

OCTOBER 25, 2023

---

# PowerRunner on the AVEVA™ PI System™ - Extending the value of the PI Data infrastructure for real-time grid analytics

Jason Iacobucci - PowerRunner  
Kevin Walsh - AVEVA

The AVEVA logo is displayed in white, bold, uppercase letters. The letter 'V' is stylized with a horizontal bar through its center.

# An industry in transition

## Structural Transformation

### Global/Societal Trends

- Decarbonization & Electrification,
- Net-Zero Targets for 205

### Regulatory Compliance

- State renewable Mandates,
- FERC Order 2222,
- US Infrastructure Bill,
- DNO to DSO in Europe/Global

### Prosumer

- New consumer technologies are changing the physics of the electric distribution grid (Solar, wind, electric vehicles, energy storage)

## Digital Transformation

### Streaming “big data” – OT/IT convergence

- 1M Meters with 7 tags, read at 15-minute intervals = 1B measurement reads/day
- Joined with disparate OT and IT data sources

### Data Management

- Alignment, normalization, asset relationships, etc..

### Data Governance

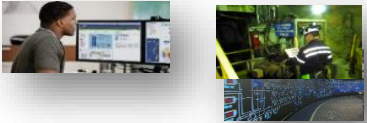
- Versioning, role-based security, traceability, etc.

### Real-time Actionable Information

- Enterprise-wide *single source of truth* containing the *best available data* with *configurable business analytics* to support *in-game* operational decisions

# AVEVA's Power & Utilities footprint

AVEVA Data Hub



**Enterprise Level Monitoring**  
Engineering & Planning

PI  
Systems



**Reporting Applications**  
KPIs, Dashboards  
Benchmarking, Mobility



**Business Applications**  
ERP, Outage Management, GIS,  
Work & Asset Management

**AMI Data at Scale**



**PowerRunner**  
Distribution Grid Analytics AMI  
Grid Analytics

AVEVA Data Hub

**Enterprise Operations Infrastructure**

**Community**

Control Center (ESP)

IEC61850  
C37.118  
COMTRADE  
DNP 3.0

Control Center (ESP)

Generation

Transmission  
EMS

Substation  
Data Integration  
(non SCADA)

Distribution  
Automation  
Devices  
(non SCADA)

Distribution  
DMS

Distributed  
Energy  
Resources

AMI  
Meter Data

Prosumer

- Fossil
- Hydro
- Renewable
  - Solar
  - Wind
- Biomass
- Thermal
- Storage



Grid Application	Advanced Sensing and Measurement Technology
Protection and Control	Line Protection Relay, Transformer Protection Relay, Bus Protection Relay, Circuit Breaker Protection Relay, Feeder Protection Relay
Monitoring & Control	Smart Recloser, Recloser Control, Voltage Regulator Control, Capacitor Bank Control, PQ Monitor, Smart Switch
Asset Condition Monitoring	Dissolved Gas Monitor, Moisture Monitor, Circuit Breaker Condition Monitor, Load Tap Changer Monitor
Fault Indicators and Sensors	Overhead Fault Indicator, Underground Fault Indicator
Metering	Smart Meter, Power Quality Meter, Revenue Meter



- Distributed Energy**
- Solar
  - Wind
- Energy Storage**
- Batteries
  - EV
- Microgrids**
- Grid sensors**

- At-the-meter**
- Load
  - Generation
  - Voltage
  - Etc.
- Behind-the-meter**
- Load
  - Generation
  - Sensor data

- Behind-the-meter**
- Solar
  - Storage
  - Sensor data
  - EV
  - Thermostats

**AVEVA**

# Overview

PowerRunner is a software and consulting solution provider - solutions address the unique and dynamic capabilities of the energy industry created by Variable Renewable Generation and Smart Meter investments needed to manage to the Whole Power System



