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OCTOBER 2024

Operations data analytics at cloud scale

Seamless integration of AVEVA™ PI System™ data with CONNECT data services

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Agenda

Operations data
analytics at cloud scale

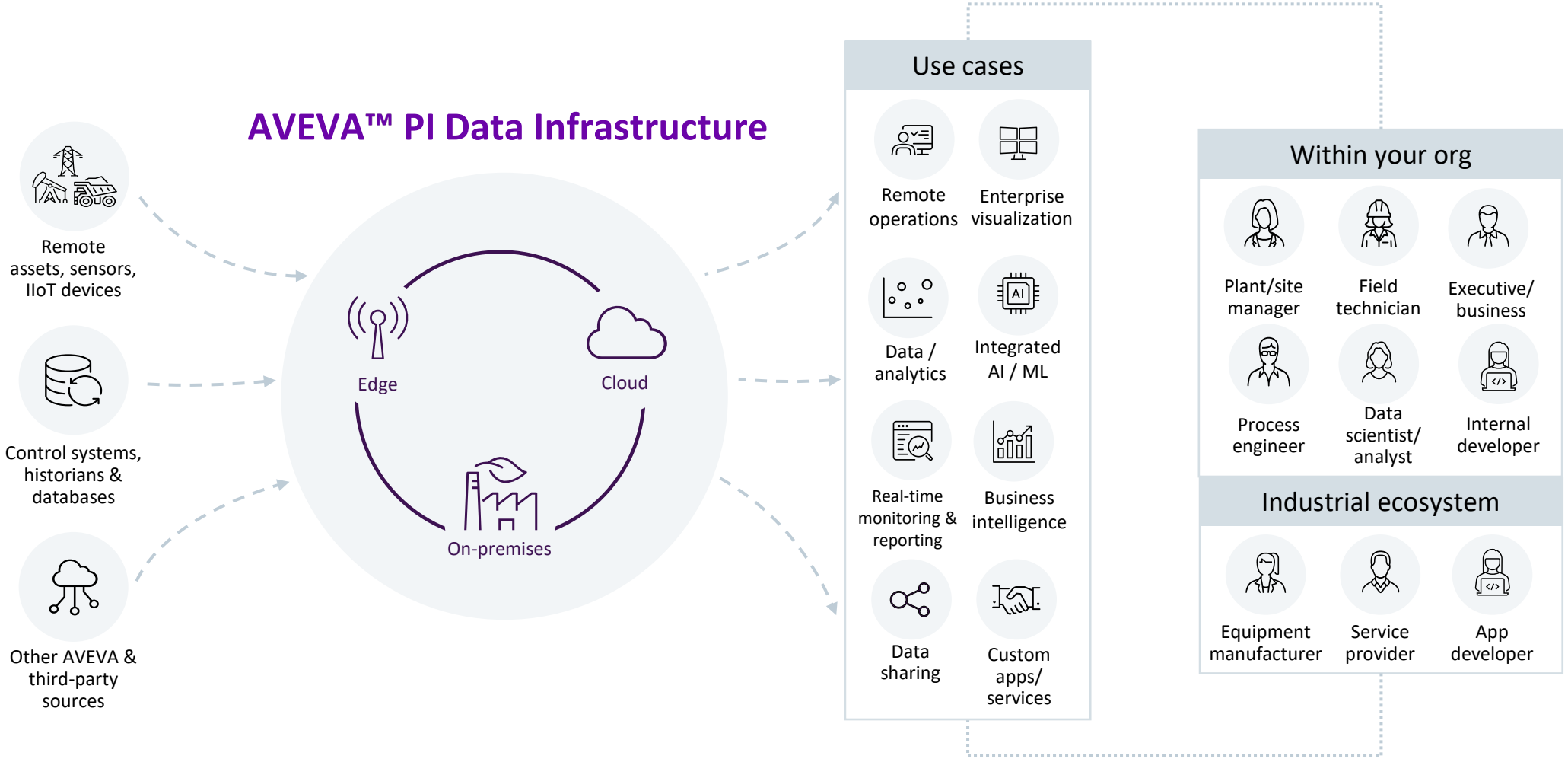
- Review the use of AVEVA™ PI Data Infrastructure as the integrated, hybrid solution for industrial data management
- Understand the multiple routes for performing advanced analytics with cloud-native CONNECT data services
- Transferring data between AVEVA™ PI Server and CONNECT
- Final thoughts

OPERATIONS DATA ANALYTICS AT CLOUD SCALE

AVEVA PI Data Infrastructure for industrial data management

Hybrid data infrastructure

From edge to plant to community



Windtopia’s data management journey with AVEVA

What is Windtopia doing today?

Monitoring wind farms

- On-premises AVEVA PI Server with data archive and asset framework
- PI connectors for data collection
- AVEVA™ PI Vision™ dashboards
- Increasing scale and scope over time

Windtopia's continued journey

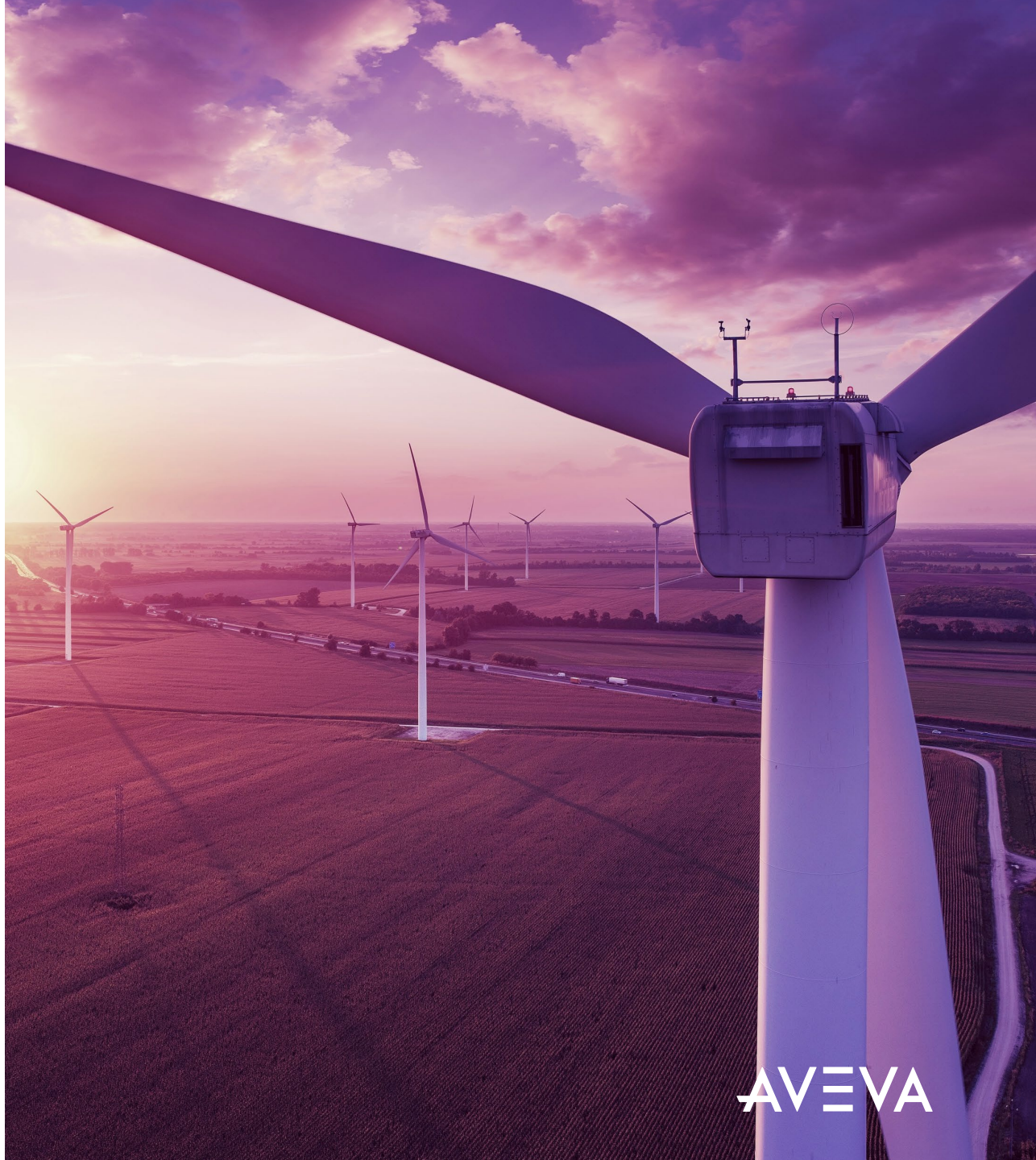
How can Windtopia prepare for the future?

