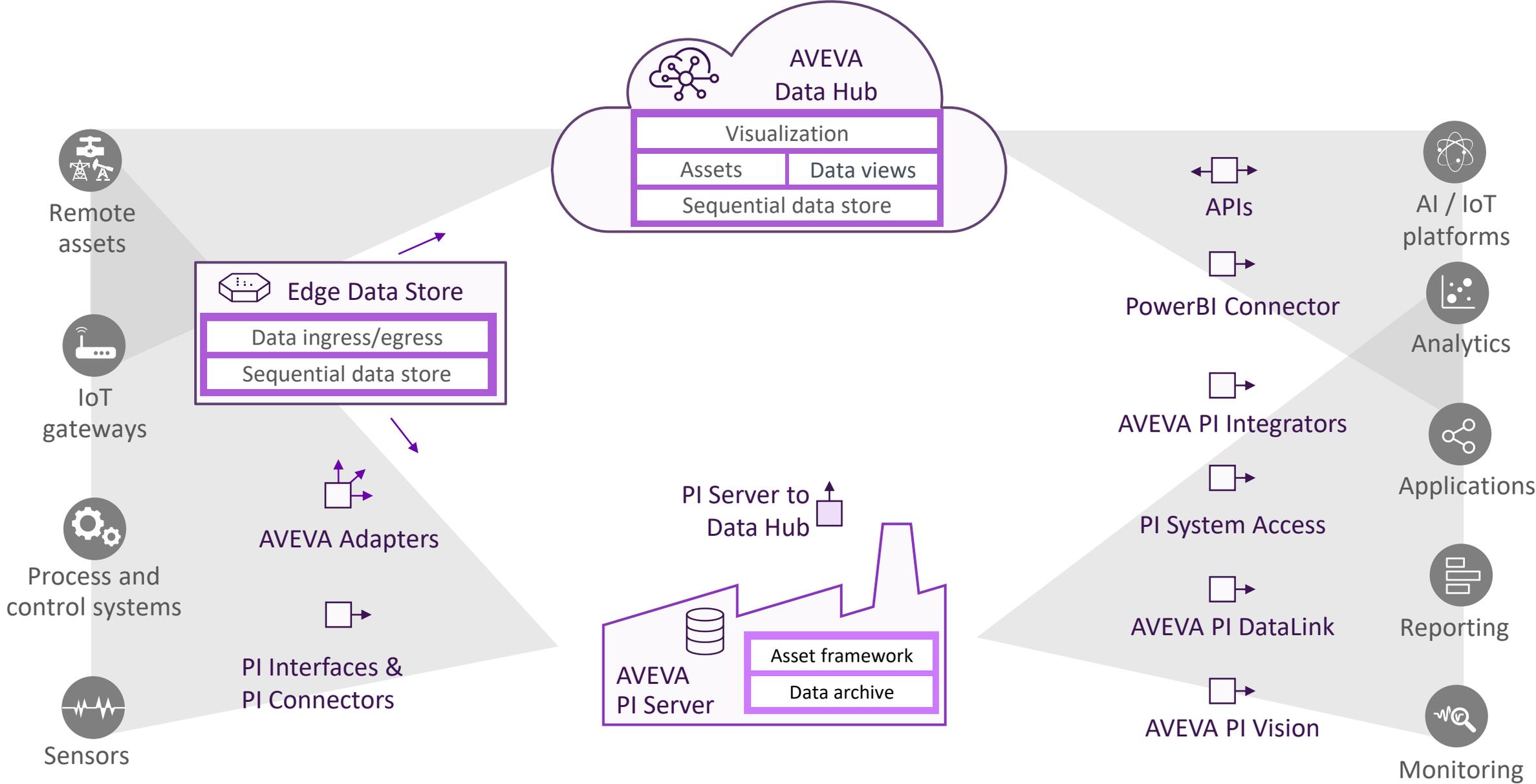
**Advanced  
analytics**



**Shared  
data sets**



# AVEVA PI System: extending to the cloud



# AVEVA PI System: extending to the cloud

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# Increased scope and value of data

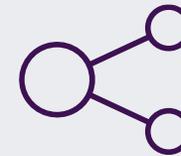
Challenges with analyzing and sharing more data