- PowerRunner’s analytical solutions **govern, analyze and predict** granular and disparate streams of data for actionable, real-time decision management support
- PowerRunner has been implemented in other commodities and industries, like **natural gas and water**, proving its core platform’s economies of scope for multiple industries

# Distribution grid analytics

## Power and Utilities

### Challenge

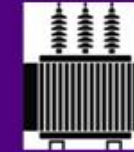
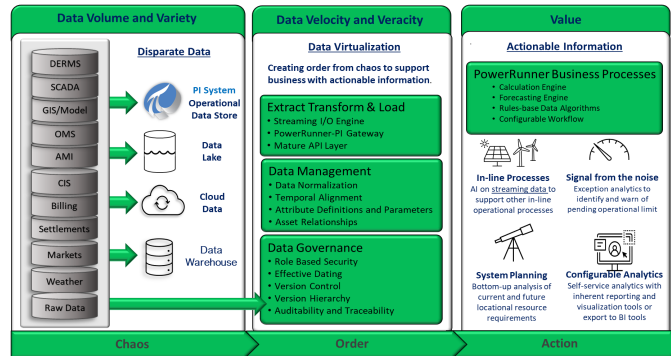
- Grid Fidelity is now dependent upon real-time awareness of Distribution Grid:
  - Thousands of network model asset relationships changes (intra) daily cross millions of assets
  - Near Real Time asset availability for operator (DG/DR/sectionalizers/ reclosers)
  - What thermal/voltage issues are present/predicted due to outages, weather etc.

### Solution

- PowerRunner on the PI System

### Results

- Asset Data Governance and Automated Network Model Validation for Connectivity Updates
  - 90% Accuracy out of the box identification of meter → xfmr mismatches, xfmr shorts
- DA Teaming Availability for Grid Reconfiguration and Segmentation
  - Reduced 2-3 FTE manual process over 2-3 days → near Real-Time display for Operators
- Automated Fault Detection and Location using SCADA and AMI for Affected Line Segments
  - Reduction in fault identification time and automated WAM ticket creation