Keep up with the industry trends
(ML, AI, Analytics, Cloud)

Increase data-driven decisions

Create analytics to predict potential problems

How can Windtopia leverage
AVEVA PI System to meet its goals?



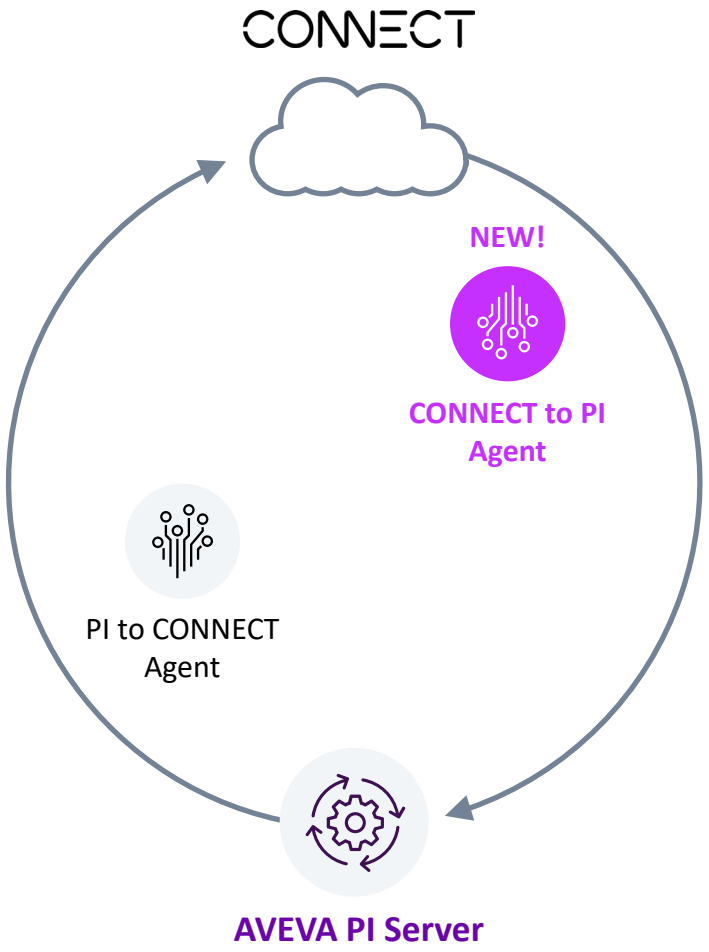
AVEVA PI Data Infrastructure has become more flexible

Over the past year…

- In October 2023, AVEVA PI Data Infrastructure—an integrated hybrid solution—was introduced.
- This hybrid solution allows companies to easily move data from AVEVA PI Server on-premises to CONNECT in the cloud:
  - Aggregate data from smart IIoT assets and multiple sites in a central location
  - Make aggregated data available for advanced analysis
  - Provide data access to authorized users in any location via the internet
  - Share real-time data with business partners and service providers
- But… how to bring cloud data into AVEVA PI Server ?

CONNECT to PI Agent is now available

Replicate data streams from CONNECT in AVEVA PI Server, serving advanced analytics scenarios



- Why go from PI Server to CONNECT ?
- Why go back from CONNECT to PI Server ?
- How to use CONNECT-to-PI Agent ?
- Demo

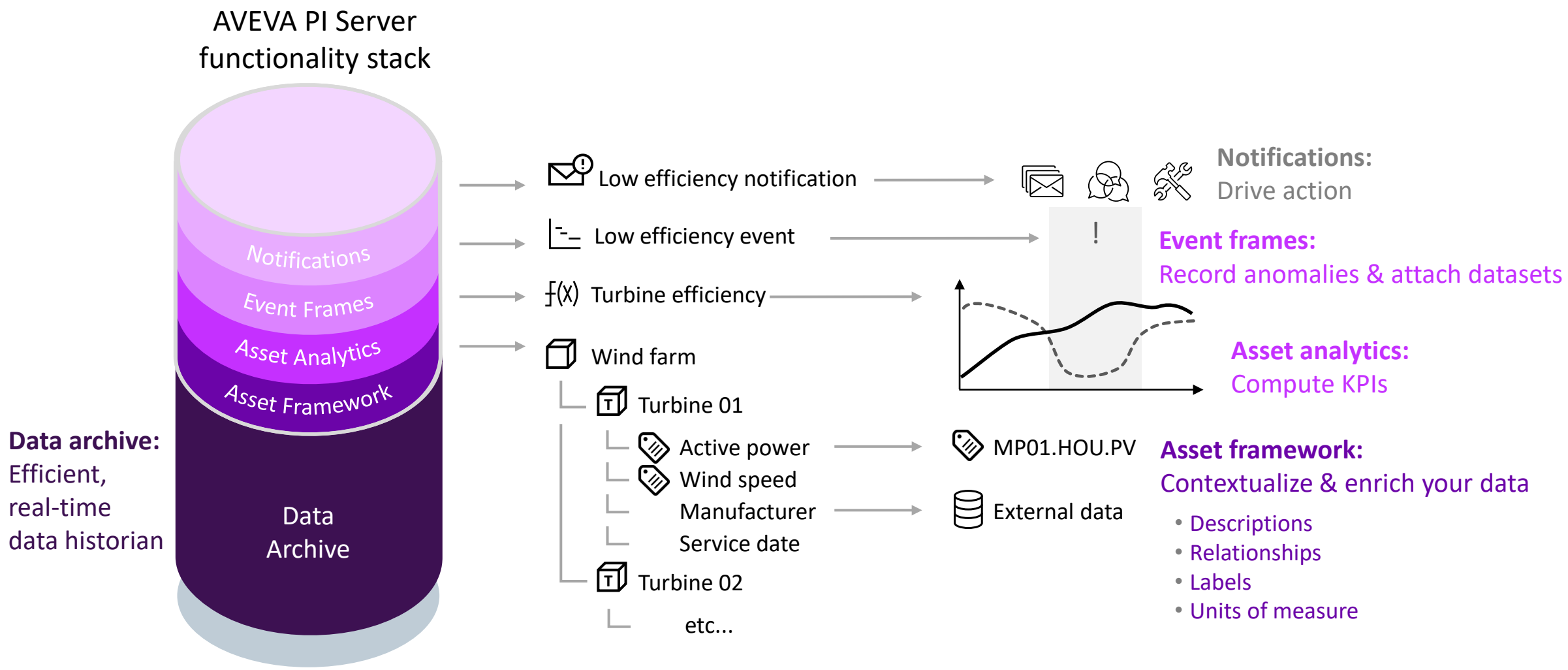
AVEVA PI System is vendor neutral

Can acquire data from almost any industrial vendor or protocol, including at the edge

- Hundreds of PI Interfaces, PI Connectors and AVEVA Adapters are available.
- Here are a few standard ones:

