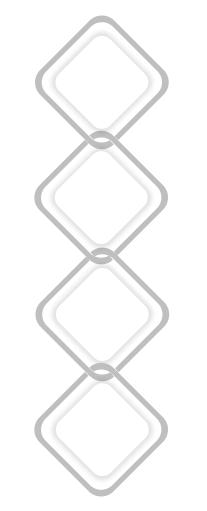# The Data Value Chain: From Edge to Impact

Presented by Elizabeth McErlean, Alicia Coppock, and Chris Felts

AVEVA

# Value increases with each link in the data value chain

Data Usage
deliver impact by turning data into insight

Data Curation
create decision-ready data that is easily accessible

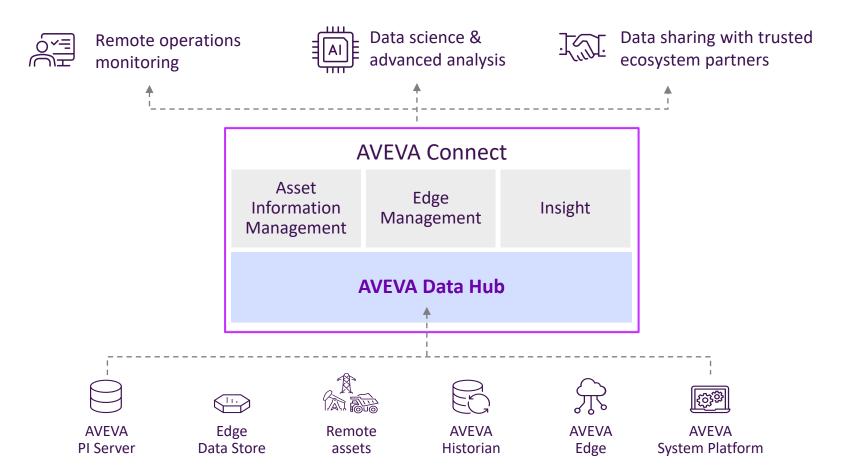Data Storage
aggregate and store operations data in context

Data Collection
connect to and manage disparate data sources
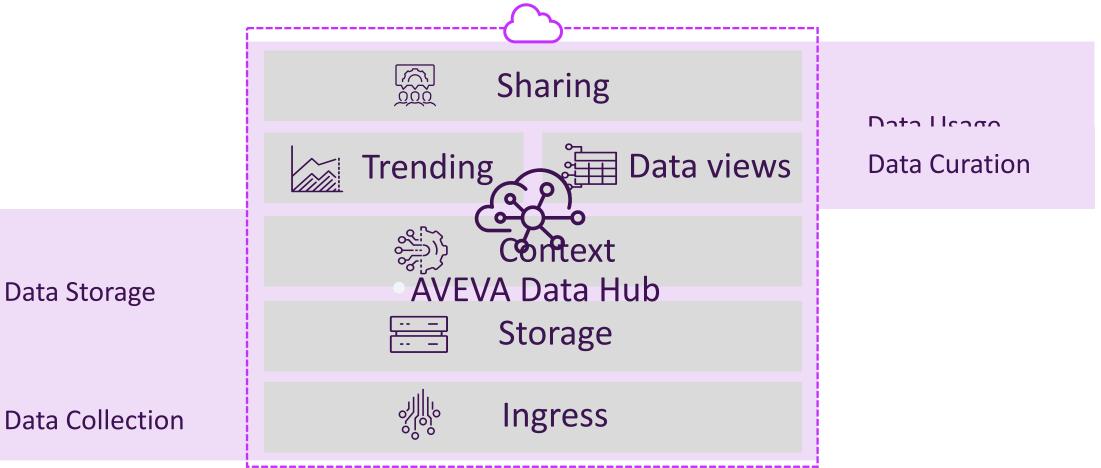
*Actionable intelligence*

*Raw data*

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# Accelerate time to value with AVEVA's portfolio from edge to cloud