Asset Monitoring



Fault Management



Load Data Analytics



Alarm Analytics



Visibility of transformers



Generation Ramping



Network Model Validation

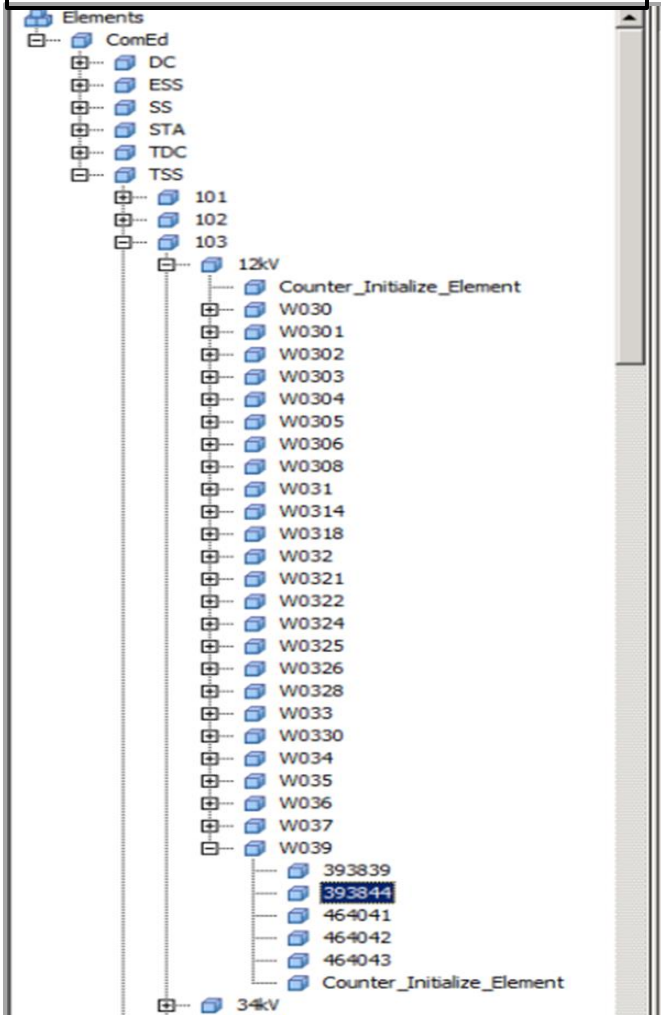


Forecasting

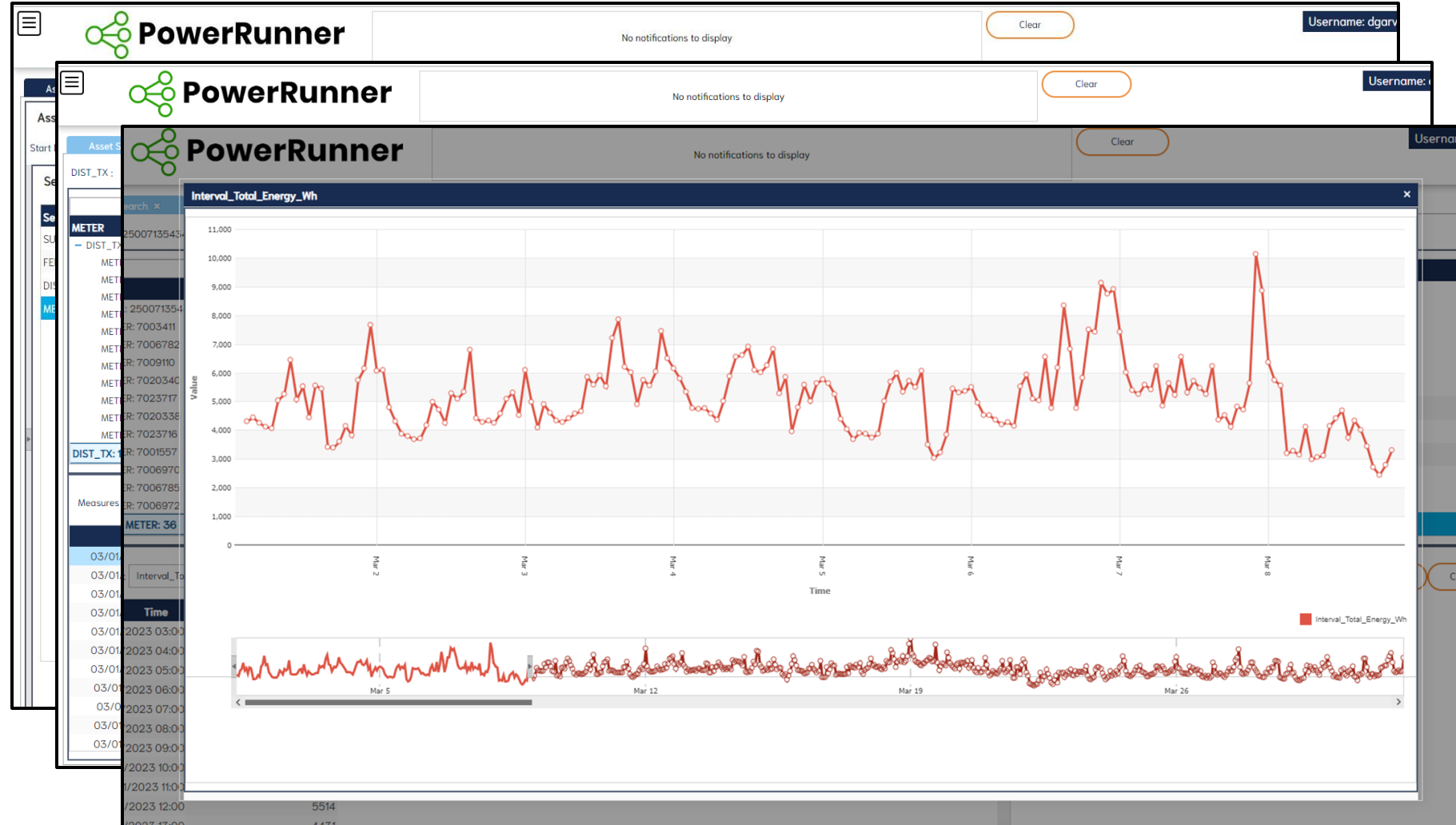
**AVEVA**

# Asset governance

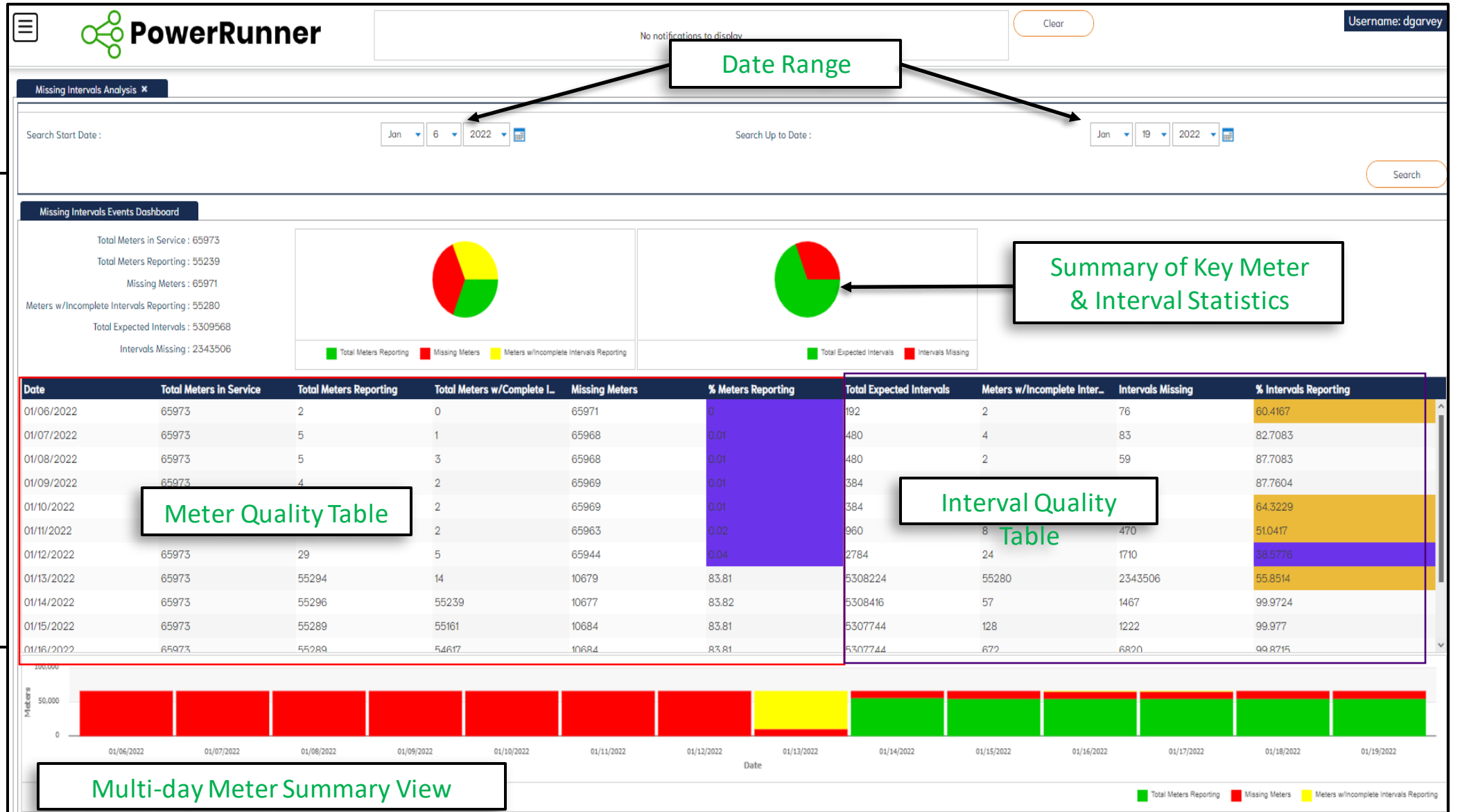
## PI Asset Framework



## High Cardinality Asset Hierarchy



# Meter data quality and exceptions



• Digital (Meter Events) and Analog Data Analysis

• SAIFI/ SAIDI calculations using AMI

Date Range

Summary of Key Meter & Interval Statistics

Meter Quality Table

Interval Quality Table

Multi-day Meter Summary View

# Network model validation and voltage analytics

- Full Network Model View
- Phase connection analysis
- Model connectivity evaluation and recommendation