PI Interface for ABB 800xA Batch	PI Interface for Rockwell Factory Talk Batch	PI Connector for OPC UA Gen 1
PI Interface for ABB 800xA Production Response Batch	PI Interface for Rockwell PharmaSuite	PI Connector for OPC UA Gen 2
PI Interface for AVEVA Batch Management	PI Interface for Siemens SIMATIC Batch	PI Connector for Ping
PI Interface for DNP3	PI Interface for SNMP	PI Connector for Siemens SIMATIC PCS 7
PI Interface for Emerson DeltaV Batch	PI Interface for TCP Response	PI Connector for UFL
PI Interface for Emerson Syncade Batch	PI Interface for Universal File and Stream Loading (UFL)	PI Connector for Wonderware Historian
PI Interface for Modbus Ethernet PLC	PI Interface for Werum Pas-X Batch	AVEVA Adapter for BACnet
PI Interface for OPC DA	PI Connector for BACnet	AVEVA Adapter for DNP3
PI Interface for OPC HDA	PI Connector for CygNet	AVEVA Adapter for Modbus TCP
PI Interface for Performance Monitor	PI Connector for Ethernet IP	AVEVA Adapter for MQTT
PI Interface for Ping	PI Connector for FANUC Focas	AVEVA Adapter for OPC UA
PI Interface for Ramp Soak Simulator Data	PI Connector for HART-IP	AVEVA Adapter for RDBMS
PI Interface for Random Simulator Data	PI Connector for IEC 61850	AVEVA Adapter for Structured Data Files
PI Interface for Relational Database (RDBMS via ODBC)	PI Connector for MQTT Sparkplug	AVEVA Adapter for Azure Event Hubs

AVEVA PI Server has powerful data transformation features



Configured with no-code tools, all based on templates

Data management at scale with AVEVA PI AF templates

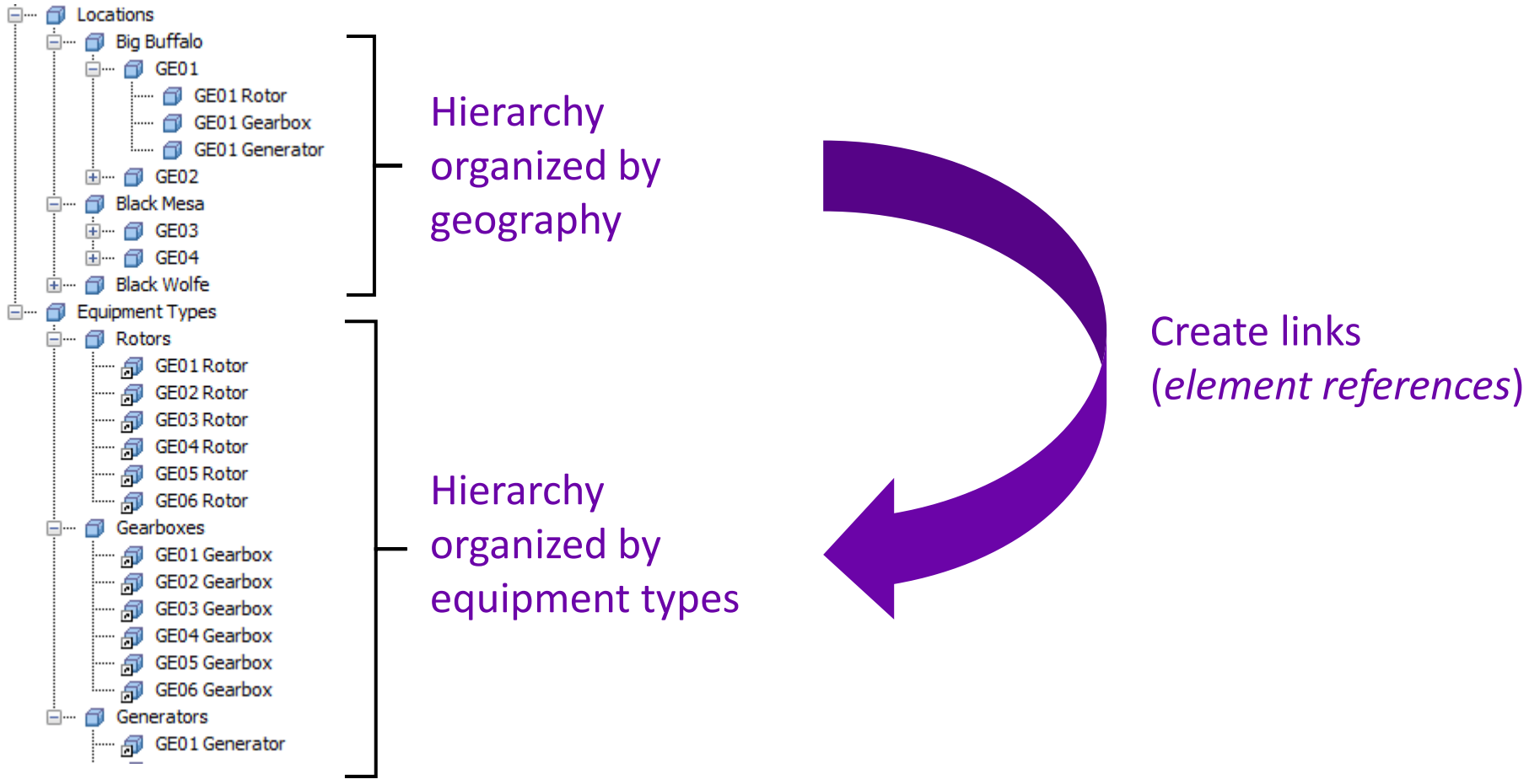
True object-oriented programming… without writing any code

Object-oriented programming concept	PI AF equivalent
Classes	Element & event frame templates
Properties	Attributes
Methods	Analyses & notification rules
Inheritance	Derived template
Polymorphism	Attribute & analysis & analysis configuration overrides
Encapsulation	Hidden attributes

AVEVA

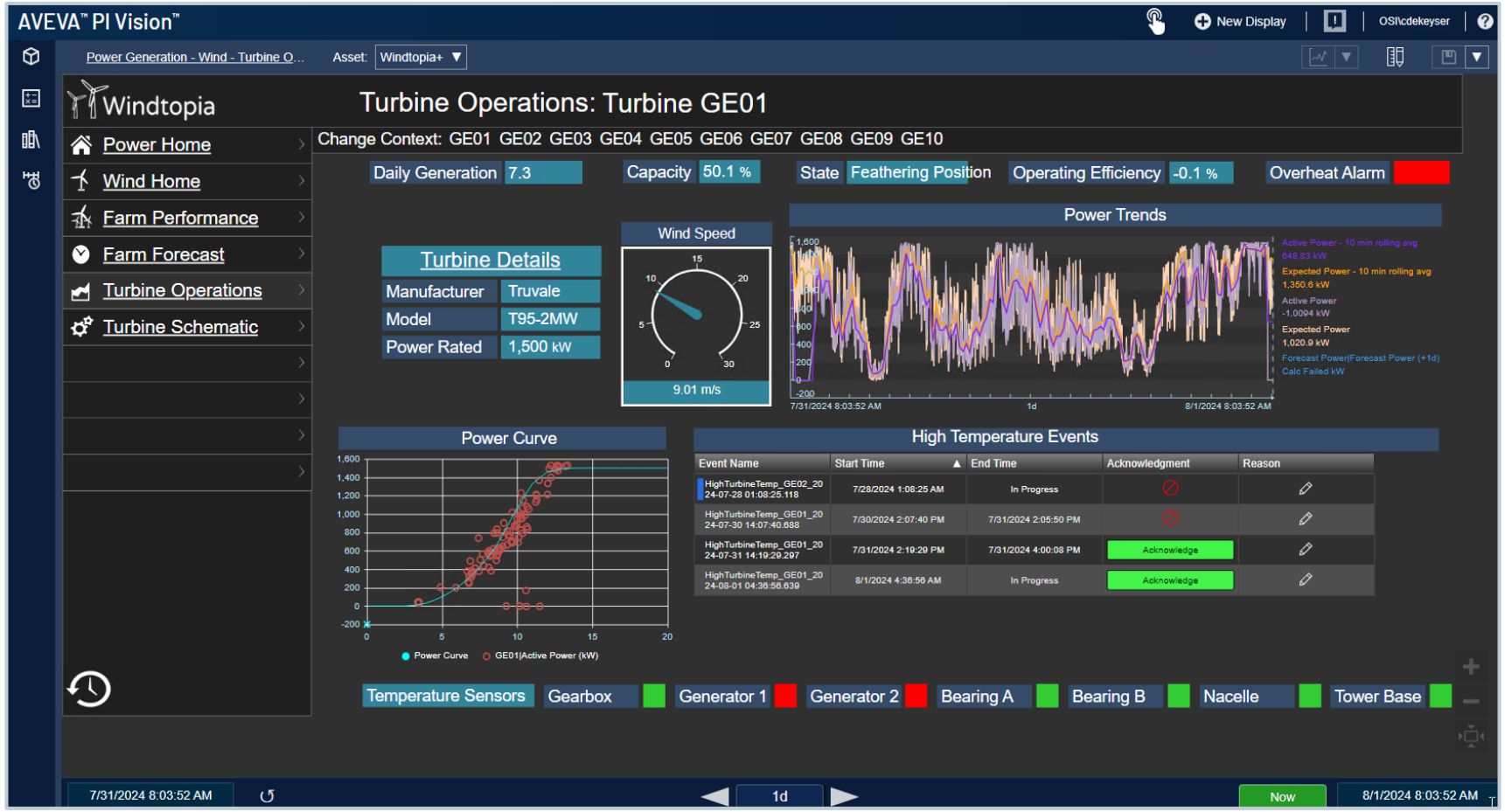
AVEVA PI Server can combine multiple types of asset hierarchy