**Self service  
analytics**

$f(x)$

**Context  
and calculations**



**Data shared  
with context**

# Experiment with PI Tag and PI AF expressions with AVEVA PI Vision ad-hoc calculations

The image displays the AVEVA PI Vision interface. On the left, the 'Calculation Editor' window is open, showing the configuration for a calculation named 'Total Flow'. The description is 'Sum of Control Valve Flows'. The server is 'dfpiserverstst.osisoft.ext'. The expression is `'FC-010.FL.PV' + 'FC-011.FL.PV' + 'FC-012.FL.PV'`. The 'Preview' button shows a value of 2,680. The 'Advanced Options' section includes 'Time Interval' set to 'Auto', 'Total Conversion Factor' set to 1, and 'Stepped Plot' checked. The main interface shows a process flow diagram for 'Unit 3-1415' with various control valves (FC-009, FC-010, FC-011, FC-012) and flow meters (LC-780, P-24/09A). A graph titled 'Flow Control Valve Readings' shows the values of FC-010, FC-011, and FC-012. A 'Total Flow, gpm' tag is highlighted with a value of 2,680, which is linked to the 'Preview' button in the Calculation Editor. A zoomed-in view of the 'Total Flow, gpm' tag shows a stepped plot of the calculation results over time.

# Diagnose PI AF analytics performance and bottlenecks

The screenshot displays the Performance tab of the PI System Explorer. It features several key performance indicators (KPIs) and a detailed table of analysis elements.