## AVEVA Connect enables a hybrid data architecture through cloud offerings

Remote operations monitoring

Data science & advanced analysis

Data sharing with trusted ecosystem partners

### AVEVA Connect

| Asset Information Management | Edge Management | Insight |
| --- | --- | --- |

**AVEVA Data Hub**

AVEVA PI Server

Edge Data Store

Remote assets

AVEVA Historian

AVEVA Edge

AVEVA System Platform

AVEVA

# Extract value at every step of the data value chain

With core capabilities of AVEVA Data Hub

Data Usage

Data Curation

Sharing

Trending          Data views

Context

AVEVA Data Hub

Storage

Data Storage

Ingress

Data Collection

AVEVA

# Seeing is believing: how can you make an impact?

## Data Usage
deliver impact by
turning data into insight

## Data Curation
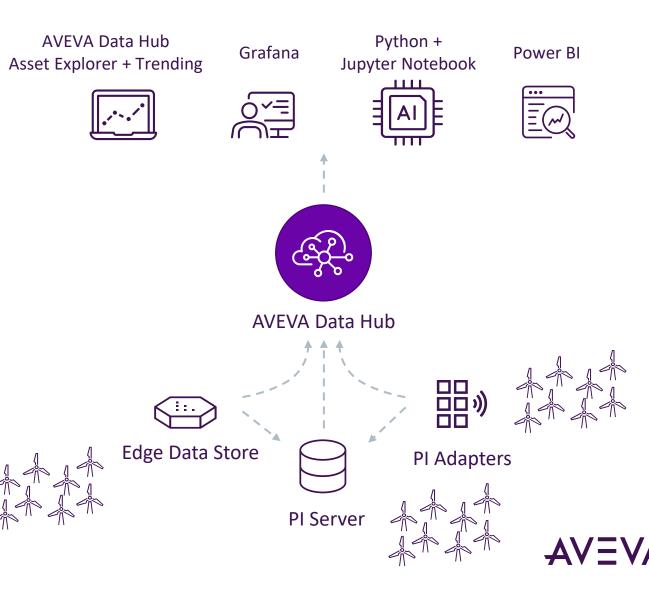create decision-ready data
that is easily accessible

## Data Storage
aggregate and store
operations data in context

## Data Collection
connect to and manage
disparate data sources

AVEVA

# Customer value through the lens of a wind power producer

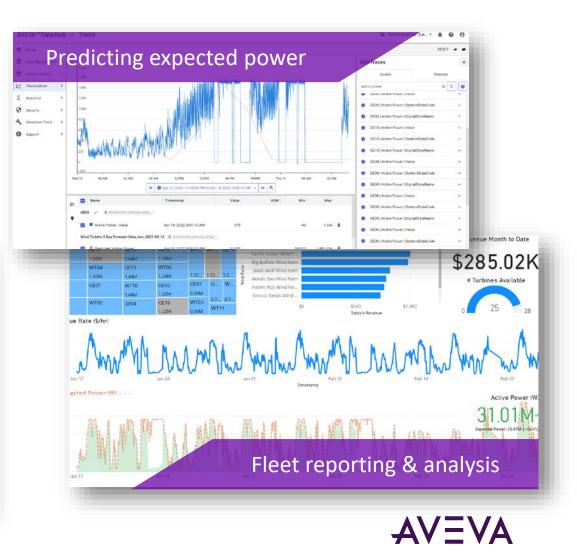## What's important to Windtopia?

- Improve availability of assets, reduce unplanned downtime

- Consistent, fleet-wide asset monitoring

- Reliable, repeatable predictive analytics

- Production reporting within organization and with external partners

AVEVA Data Hub
Asset Explorer + Trending

Grafana

Python +
Jupyter Notebook

Power BI

AVEVA Data Hub

Edge Data Store

PI Server

PI Adapters

AVEVA

# Four ways to use data & deliver impact

## Diverse tools for different types of users



Exploring deviations

Predicting expected power

Live turbine monitoring

Fleet reporting & analysis

AVEVA

# AVEVA™ Data Hub

- **Home**
- Data Management ▸
- Data Collection ▸
- Visualization ▸
- Analytics ▸
- Security ▸
- Developer Tools ▸
- Support ▸

✎ Customize

## Latest Service Updates

### AVEVA Data Hub Now Can be Deployed in East Australia

*Apr 22, 2022, 3:56:44 PM*

In addition to West US and North Europe, AVEVA™ Data Hub now has a data center available in East Australia, providing you with more options for your residency and compliance needs. It will also improve the performance for local users.

When you enable the Data Hub service on your Connect folder, if the folder's region is West US, West Europa, or Australia*, your Data Hub namespaces will be deployed in the same region. If your folder is not set to any of the three regions, a modal will ask you to pick the data center for the provisioning.

For application developers, the regional API (Application Program Interface) endpoint for East Australia is available at https://auea.datahub.connect.aveva.com/. Please see the API reference in AVEVA Data Hub documentation for more details.

*Note: there are some differences in region labels between AVEVA Connect and Data Hub. Please use the table in the documentation for your reference.

Read More

## Quick Links

- ➤ View API documentation
- ➤ Explore working code samples provided in multiple programming languages
- ➤ View service blog
- ➤ Manage Users And User Access For Your Organization
- ➤ Manage clients and secrets for securely accessing your data
- ➤ Experiment with the REST API console

## PI to Data Hub Agents

✓

All agents in good health

## Resource Usage

**Current Month Accessed Streams**

1290 of 10,000 licensed

## System Health

Ok

## Edge Systems

19
Total Systems

| 14 | 4 | 1 | 0 |
| Good | Warning | Bad | Inactive |

COLLAPSE ‹

# Four ways to use data & deliver impact

## Diverse tools for different types of users



Exploring deviations

Predicting expected power

Live turbine monitoring
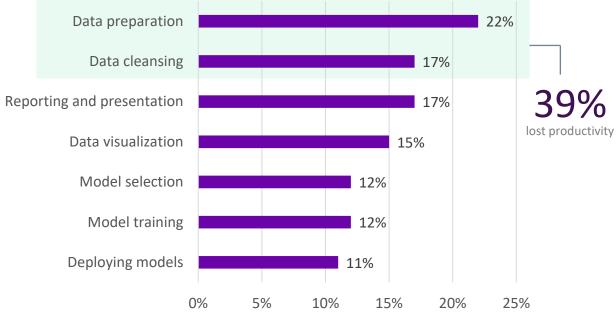
Fleet reporting & analysis

# Preparing data for analytics

## It's time consuming, even for data scientists

### How do data scientists spend their time?

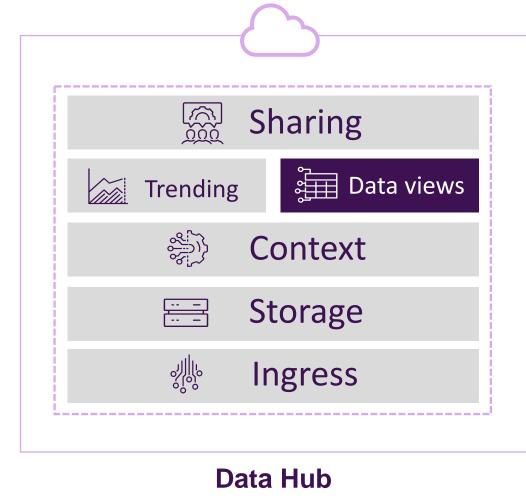| Task | Percentage |
|------|-----------|
| Data preparation | 22% |
| Data cleansing | 17% |
| Reporting and presentation | 17% |
| Data visualization | 15% |
| Model selection | 12% |
| Model training | 12% |
| Deploying models | 11% |