Reuse assets in multiple hierarchies with *element references*



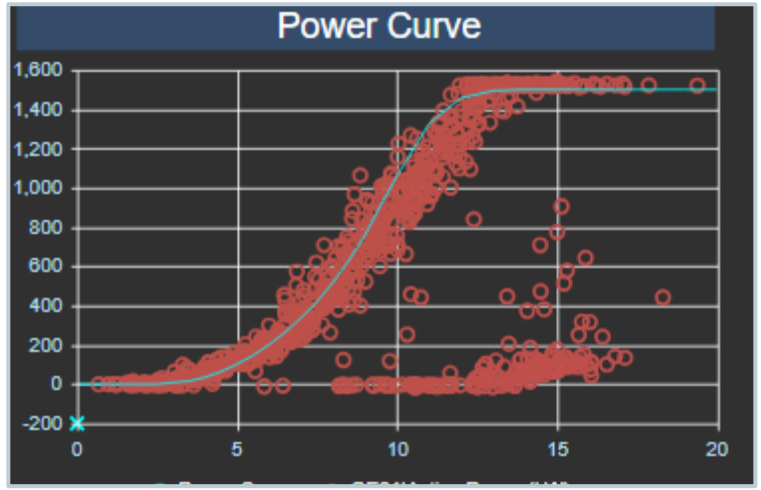
Self-service visualization with AVEVA PI Vision

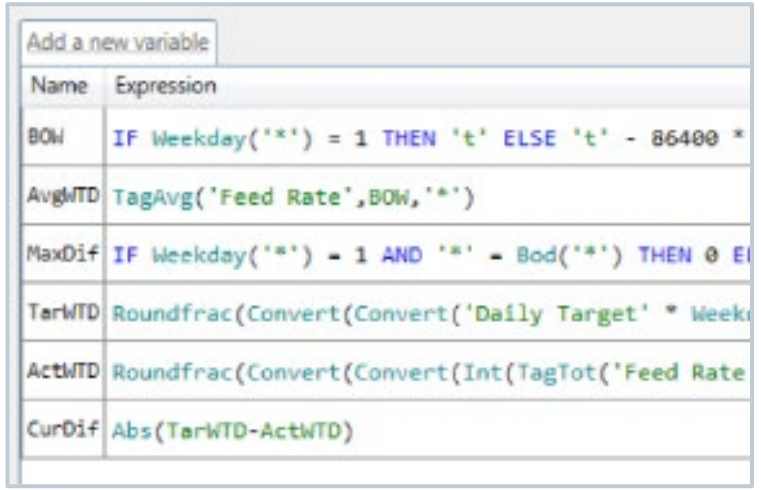
The fastest, easiest way to visualize AVEVA PI Server data

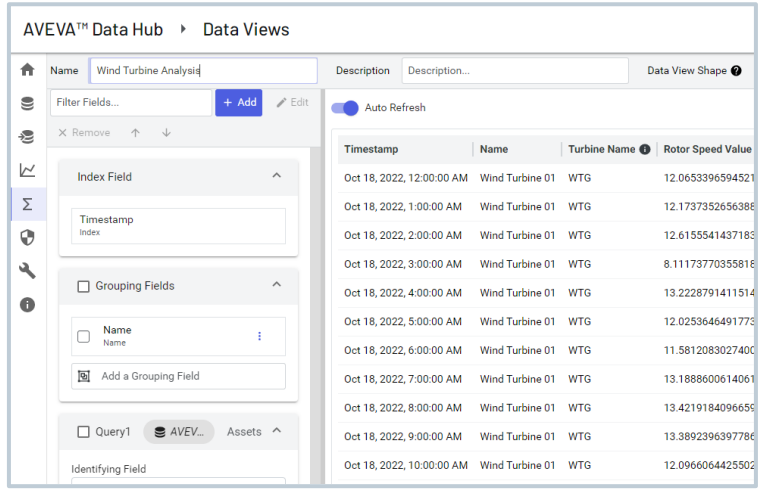


Supporting analytics needs at different levels

Visual correlations & ad-hoc calculations	Simple or more advanced streaming analytics	Data science & advanced analytics







Compare wind-power relationship with reference curves

Turbine efficiency during medium-wind phases

Early detection of turbine anomalies

Forecast power generation / demand

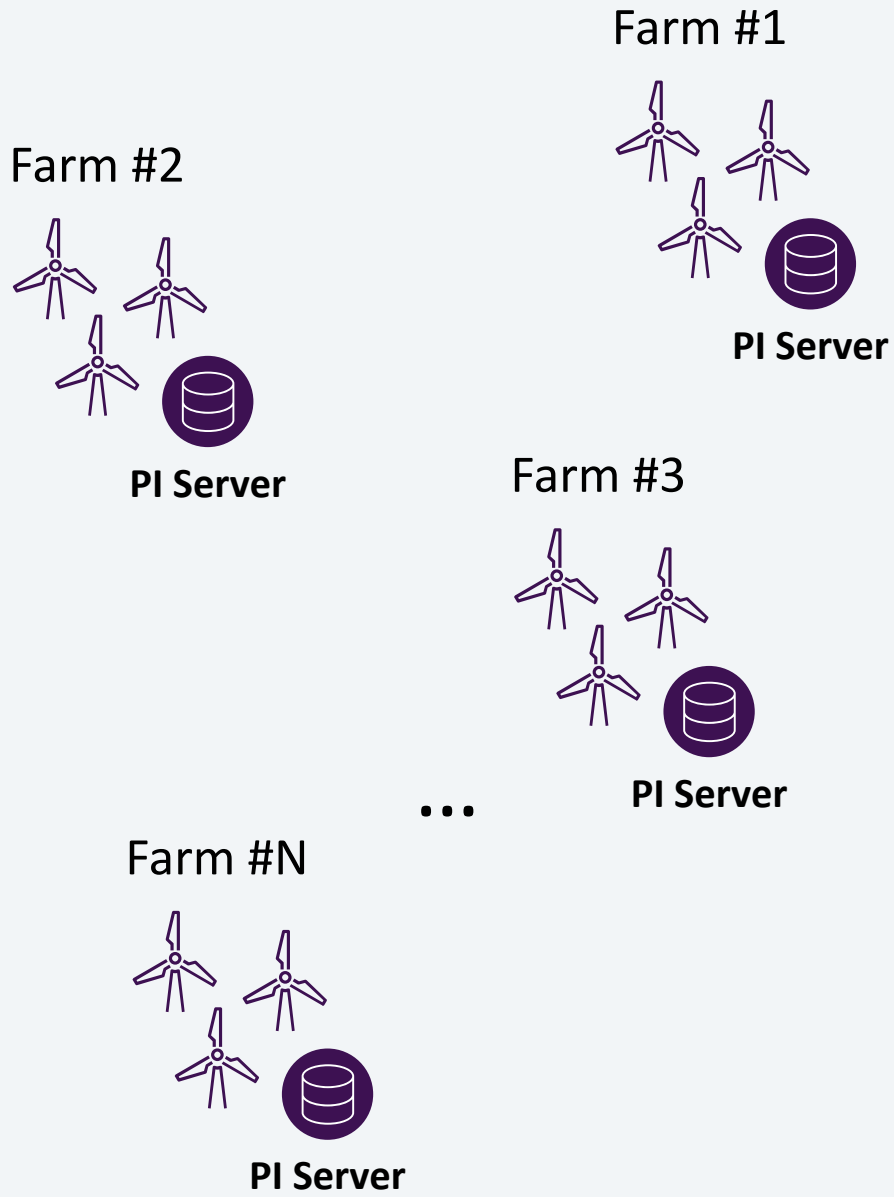
AVEVA PI System

Choice of AVEVA or third-party solution

Advanced analytics at scale

Windtopia’s challenges

- No built-in advanced analytic tools in PI
- Windtopia has dozens of AVEVA PI Servers across the world
  - How can they give access to data scientists?
- Very large volumes of data to query
  - Horizontal scalability required