**Service Startup Time:** 5m 32s 77ms

**Calculations per Second:** 117 calc/s

**Skipped Calculations:** 85,036

**Max. Calculation Lag:** 21s 163ms

**Highest Trigger Ratio:** 0.04351 (Data Regeneration)

**Table of Analysis Elements:**

Element Template	Group Name	AF Database	Group Trigger Ratio	Impact Score	Schedule	Slip Count	Success Count	Error Count	Average Elapse
EQT Well Completion Template	Data Regeneration	Petrolux Demo Sandbox	0.04	0.26	Periodic(Frequency=2)	0	410218	0	0
_NCTR_Compressor_Base_Template	Run Hour Calculation	MidstreamUserGroup2	0.02	0.10	Natural	0	13674	0	1
_NCTR_Compressor_Base_Template	Run Hour Calculation	MidstreamUG	0.02	0.10	Natural	0	13674	0	1
_NCTR_Driver_Base_Template	Run Hour Calculation	MidstreamUG	0.02	0.10	Natural	0	13674	0	1
_NCTR_Driver_Base_Template	Run Hour Calculation	MidstreamUserGroup2	0.02	0.09	Natural	0	13674	0	1
Compressor Skid Gas Driven	Health Index Ex	MidstreamSB	0.01	0.04	Periodic(Frequency=300)	0	2734	0	4
StairWAC	MaxValOffTopFault	AKZ	0.01	0.01	Periodic(Frequency=300)	0	2734	0	4
CC zone - current Exit = next Entry	01 Entry Slab IN - triggered by Slab IN trigger	Metals and Mining	0.01	0.08	Natural	0	275724	0	0
Windtopia Wind Turbine	EAF	TJCVindDemo	0.01	0.03	Periodic(Frequency=60)	0	13674	0	0
GenerationUnit	Systems Percentage	HydroPowerGeneration	0.01	0.03	Periodic(Frequency=15)	0	54695	0	0
GenerationUnit	Systems Percentage	Asset Based PI Example Kit - Hydro Plant Monitoring	0.01	0.03	Periodic(Frequency=15)	0	54695	0	0
CC orphaned zone	01 Exit Slab IN - triggered by Slab IN trigger	Metals and Mining	0.00	0.00	Natural	0	275724	0	0
GenerationUnit	Systems Percentage	Hydro Plant Demo for MISO	0.00	0.00	Periodic(Frequency=15)	0	54695	0	0
CC orphaned zone	01 Entry Slab IN - triggered by Slab IN trigger	Metals and Mining	0.00	0.00	Natural	0	275724	0	0
Windtopia Wind Turbine	Revenue Loss Aggregation	TJCVindDemo	0.00	0.01	Natural	0	268949	0	0
HydroUnit	Countdown Timer	Hydro Plant Demo for MISO	0.00	0.00	Periodic(Frequency=5)	0	164087	0	0
Paper Machine	Current Production	Sandbox	0.00	0.00	Natural	0	13731	0	0
Unit	Running State	IndustrialDigitalPlant	0.00	0.03	Natural	0	13732	0	0
PFSD Well	Analysis Template216	Sandbox	0.00	0.07	Periodic(Frequency=600)	0	1367	0	0
Paper Machine	Paper Break	Sandbox	0.00	0.00	Periodic(Frequency=60)	0	13674	0	0
EQT Well Completion Template	Data Regeneration Wireline	Petrolux Demo Sandbox	0.00	0.00	Periodic(Frequency=20)	0	41022	0	0
PFSD Storage Tank	Capacity	Sandbox	0.00	0.00	Periodic(Frequency=60)	0	13674	0	0
_NCTR_Electric_Driver	Run Hours per Day	MidstreamUserGroup2	0.00	0.01	Natural	0	13674	0	0
PFSD Storage Tank	Level	Sandbox	0.00	0.00	Periodic(Frequency=60)	0	13674	0	0
Windtopia Wind Turbine	Revenue Loss Aggregation	WaterT3C	0.00	0.00	Natural	0	118195	0	0
Unit	Down State	IndustrialDigitalPlant	0.00	0.02	Natural	0	13712	0	0
Continuous Caster simulation	04 Slab Internal Number - cycle is	Metals and Mining	0.00	0.00	Periodic(Frequency=1)	0	820435	0	0
EQT Well Completion Template	24-Hour Pump Uptime	Petrolux Demo Sandbox	0.00	0.00	Periodic(Frequency=1800)	0	496	0	1
_NCTR_Electric_Driver	Run Hours per Day	MidstreamUG	0.00	0.00	Natural	0	13674	0	0
Unit	Mode	Sandbox	0.00	0.04	Natural	0	13674	0	0
Unit	Trouble State	Universal Digital Plant	0.00	0.00	Natural	0	13684	0	0
Unit	Clock	Sandbox	0.00	0.03	Periodic(Frequency=60)	0	13674	0	0
DGA XFMR NoLTC	Analysis Template18	Mknex - PHM Workshop	0.00	0.00	Natural	0	7266	0	0
Pump	Run Times	WaterT3C	0.00	0.00	Periodic(Frequency=900)	0	912	0	0
None	NoneLoadSheddingSupported	BkartiKayan_Test	0.00	0.00	Periodic(Frequency=300)	0	2734	0	0
CC zone	02 SdABN_05d	Metals and Mining	0.00	0.00	Natural	0	1224637	0	0
Unit	Trouble State	IndustrialDigitalPlant	0.00	0.01	Natural	0	13712	0	0
Unit	Maintenance State	IndustrialDigitalPlant	0.00	0.01	Natural	0	13712	0	0
CC zone	02 SdABN_05en	Metals and Mining	0.00	0.00	Natural	0	1224641	0	0
Unit	Down State	Universal Digital Plant	0.00	0.00	Natural	0	13684	0	0
Unit	Running State	Universal Digital Plant	0.00	0.00	Natural	0	13684	0	0
Windtopia Wind Farm Template	Forecast Daily Revenue +15m	TJCVindDemo	0.00	0.00	Periodic(Frequency=60)	0	13674	0	0
Windtopia Wind Farm Template	Forecast Power +15m	TJCVindDemo	0.00	0.00	Periodic(Frequency=60)	0	13674	0	0
Windtopia Wind Farm Template	Forecast Power +15m	WaterT3C	0.00	0.00	Periodic(Frequency=60)	0	13674	0	0
Windtopia Wind Farm Template	Forecast Daily Revenue +1h	TJCVindDemo	0.00	0.00	Periodic(Frequency=60)	0	13674	0	0
Asset_Type_ABC	Analysis Template	WaterT3C	0.00	0.00	Natural	0	23957	0	0
Asset_Type_XYZ	Analysis Template	Mknex Test Example - Single EF Template for multiple Element Templates	0.00	0.00	Natural	0	23957	0	0
Asset_Type_XYZ	Analysis Template	Mknex Test Example - Single EF Template for multiple Element Templates	0.00	0.00	Natural	0	23957	0	0