**39%**
lost productivity

■ Percentage of time spent on task

Source: Anaconda's State of Data Science 2021 Survey

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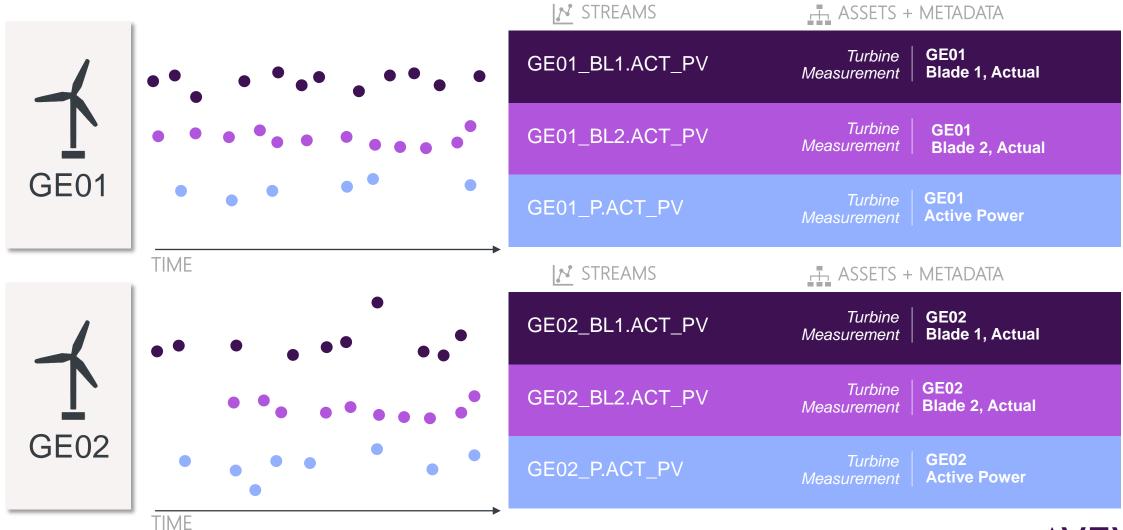# Data Views curate operational data for external consumption
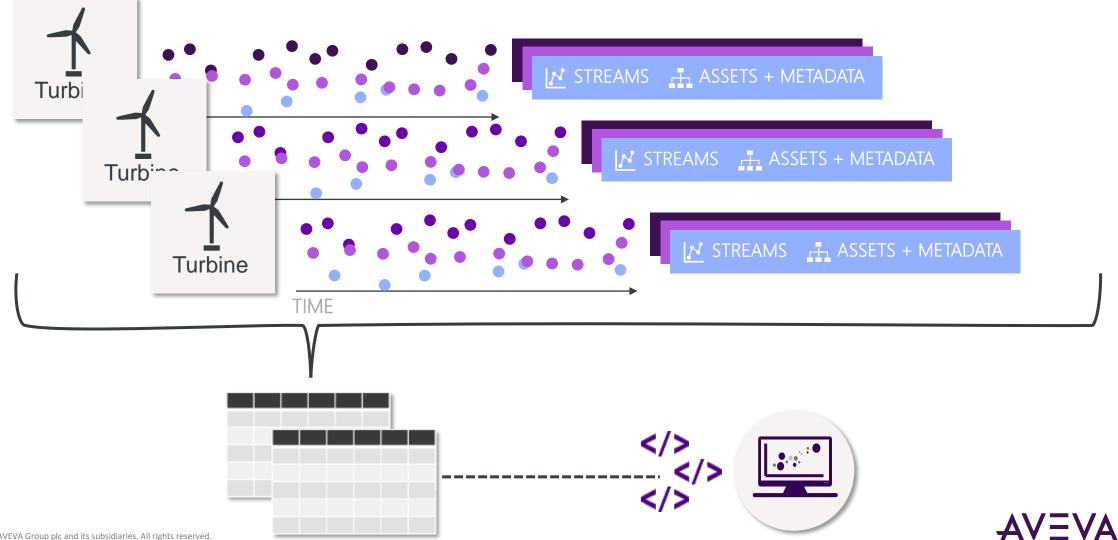


**Enabling data exploration & integration**

DATA VIEW

**Data Hub**

AVEVA

# Data is aggregated and context-aware



GE01

STREAMS | ASSETS + METADATA

| GE01_BL1.ACT_PV | Turbine Measurement | GE01 Blade 1, Actual |
| GE01_BL2.ACT_PV | Turbine Measurement | GE01 Blade 2, Actual |
| GE01_P.ACT_PV | Turbine Measurement | GE01 Active Power |

TIME

GE02

STREAMS | ASSETS + METADATA

| GE02_BL1.ACT_PV | Turbine Measurement | GE02 Blade 1, Actual |
| GE02_BL2.ACT_PV | Turbine Measurement | GE02 Blade 2, Actual |
| GE02_P.ACT_PV | Turbine Measurement | GE02 Active Power |

TIME

AVEVA

# Data is shaped for consumption



TIME

# OT/IT Collaboration



## Engineer

- Operations subject matter expert
- Organize and shape data for analysis
- Add meaningful context to data

## Data Scientist

- Access Data Views
  - REST API
  - AVEVA Data Hub Power BI Connector
- Use AI / ML and visual analytics to enable new insights

AVEVA

# Integration through REST API for many use cases

## AVEVA Data Hub

| Data Views | Assets | Streams |
|------------|--------|---------|

**REST API**

- Machine learning & AI
- Data pipeline & Workflows
- Business intelligence & Data exploration
- Partner applications
- Collaboration tools
- Custom development