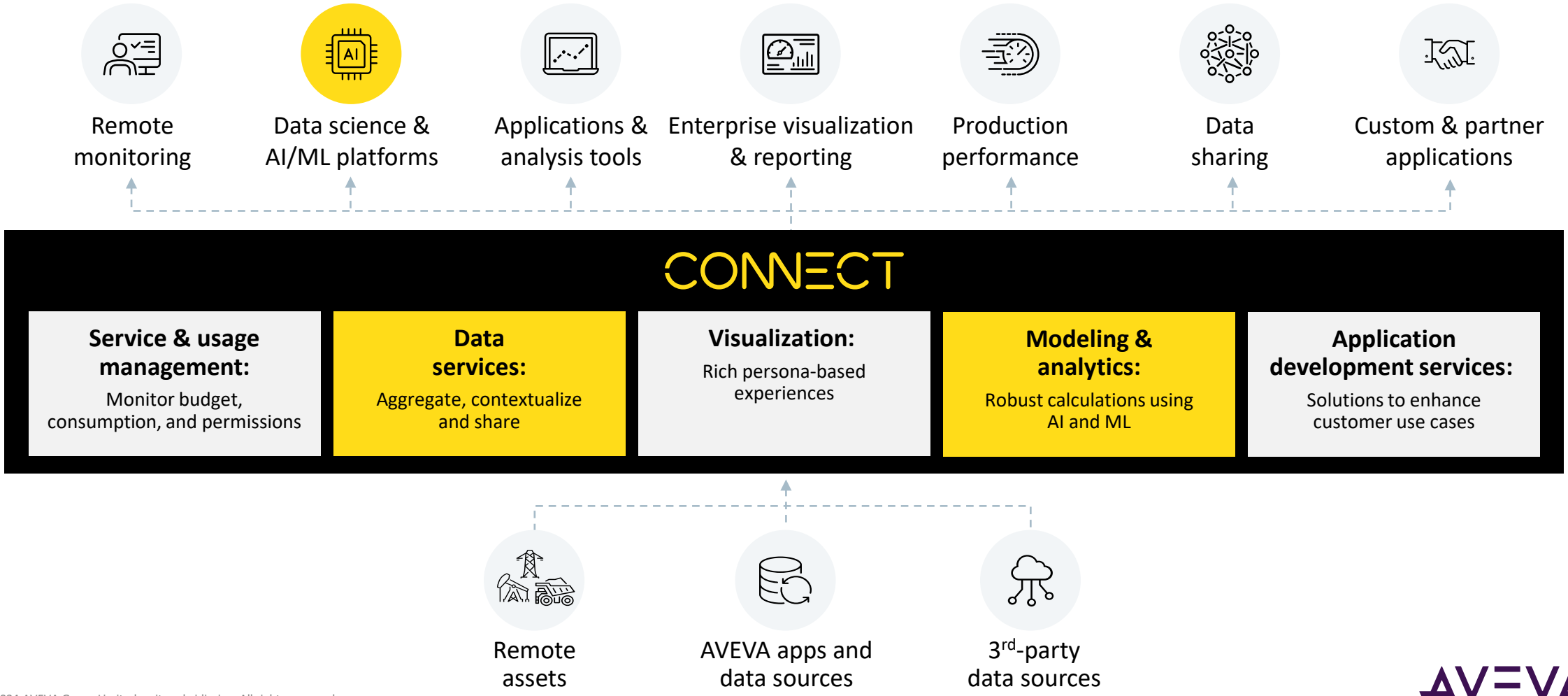


OPERATIONS DATA ANALYTICS AT CLOUD SCALE

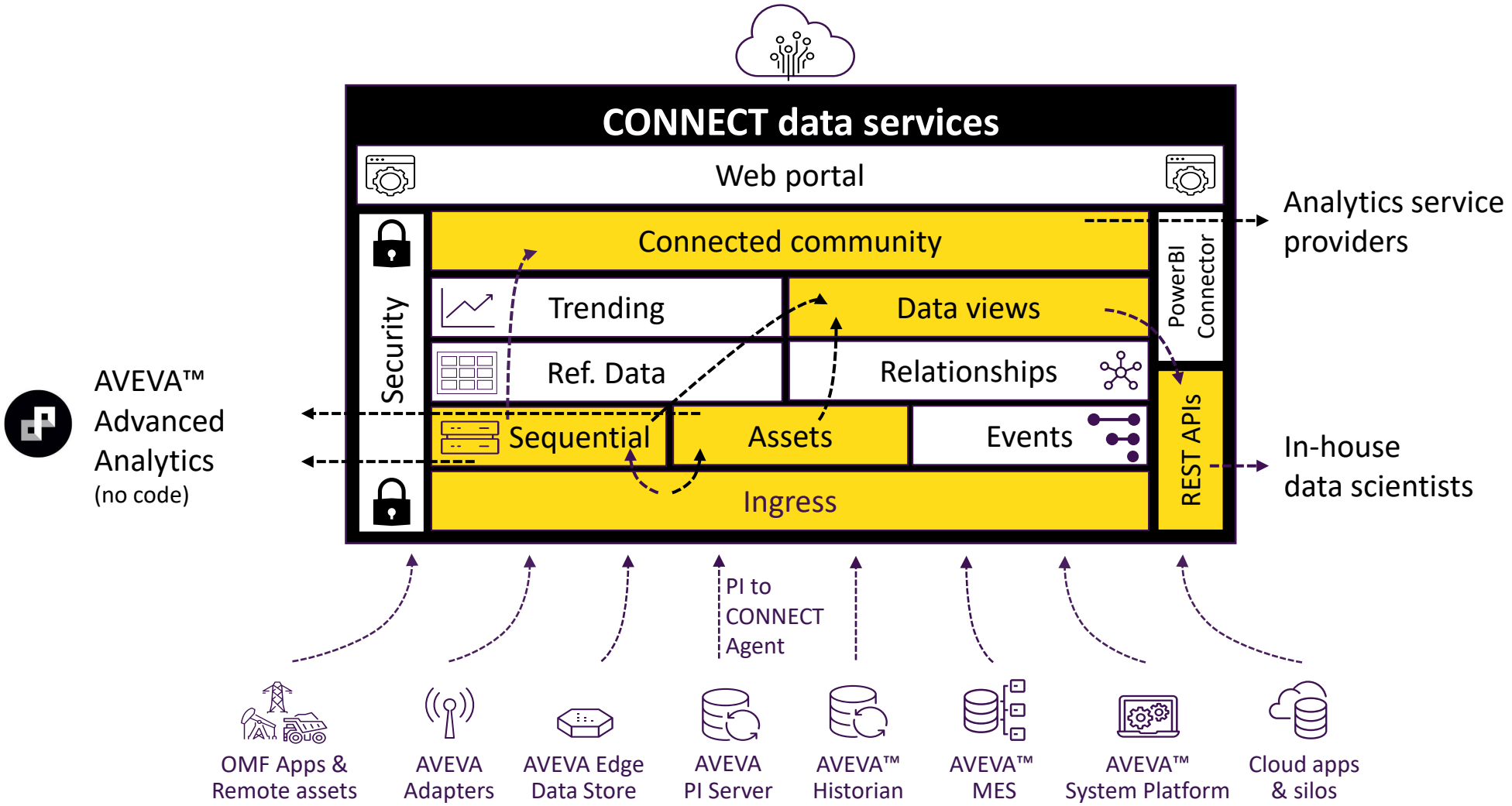
CONNECT provides multiple routes for performing advanced analytics