# Replicate AF Elements to AVEVA Data Hub with PI to Data Hub

The image displays two software interfaces side-by-side. On the left is the 'PI System Explorer (Administrator)' window, showing a hierarchical tree of elements under 'Plant' with sub-elements like 'Line 1', 'Line 2', and 'Line 3', each containing 'Inlet Pump', 'Outlet Pump', and 'Reactor'. On the right is the 'AVEVA™ Data Hub Asset Explorer' window, which is open to the 'Inlet Pump' asset. The 'Filter' panel shows a search for 'inlet\*' and a list of assets including 'Inlet Pump'. The 'Properties' tab is active, showing a table of asset properties:

Property	Last Value	UOM	Timestamp
<input checked="" type="checkbox"/> Bearing Temperature   Value	170.902		10/10/22, 4:30 PM
<input type="checkbox"/> Flow Rate   Value	454.173		10/10/22, 4:30 PM
<input type="checkbox"/> OnOff   Value	0.726		10/10/22, 4:00 PM
<input type="checkbox"/> Reason Code   Value	Unknown		10/10/22, 9:35 AM

Below the table is a line chart for 'Bearing Temperature | Value' showing a fluctuating blue line over a time period from 09 AM to 04 PM. The y-axis ranges from -20 to 200. Navigation controls for the chart include 'Last 8 hours' and search icons.