AVEVA

datahub.connect.aveva.com/tenant/cee3a3fd-aeb2-4950-80f5-4b72c77322b1/data-views

# AVEVA™ Data Hub ▸ Data Views

AVEVA-Events ▾    14    ?    ⊙
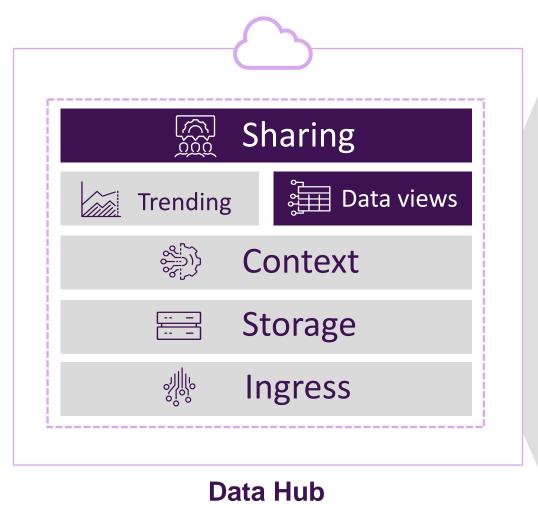
| Filter Data Views... | + Add Data View | ✎ Edit Data View | 🗑 Remove Data View | ⋮ |
|---|---|---|---|---|

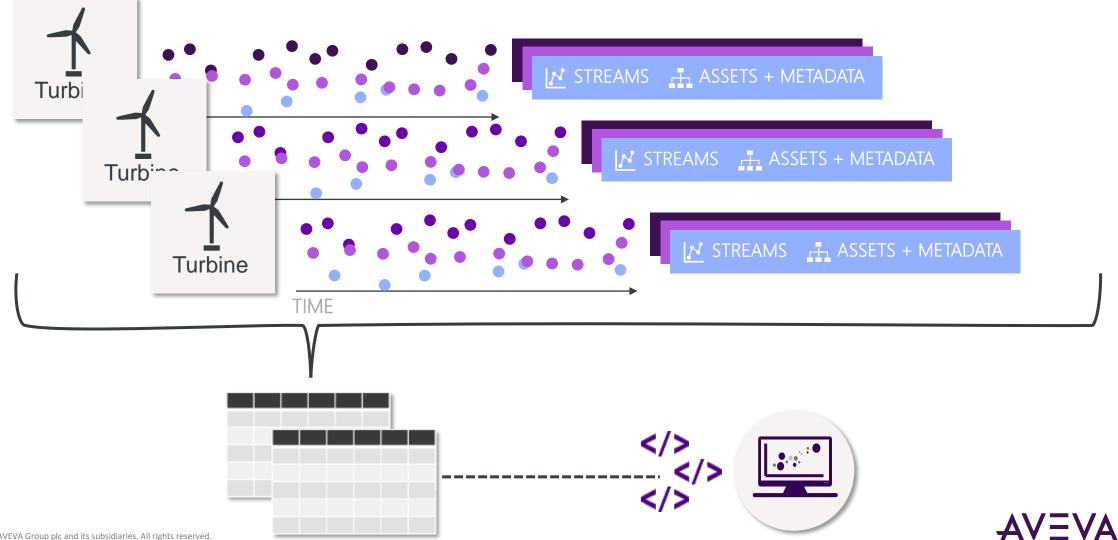| Id ↑ | Name | Description |
|---|---|---|
| SLTC Building plus | SLTC Building plus | |
| SLTC_Building_Energy_Consumption | SLTC_Building_Energy_Consumption | |
| SLTC_Building_Energy_Predictions | SLTC_Building_Energy_Predictions | |
| Wind Turbine Analysis | Wind Turbine Analysis | |
| Windtopia Assets | Windtopia Assets | |
| windtopia wind farm power outputs | windtopia wind farm power outputs | |

Showing 1 - 6 of 6

Items per page: 50 ▾    ‹  1  ›

---

## SLTC Building plus

⧉ View in API Console    ⋮

### Data View Details    ⌃

**Id**
SLTC Building plus

**Name**
SLTC Building plus

**Shape**
Standard

**API URL**
https://uswe.datahub.connect.aveva.com/api/v1/Tenants/cee3a3fd-aeb2-4950-80f5-4b72c77322b1/Namespaces/ed809cce-0e64-446f-a4c3-ada80bcf3367/DataViews/SLTC%20Building%20plus

### Query1    Assets    ⌃

**Query Value**
"sltc Building 1600"

**Fields**

Ambient Humidity Maximum  Uom
Property Id · Weather: Relative Humidity | Value · Maximum | Forward

Ambient Humidity Weighted Mean  Uom
Property Id · Weather: Relative Humidity | Value · Weighted Mean | Forward

Ambient Temperature Maximum  Uom

# Data is shaped for consumption



STREAMS · ASSETS + METADATA

STREAMS · ASSETS + METADATA
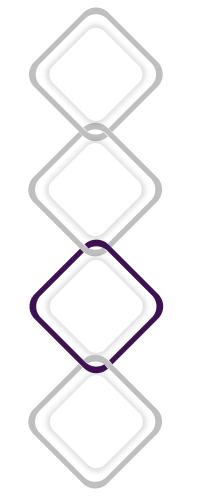
STREAMS · ASSETS + METADATA

TIME

AVEVA

# Community data in Data Views – In Development



**Data Hub**

## Enabling analytics for service providers

Community

Industrial Operator

AVEVA Data Hub Tenant

Service Provider

AVEVA Data Hub Tenant

API </> API </>

PI Servers

Sharing

Trending   Data views

Context

Storage

Ingress

AVEVA

# Reliable and flexible data storage in context

**Data Usage**
deliver impact by
turning data into insight

**Data Curation**
create decision-ready data
that is easily accessible

**Data Storage**
aggregate and store
operations data in context

**Data Collection**
connect to and manage
disparate data sources

AVΞVA

# Flexible sequential data storage



**AVEVA Data Hub**

SEQUENTIAL DATA STORE (SDS)

## Stream types & streams

STREAM PROPERTIES

# Assets give useful context to your data streams



**AVEVA Data Hub**

**ASSET STORE**

## Asset types & assets
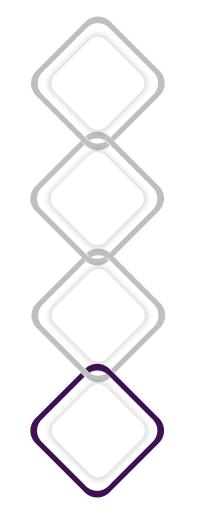


- **Static metadata** (Region, Location, Manufacturer, Model, etc.)
- **Properties** (Active power, expected power, operating state, etc.)
- **Asset status** (enum/string property values mapped to status: good, warning, bad)