- Recommended transformer voltage analysis/validation
- Broken Neutral and Shorted-Coil Detection



Network Model Job  
Runs

The screenshot displays the PowerRunner web application interface. It features a navigation menu on the left with options like 'Network Model View', 'Map', and 'Transformer'. The main content area shows a 'Meter: 25643923A' section with a 'Meter Voltage Profile' graph. The graph plots '2-Phase Service Voltage' on the y-axis (ranging from 240.5 to 247) against 'Time' on the x-axis (ranging from Feb 14 to Feb 21). The graph shows a significant voltage spike starting around Feb 18. Below the graph is a table titled 'All Transformer Short Violation View' with columns for Transformer, Operating Center, Transformer Phase, Measure Name, Start Date, End Date, Transformer Violation Type, Transformer Short Date TL, Voltage Jump, and Direction.

Transformer	Operating Center	Transformer Phase	Measure Name	Start Date	End Date	Transformer Violation Type	Transformer Short Date TL	Voltage Jump	Direction
36011143950	GALESBURG-KEWANEE	C	Voltage Phase A	09/01/2020	09/27/2020	TRANSFORMERSHORT	09/06/2020 09:45	0.15005569063168162	UP
36013370501	LASALLE		Unknown Phase A	09/01/2020	09/27/2020	TRANSFORMERSHORT	09/06/2020 16:15	0.6546638208790434	DOWN
30010101884	MARION						2021 08:15	0.0786579802599804	UP



# Near real-time distribution automation analysis and exceptions

- DA Network Configuration Availability
- Line Fault Locator
  - Work Request Automation
- Last Asset Operation
- Asset Failure Risk Analysis
- Cap Bank Monitoring