# Manageable software, security and reliability

## Challenges on premises



**Cyber security**



**Evolving  
IT landscape**

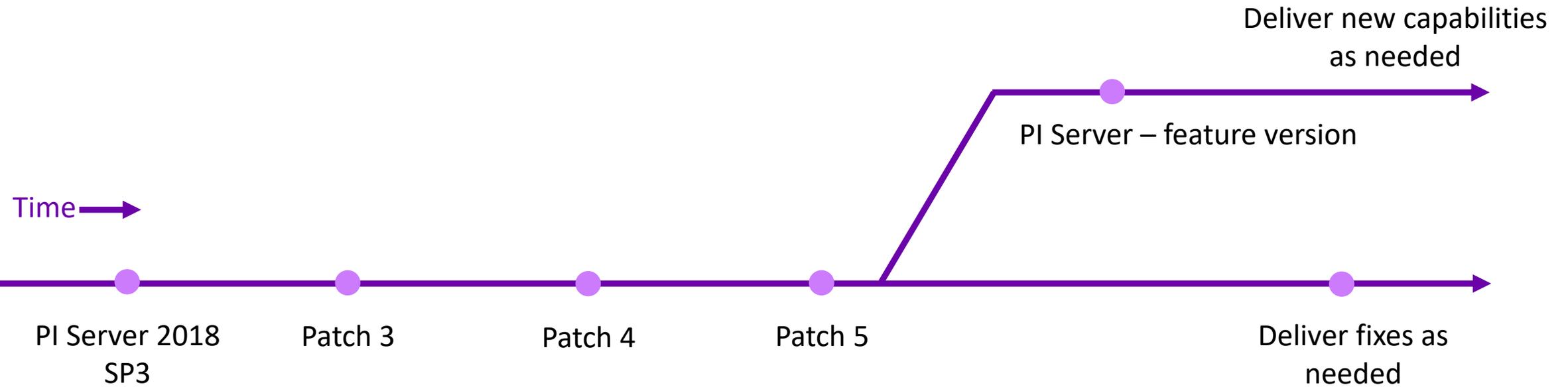


**Validate  
new releases**

# The AVEVA PI Server



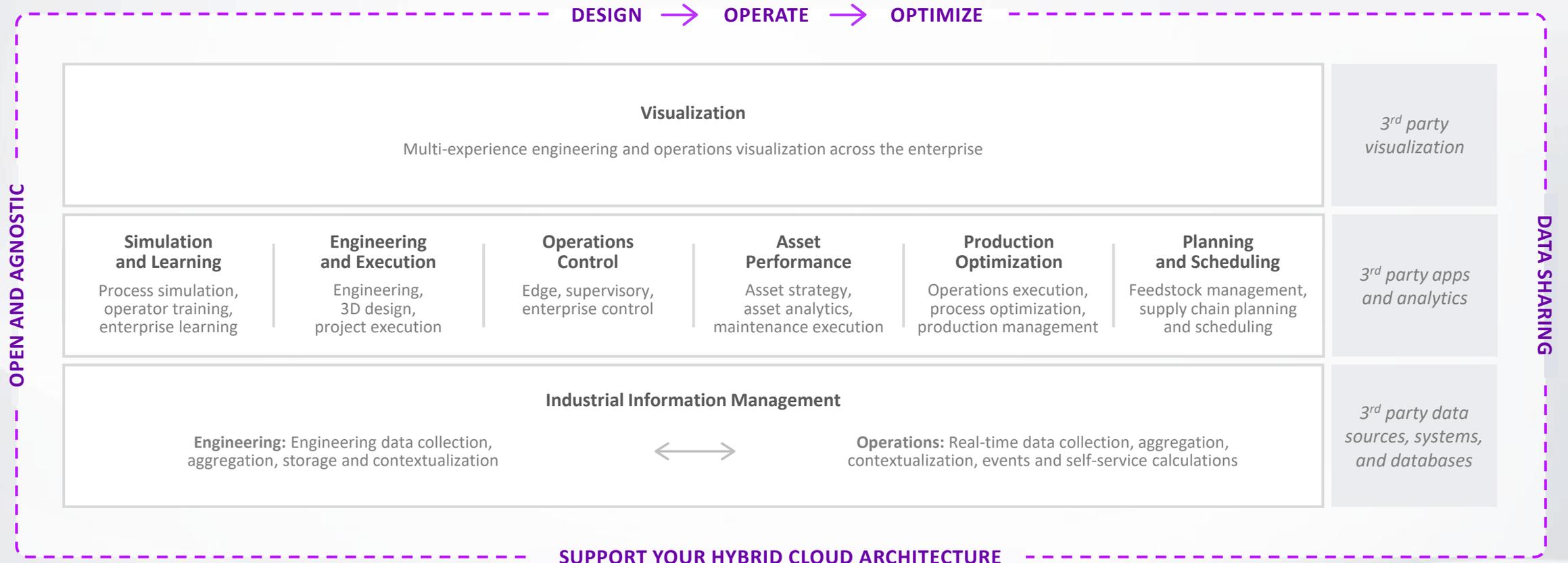
Modern authentication



Critical fixes over time

# Delivering a complete digital thread, purpose-built for industry

Accelerate time to value with flexible, scalable, and trusted industrial hybrid SaaS solutions



# AVEVA Mobile Operator manually collects & validates data

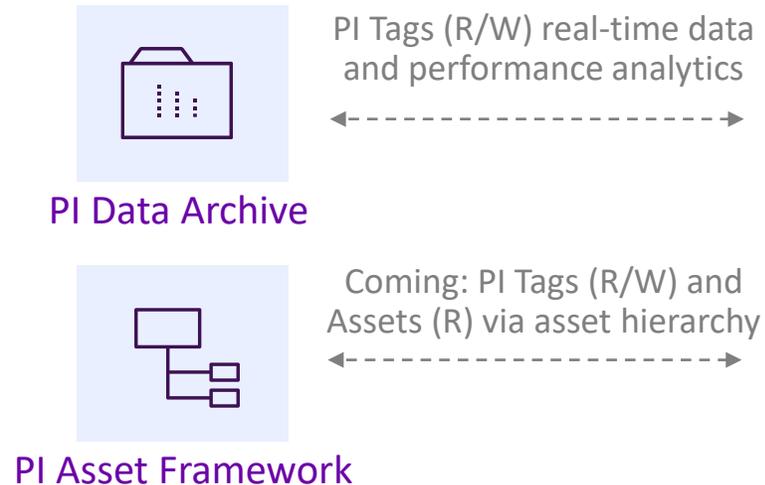
The image displays three overlapping screenshots from the AVEVA ecosystem:

- Management Center (Left):** A web-based interface with a navigation menu on the left. The main area shows a workflow for "Haul Truck 101" with steps like "If Defective and Not Safe to Use", "Conditional Truck Health Check", and "Get From PI AssetHealth Result". A task "Get From PI AssetHealth Result" is highlighted, showing a reading of 452.973.
- Mobile App (Center):** A smartphone screen showing a "Blower #2" inspection checklist. The checklist includes items like "Record the blower inlet vacuum" and "Record the blower flow rate". A numeric keypad is visible at the bottom of the screen.
- PI Vision Dashboard (Right):** A real-time monitoring dashboard for "OSI MMM Co. Engine Exhaust Monitoring" for "Truck 101". It features several gauges and a line graph. Key data points include:
  - Coolant Temp: 90.636
  - Aftercooler Temp: 64.562
  - Left Exhaust Temp: 487.16
  - Right Exhaust Temp: 457.96
  - Delta Temp: 26.158The graph shows temperature trends over time, with the last inspection on 4/16/2022 at 11:13:49 AM.