# The data value chain at scale



West US Region

NA Customer

North EU Region

EU Customer

APAC Customer

Global Customer

East AUS Region

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Decisions made here will affect the quality and usability of data throughout its life-cycle
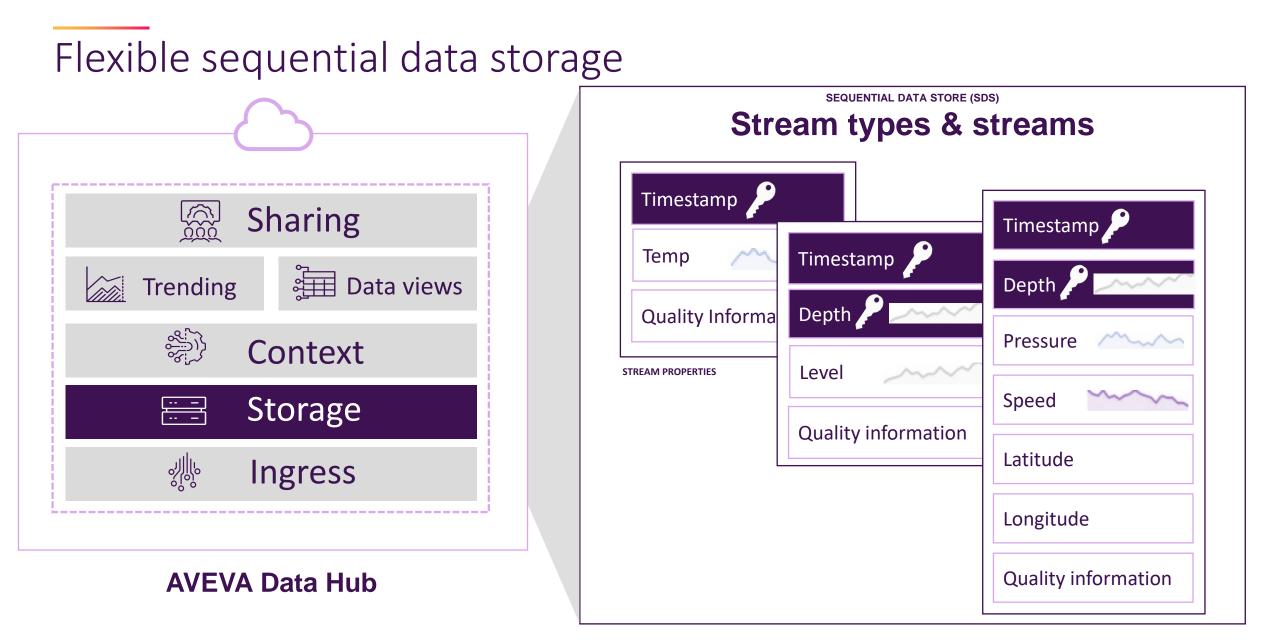
**Data Usage**
deliver impact by turning data into insight

**Data Curation**
create decision-ready data that is easily accessible

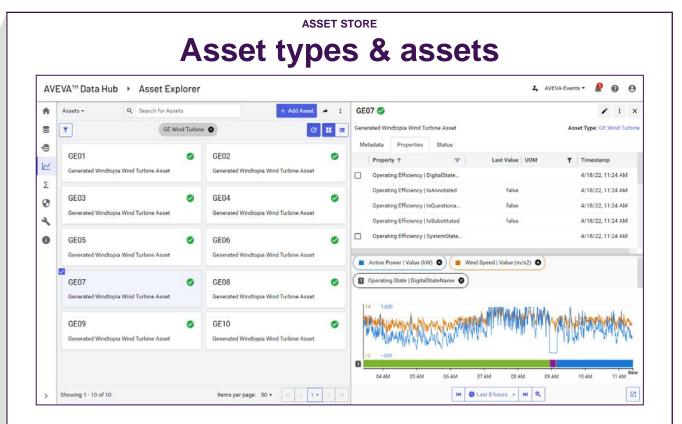**Data Storage**
aggregate and store operations data in context

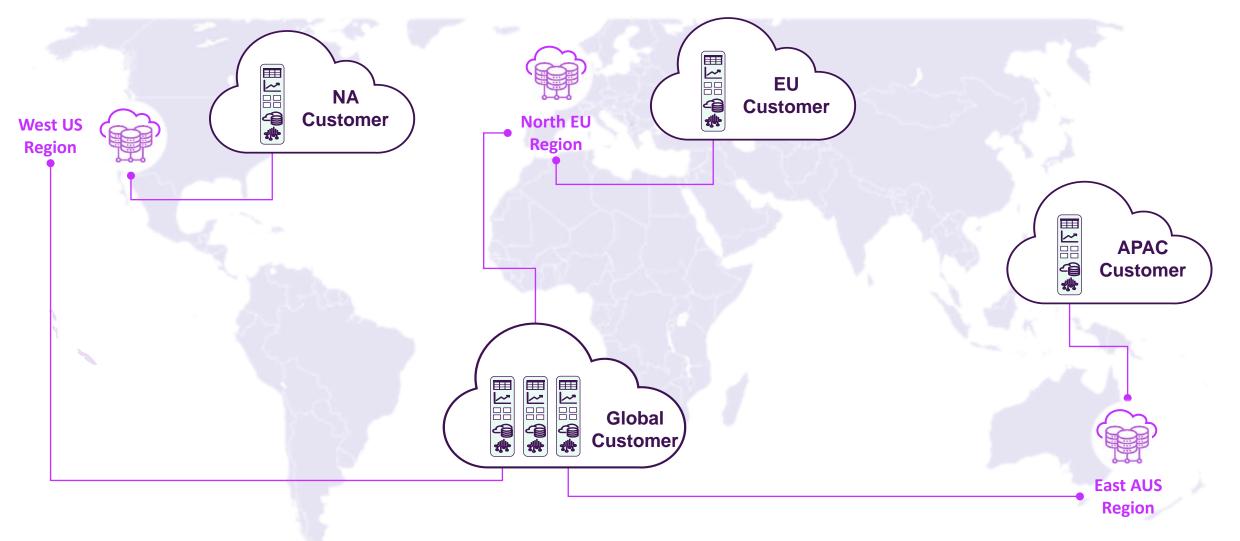**Data Collection**
connect to and manage disparate data sources