Leveraging CONNECT, the industrial intelligence platform

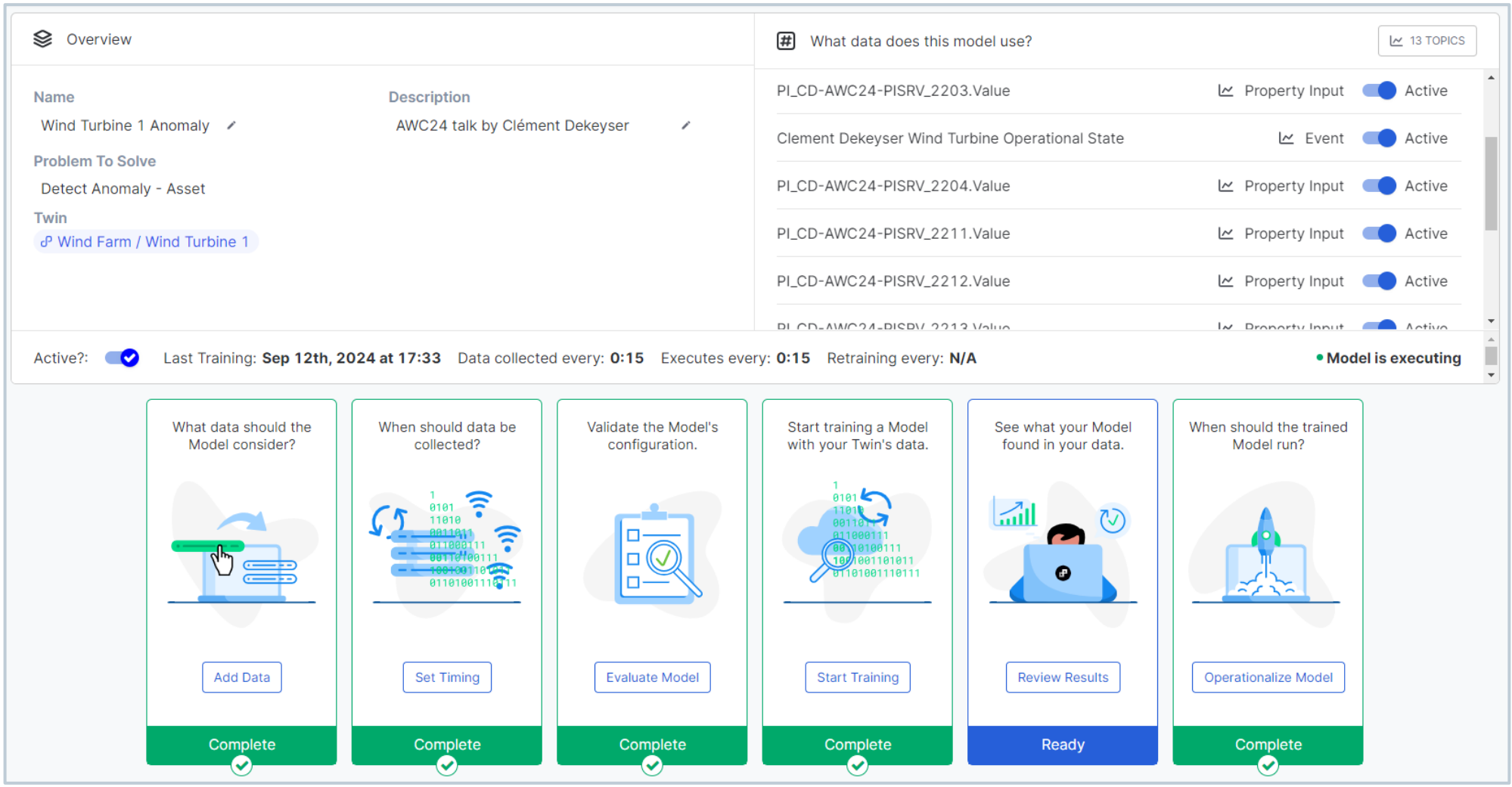
Open and neutral, providing rich data insights for your unified industrial ecosystem



Multiple routes for advanced analytics



AVEVA Advanced Analytics

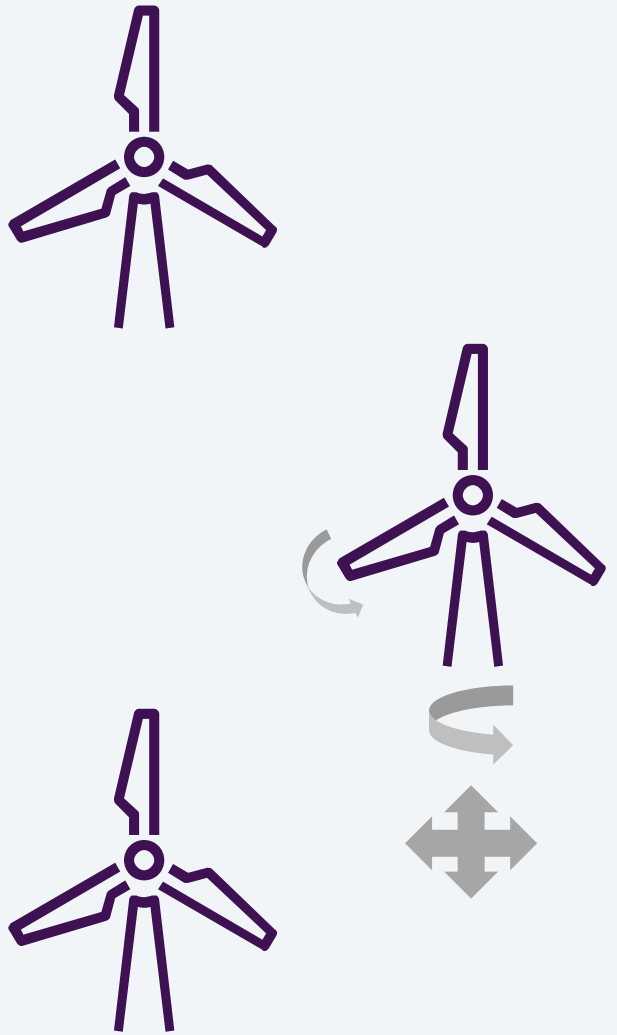


OPERATIONS DATA ANALYTICS AT CLOUD SCALE

Transferring data between AVEVA™ PI Server and CONNECT

Windtopia’s maintenance challenges

- Monitor not only the wind turbines, but also the accessories
- Additional motors move the turbines and blades
  - Important for windfarm performance optimization
  - Not enough monitoring
- How to detect potential anomalies as early as possible ?
  - More time to plan and optimize maintenance visits
  - More time to book spare parts