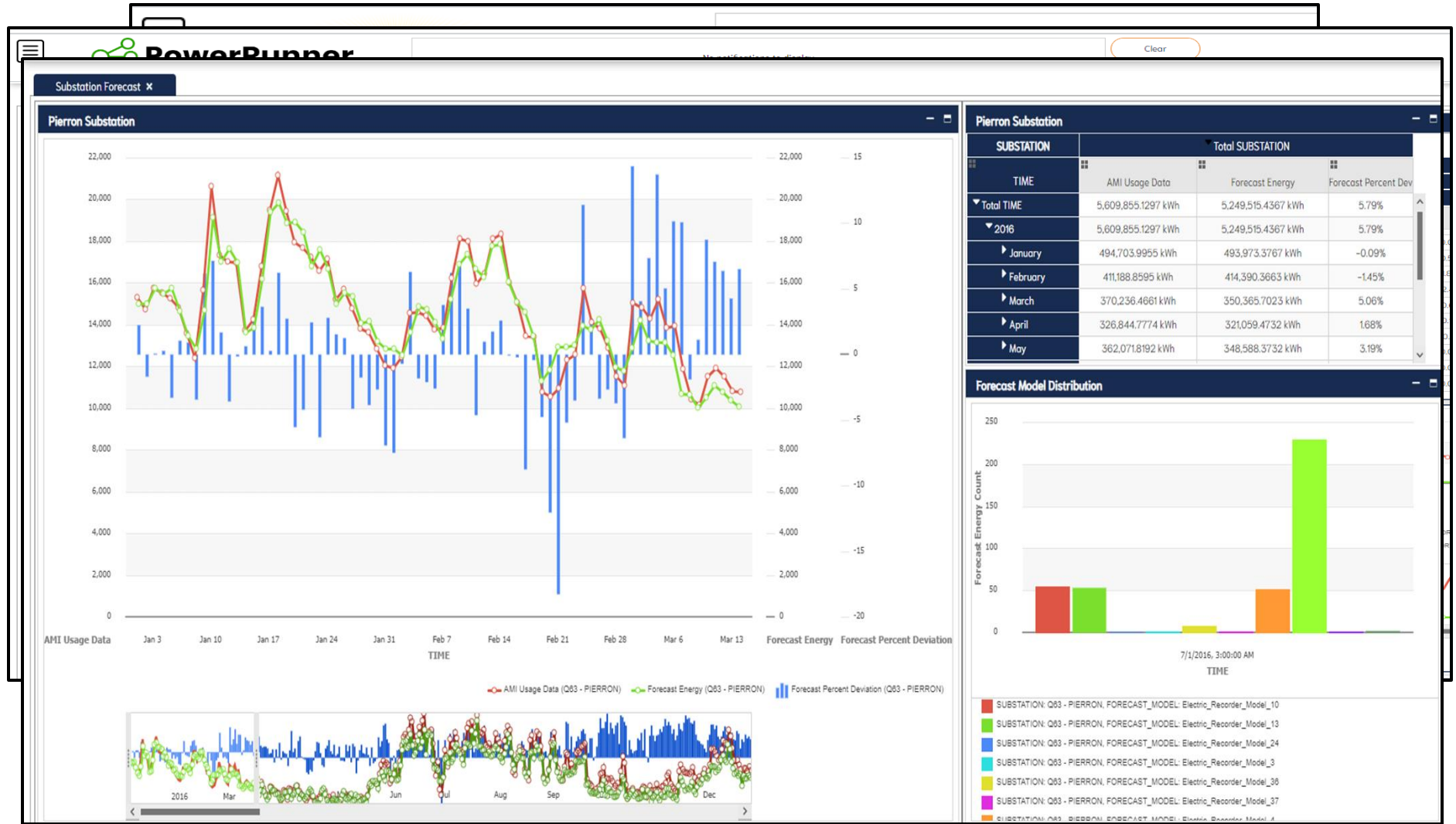
The screenshot displays the PowerRunner web application interface, which is used for near real-time distribution automation analysis and exceptions. The interface is divided into several sections:

- Top Section:** Displays the PowerRunner logo, a notification area with "No notifications to display", and a "Clear" button. The user's name "Username: jacobucci" is visible in the top right corner.
- Navigation Tabs:** Includes "Teaming", "Last Operations", "Risk Scoring Algorithm", and "Cap Bank Monitoring".
- Left Panel:** A list of devices with their IDs, such as 384281, 384303, 528551, 468925, 488888, 488897, 521945, 522429, 509070, 488889, 533573, 482478, 464939, 509622, 509613, 525108, 350054, 483250, 525564, and 459646.
- Right Panel:** Contains a "Risk Scoring Algorithm" section and a "Cap Bank Monitoring" section. The "Cap Bank Monitoring" section includes a table with columns for Device, SW Trbl Value, SW Trbl Timestamp, OV Value, OV Timestamp, UV Value, UV Timestamp, EVO Value, and EVO Timestamp. Below the table is a line graph showing the values over time.