AVEVA
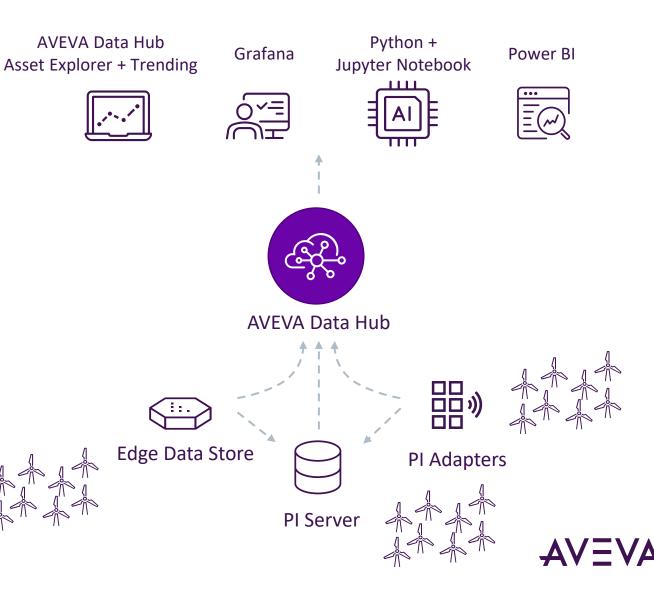
# The data value chain data flow

## What's important to Windtopia?
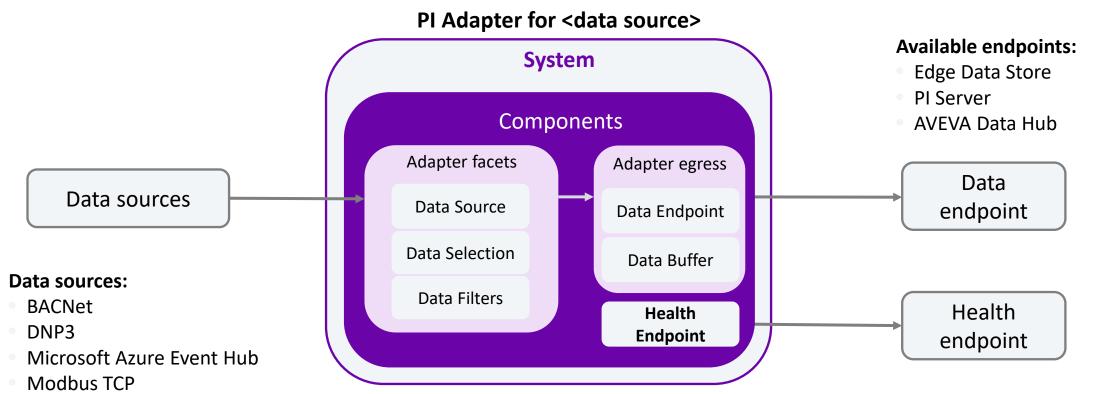
Addressing the four v's of data collection: volume, velocity, variety, and value

- Volume: fleet-wide and geographically dispersed assets

- Velocity: timely delivery to all stakeholders

- Variety: assets from multiple suppliers with varying versions of hardware and software

- Value: metadata for building asset context and data quality for building better models