# AVEVA Predictive Analytics & AVEVA PI Server

Combine PI Server data with AI and machine learning-driven insights for early warning detection

- Reduce downtime
- Minimize maintenance costs
- Prevent asset failure
- Extend asset/equipment life
- Improve safety
- ✓ **Optimize your asset management strategy**



AVEVA Predictive Analytics

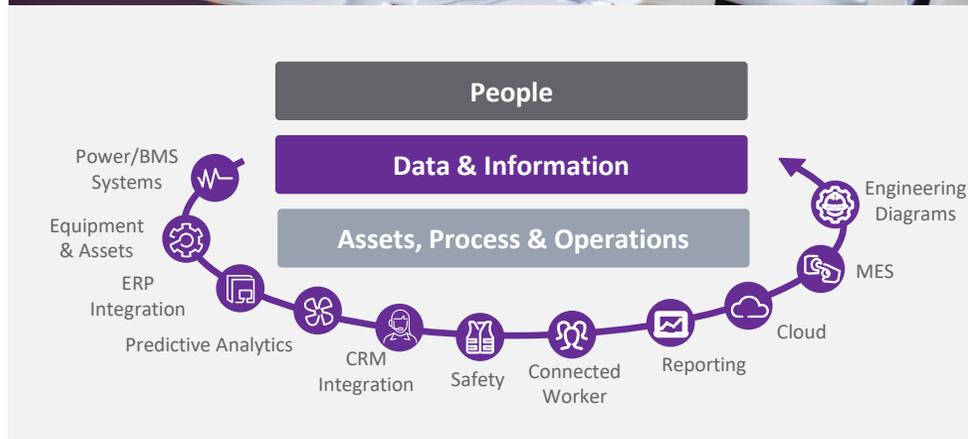
# AVEVA Unified Operations Center



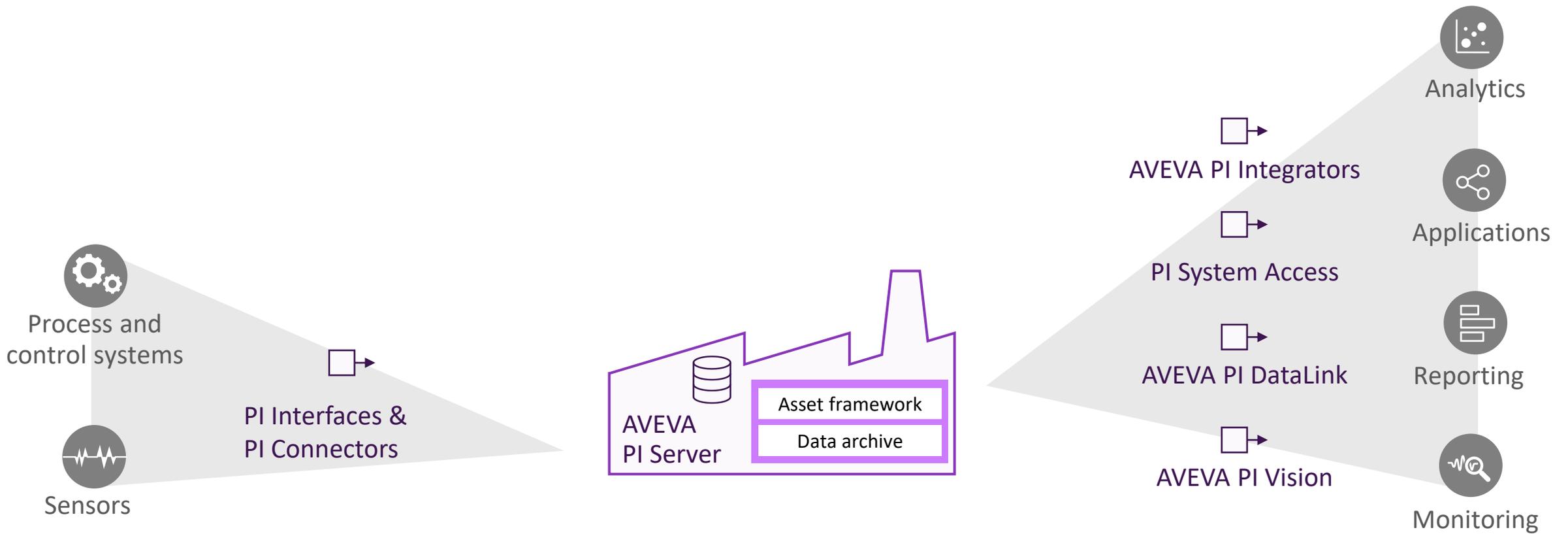
Mobile / Desktop / Wall

Powerful 3D diagrams

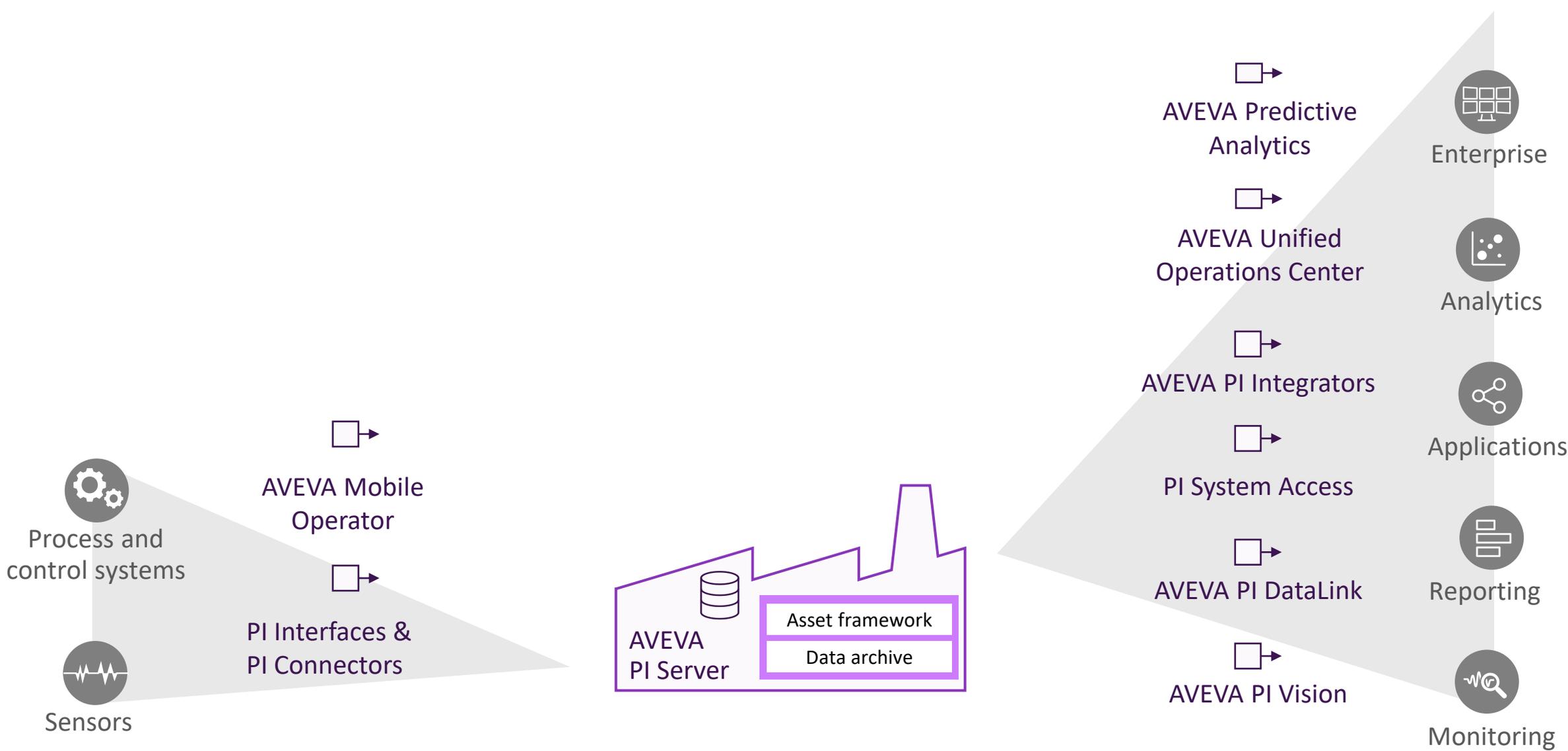
Contextually connected visuals



Show AVEVA PI Server data & AVEVA PI Vision displays in context

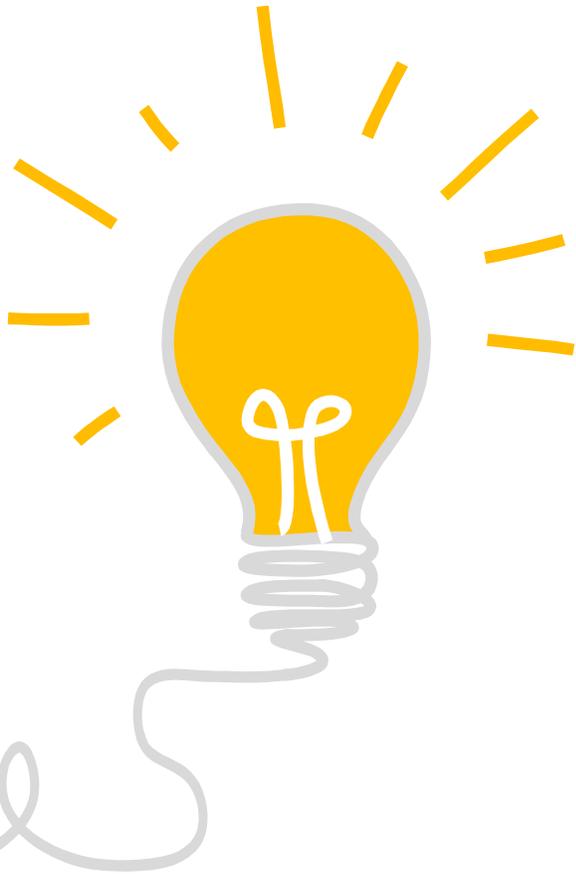


# AVEVA PI System: expanding capabilities



# AVEVA PI System: expanding capabilities

How can you influence the AVEVA PI System roadmap?



<https://feedback.aveva.com>

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Let us know your product feedback!



# Brian Bostwick

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AVEVA