Wind turbine anomaly score from AVEVA™ Advanced Analytics

Use case: maintaining asset health

CONNECT
data services

Turbine
anomaly score

AVEVA Advanced
Analytics

a CONNECT service

'PI to CONNECT
Agent' sends
curated data

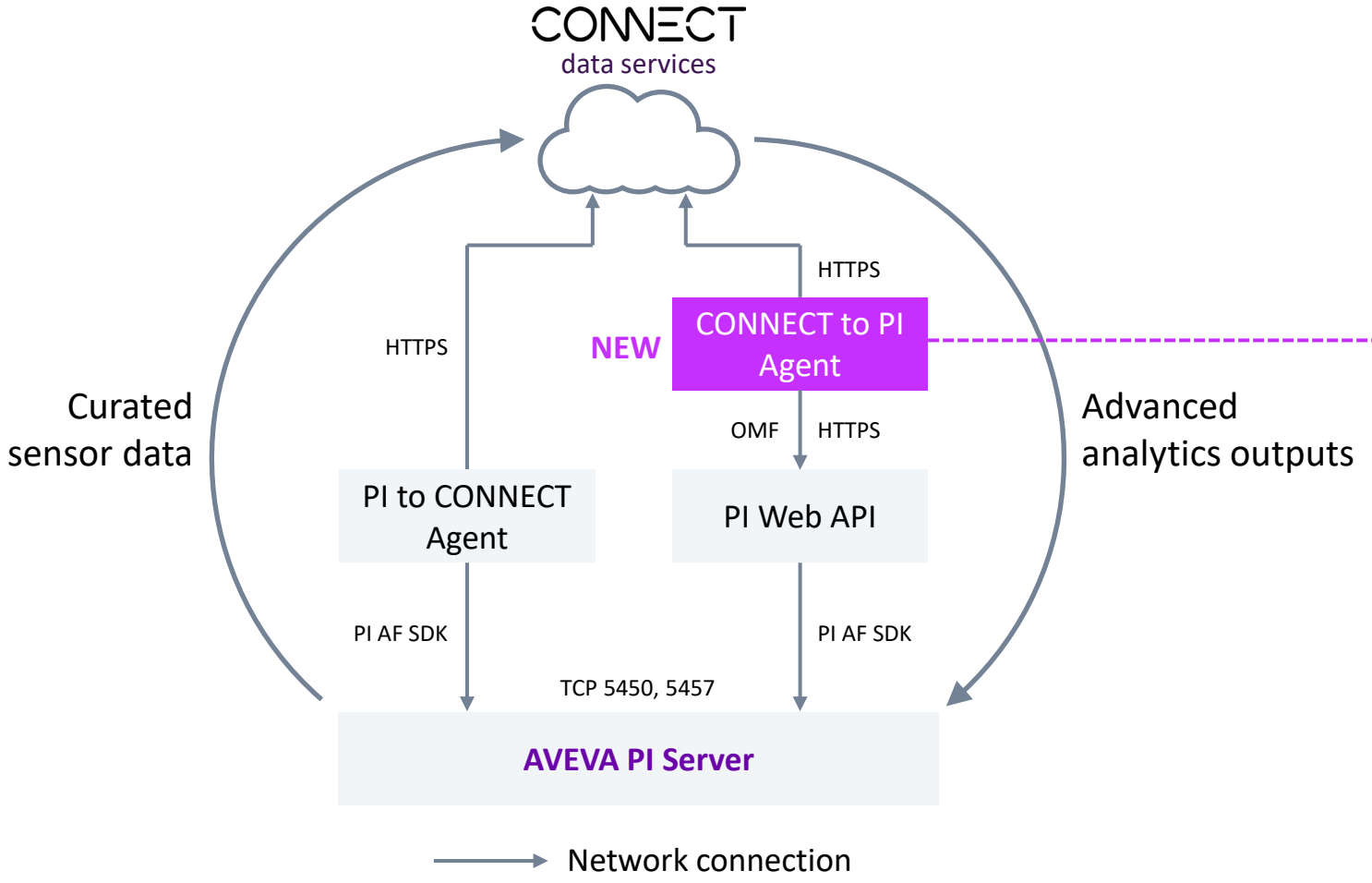
Challenge:
How to transfer anomaly results to operator screens without custom code ?

AVEVA PI Server

Existing AVEVA PI Vision display

Deploying CONNECT to PI Agent

Based on the AVEVA Adapter framework and Open Message Format (OMF)



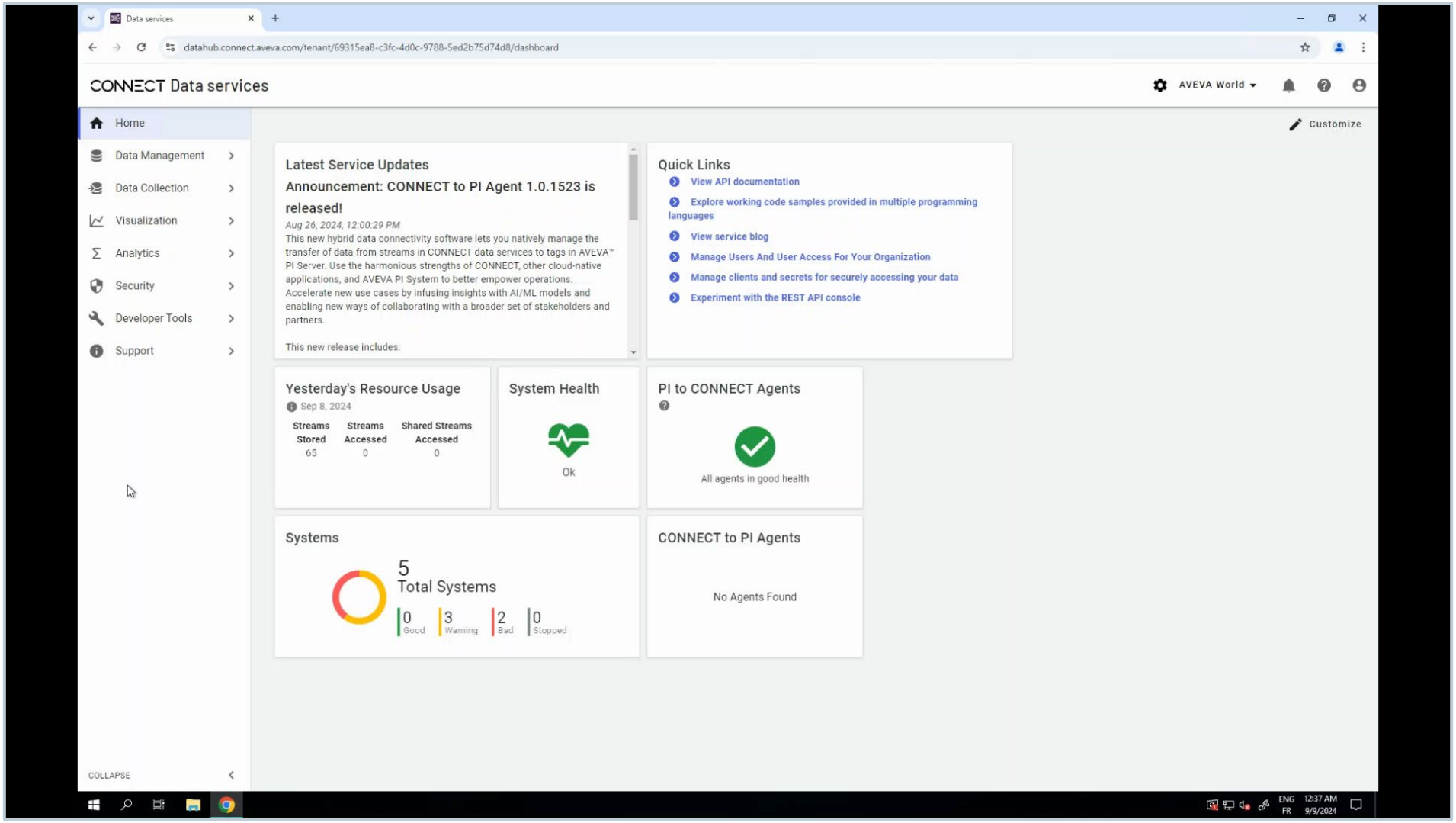
System requirements

- Windows
- Outbound internet connectivity
- Performance guidelines
  - 4 Core CPU, 8 GB RAM
  - 1k events/sec, 1k streams total