AVEVA Data Hub
Asset Explorer + Trending

Grafana

Python +
Jupyter Notebook

Power BI

AVEVA Data Hub

Edge Data Store

PI Server

PI Adapters

# Ubiquitous data collection



**AVEVA Data Hub**

Sharing
Trending
Data views
Context
Storage
Ingress

INGRESS
**Data collection**

Edge Data Store
Modbus
MQTT
PI Adapters
dnp
ASHRAE BACnet®
OMF
OPC UA™

AVEVA

# PI Adapter in the data value chain

**PI Adapter for <data source>**

## System

### Components

**Data sources** → 

**Adapter facets**
- Data Source
- Data Selection
- Data Filters

**Adapter egress**
- Data Endpoint
- Data Buffer

**Health Endpoint**

→ **Data endpoint**

→ **Health endpoint**

**Available endpoints:**
- Edge Data Store
- PI Server
- AVEVA Data Hub

**Data sources:**
- BACNet
- DNP3
- Microsoft Azure Event Hub
- Modbus TCP
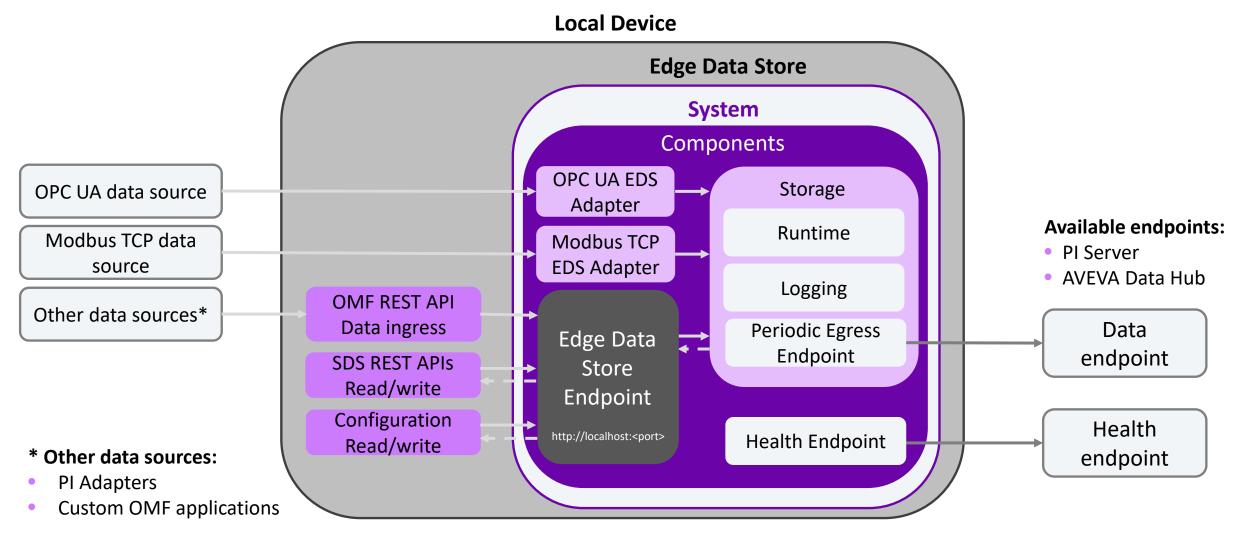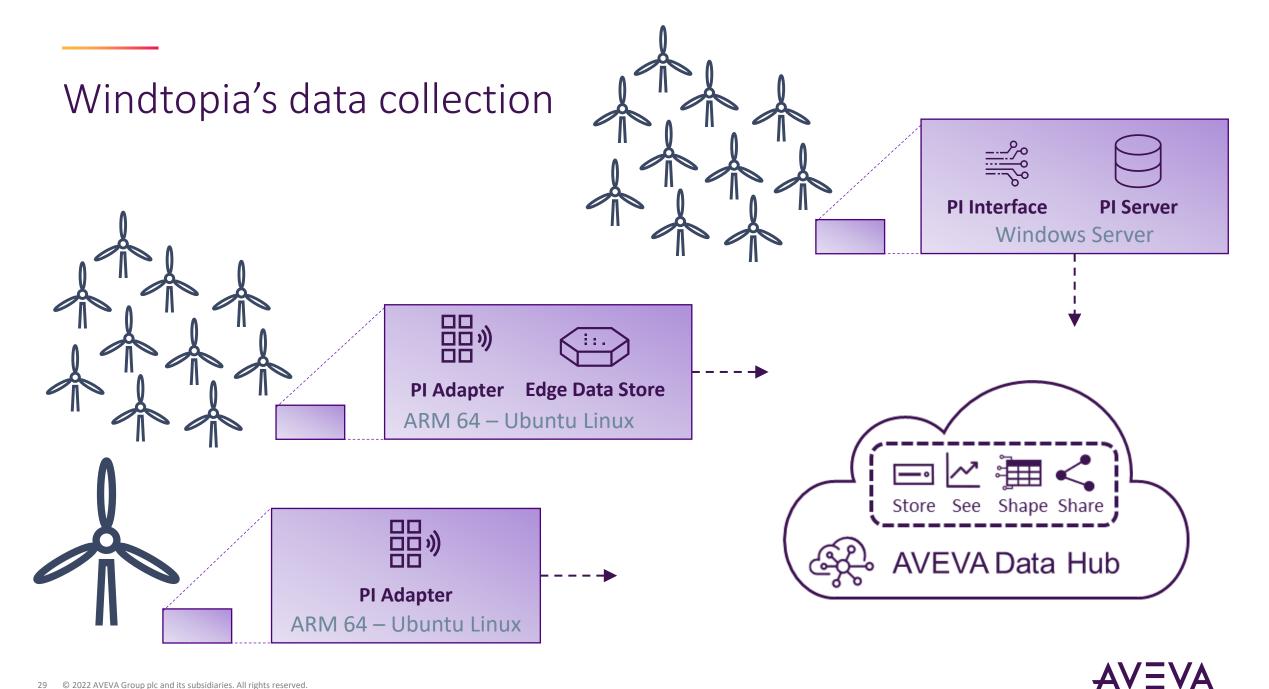- MQTT (generic)
- MQTT Sparkplug B
- OPC UA
- RDBMS
- Structured Data Files

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# Edge Data Store in the data value chain

**Local Device**
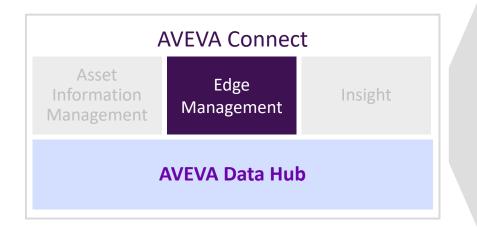
**Edge Data Store**

**System**

Components

OPC UA data source → OPC UA EDS Adapter → Storage

Modbus TCP data source → Modbus TCP EDS Adapter

Runtime

Logging

Other data sources* → OMF REST API Data ingress

SDS REST APIs Read/write

Configuration Read/write

Edge Data Store Endpoint

http://localhost:<port>

Periodic Egress Endpoint

Health Endpoint

**Available endpoints:**
- PI Server
- AVEVA Data Hub

Data endpoint

Health endpoint

**\* Other data sources:**
- PI Adapters
- Custom OMF applications

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# Windtopia's data collection



**PI Interface**    **PI Server**
Windows Server

**PI Adapter**    **Edge Data Store**
ARM 64 – Ubuntu Linux

**PI Adapter**
ARM 64 – Ubuntu Linux

Store   See   Shape   Share

AVEVA Data Hub

AVEVA

# The data value chain at scale



**West US Region**

**NA Customer**

**North EU Region**

**EU Customer**

**APAC Customer**

**Global Customer**

**East AUS Region**

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# Scalable device management