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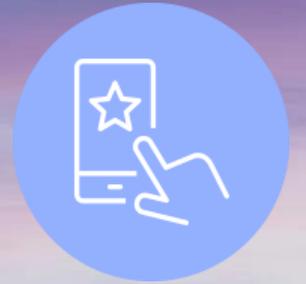
# Questions?

Please wait for the microphone.  
State your name and company.



# Please remember to...

Navigate to this session in the mobile app to complete the survey.



# Thank you!

This presentation may include predictions, estimates, intentions, beliefs and other statements that are or may be construed as being forward-looking. While these forward-looking statements represent our current judgment on what the future holds, they are subject to risks and uncertainties that could result in actual outcomes differing materially from those projected in these statements. No statement contained herein constitutes a commitment by AVEVA to perform any particular action or to deliver any particular product or product features. Readers are cautioned not to place undue reliance on these forward-looking statements, which reflect our opinions only as of the date of this presentation.

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#### ABOUT AVEVA

AVEVA is a global leader in industrial software, sparking ingenuity to drive responsible use of the world's resources. The company's secure industrial cloud platform and applications enable businesses to harness the power of their information and improve collaboration with customers, suppliers and partners.

Over 20,000 enterprises in over 100 countries rely on AVEVA to help them deliver life's essentials: safe and reliable energy, food, medicines, infrastructure and more. By connecting people with trusted information and AI-enriched insights, AVEVA enables teams to engineer efficiently and optimize operations, driving growth and sustainability.

Named as one of the world's most innovative companies, AVEVA supports customers with open solutions and the expertise of more than 6,400 employees, 5,000 partners and 5,700 certified developers. With operations around the globe, we are headquartered in Cambridge, UK and listed on the London Stock Exchange's FTSE 100.

Learn more at [www.aveva.com](https://www.aveva.com)