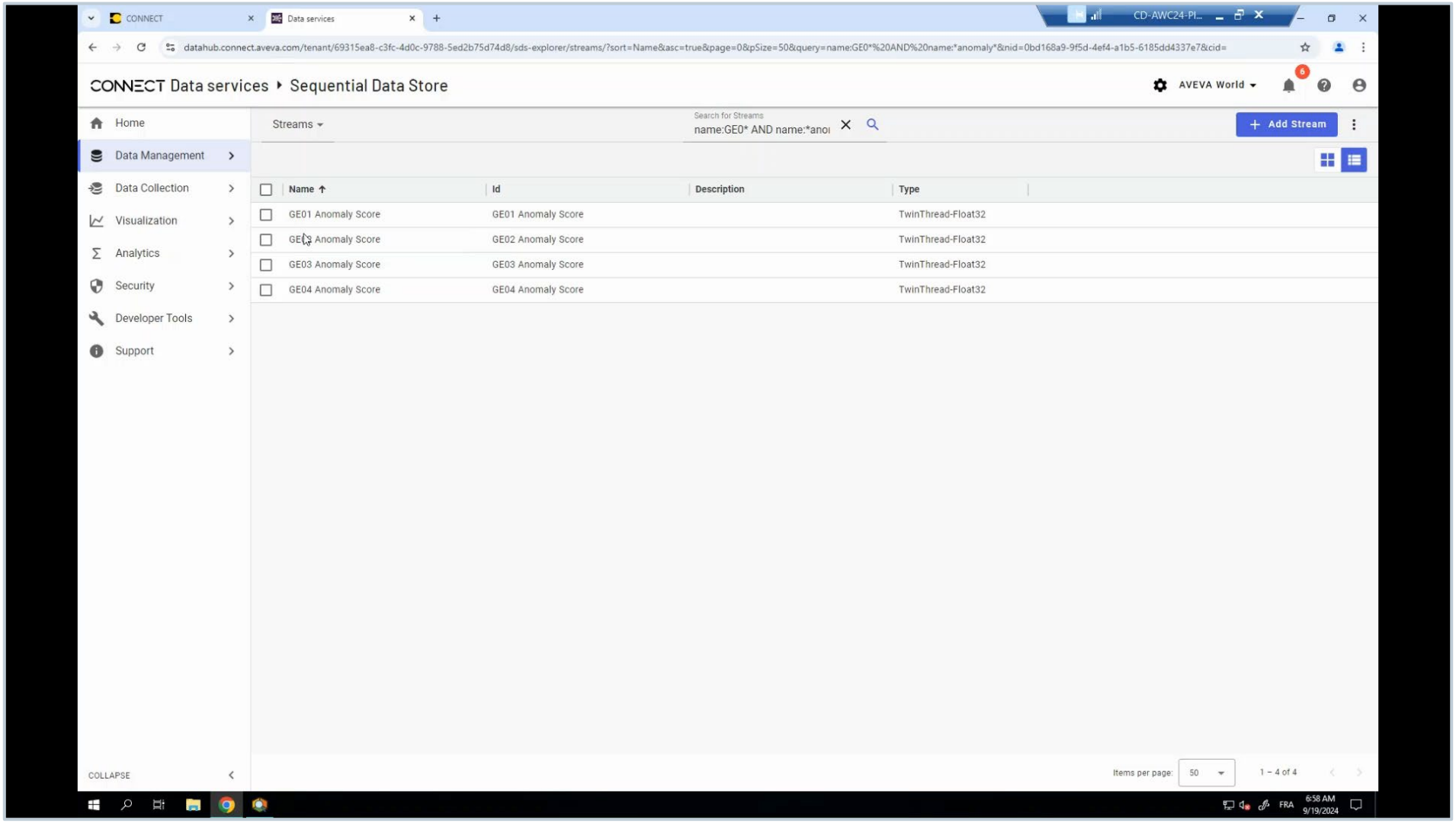
Steps to deploy the Agent

Install & configure the Agent → Create a data transfer → Embed outputs in existing PI models

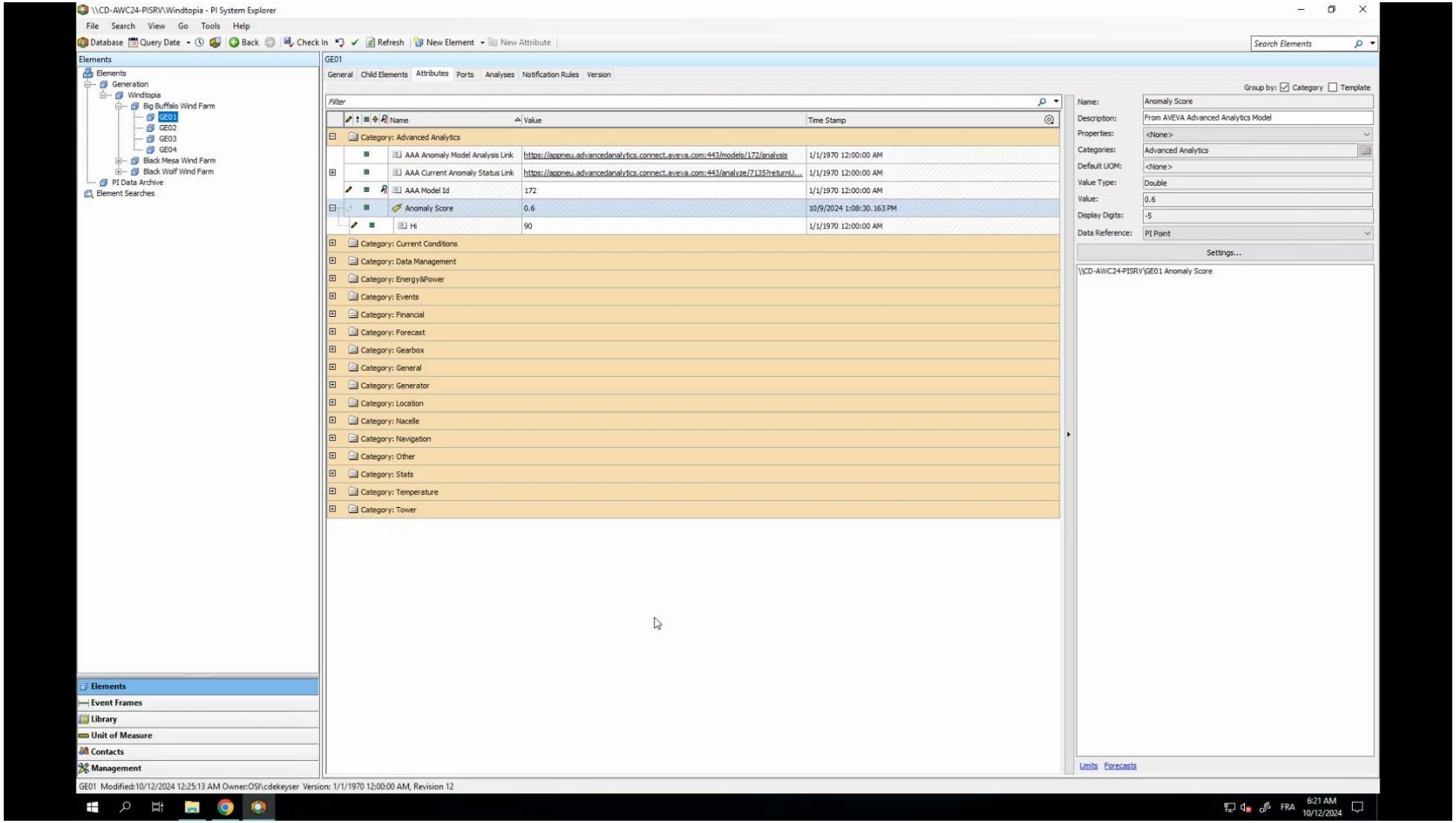
1. Install & configure the ‘CONNECT to PI Agent’



2. Create a ‘CONNECT to PI Agent’ data transfer



3. Results: Enriched AVEVA PI Vision display with greater insight



ADVANCED ANALYTICS WITH BI-DIRECTIONAL DATA TRANSFER

Final thoughts

Final thoughts

- AVEVA PI Data Infrastructure, featuring **AVEVA PI Server + CONNECT data services**, delivers advanced analytics faster based on curated data.
- Put analytic results back into the hands of your operations engineers.
  - Ops team knows how to interpret and act on PI data
  - Ops team will welcome new insights in their existing visualizations
- With the ‘CONNECT to PI Agent’, you can easily complete the roundtrip.

The Windtopia story continues

Watch Windtopia transform its data infrastructure over the course of AVEVA World

This Session: Operations data analytics at cloud scale:
Seamless integration of PI System data with CONNECT data services
Room: Ternes Hall |16 October, 14:45 – 15:15

Later: Easily deploy AVEVA Adapters to remotely collection operations data at scale
Room: #251 |16 October, 15:30 – 16:00

Later: Hosting PI Asset Framework's SQL database in the cloud with Azure SQL DB
Room: #252A+B |16 October, 16:15 – 16:45

Later: Support expanding needs with AVEVA PI Vision 2024
Room: #241 |16 October, 17:00 – 17:30

Questions?

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