**EDGE MANAGEMENT**

## Device deployment & management

1. **Pair & bootstrap device:** establishes secure communications

2. **Deploy edge system software:** chose from a library of edge modules

3. **Manage device and edge system:** communications, licensing, versions
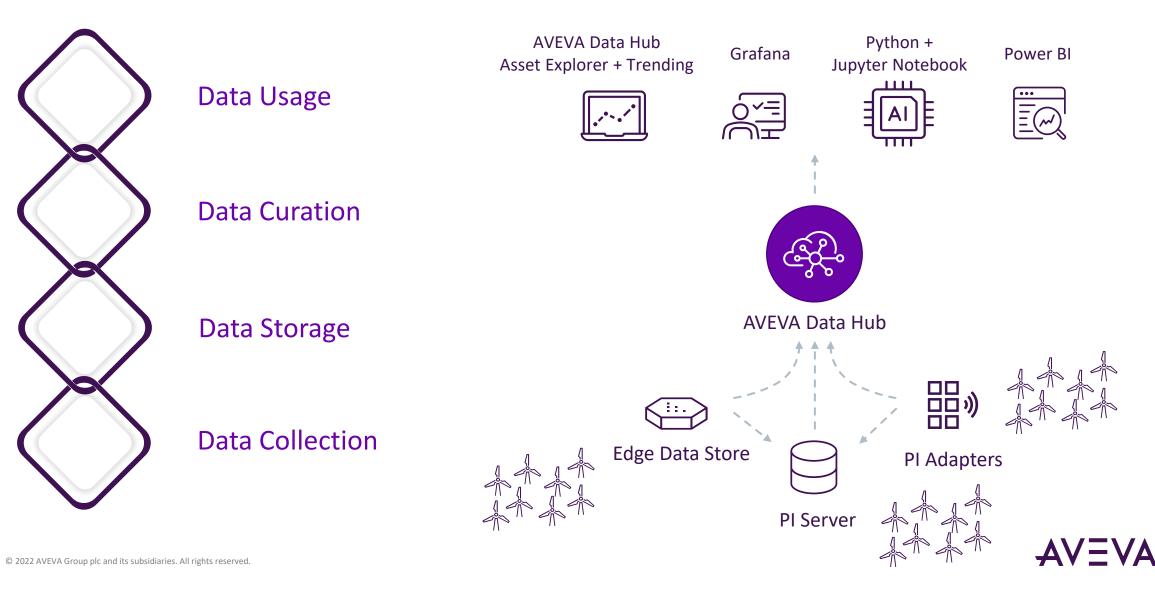
# Remote monitoring – Coming Soon!



**AVEVA Data Hub**

## Software configuration & monitoring

SOFTWARE MANAGEMENT

- **Edge system configuration authoring & validation**
- **Edge system monitoring**
  - **Status:** good, warning, bad
  - **Device diagnostics:** status, CPU, memory, storage usage
  - **Component metrics:** health, stream count, IO rate, etc.

# Extracting value at every step of the data value chain

**Data Usage**

**Data Curation**

**Data Storage**

**Data Collection**

AVEVA Data Hub
Asset Explorer + Trending

Grafana

Python +
Jupyter Notebook

Power BI

AVEVA Data Hub

Edge Data Store

PI Server

PI Adapters

# Learn more about AVEVA Data Hub

## Day 1 - Tuesday

- AVEVA Connect vision & roadmap
  *AVEVA, 13:45 - 14:15*

- Tapping into data from your industrial ecosystem on AVEVA Data Hub
  *AVEVA, 15:25 - 15:55*

- Secure Industrial Information Infrastructure to comply to your IT standards
  *AVEVA, 16:05 – 16:35*

- Lighten your load: How to accelerate time to value and streamline technology upkeep through SaaS
  *AVEVA, 16:45 – 17:15*

## Day 2 - Wednesday

- OSIsoft Cloud Services in discrete manufacturing / value chain approach
  *HENN GmbH, 08:40 - 09:30*

- Analyzing Wind Power data in the AVEVA Data Hub (OCS)
  *EDP Renewables, 09:45 - 10:15*

- Real Time Fleet Analytics with OCS
  *Industrial Digital Solutions, 11:15 - 11:45*

- Leveraging the combination of on-prem PI server and OCS cloud, to feed data analytics and machine learning applications
  *IMA LIFE, 14:00 - 14:30*

- Leveraging on AVEVA Edge/Cloud solutions to satisfy Enel's new data needs
  *Enel, 16:00 – 16:30*

## Day 3 - Thursday

- Customer Administration Best Practices for AVEVA Connect
  *AVEVA, 10:00 – 11:00*

- Securely Share Data with Your Trusted Business Partners & Customers using AVEVA Data Hub connected community
  *AVEVA, 11:15 - 12:15*

- Integrating your Operations Data Infrastructure
  *AVEVA, 13:30 - 14:30*

# How do I influence the roadmap?

https://feedback.osisoft.com

Let us know your product feedback!

AVEVA

# Elizabeth McErlean

## Senior Strategic Product Manager

- AVEVA
- elizabeth.mcerlean@aveva.com

# Alicia Coppock

## Senior Technical Product Manager

- AVEVA
- alicia.coppock@aveva.com

# Chris Felts

## Staff Strategic Product Manager

- AVEVA
- chris.felts@aveva.com

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The Company shall not be obliged to disclose any revision to these forward-looking statements to reflect events or circumstances occurring after the date on which they are made or to reflect the occurrence of future events.

AVEVA

in linkedin.com/company/aveva

🐦 @avevagroup

ABOUT AVEVA

AVEVA is a global leader in industrial software, driving digital transformation and sustainability. By connecting the power of information and artificial intelligence with human insight, AVEVA enables teams to use their data to unlock new value. We call this Performance Intelligence. AVEVA's comprehensive portfolio enables more than 20,000 industrial enterprises to engineer smarter, operate better and drive sustainable efficiency. AVEVA supports customers through a trusted ecosystem that includes 5,500 partners and 5,700 certified developers around the world. The company is headquartered in Cambridge, UK, with over 6,500 employees and 90 offices in over 40 countries.

Learn more at www.aveva.com

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