Device	SW Trbl Value	SW Trbl Timestamp	OV Value	OV Timestamp	UV Value	UV Timestamp	EVO Value	EVO Timestamp
5950615	ALARM-METER	01/23/2023 11:48	ALARM-METER	01/23/2023 11:48	NORMAL-METER	01/23/2023 11:48	NORMAL-METER	01/23/2023 11:48
5950615	ALARM-METER	04/11/2023 19:00	ALARM-METER	04/11/2023 19:00	NORMAL-METER	04/11/2023 19:00	NORMAL-METER	04/11/2023 19:00

# Look-ahead analysis with Predictive Analytics

- Asset- Level Gen/ Load Forecasts
- Constraint Analysis
- DER Performance and Impacts



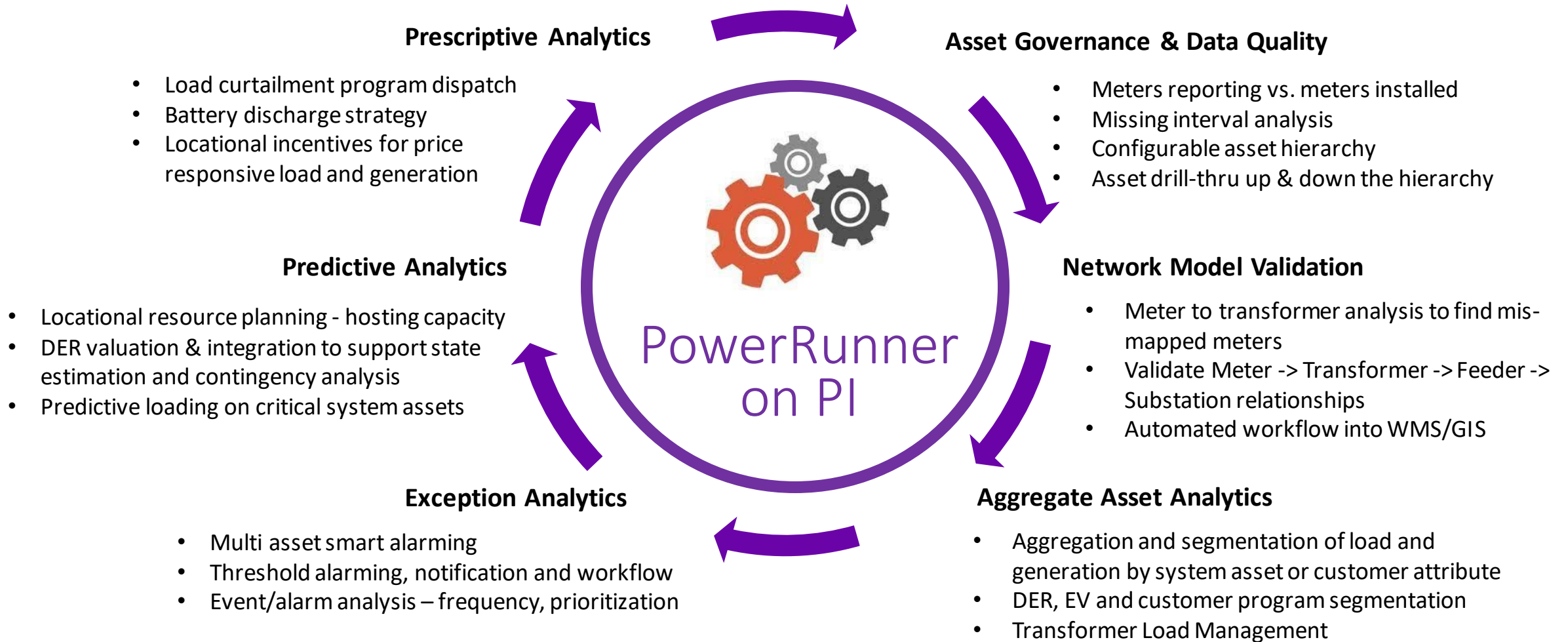
# Benefits- Automated DA monitoring with sectionalizer and autorecloser teams



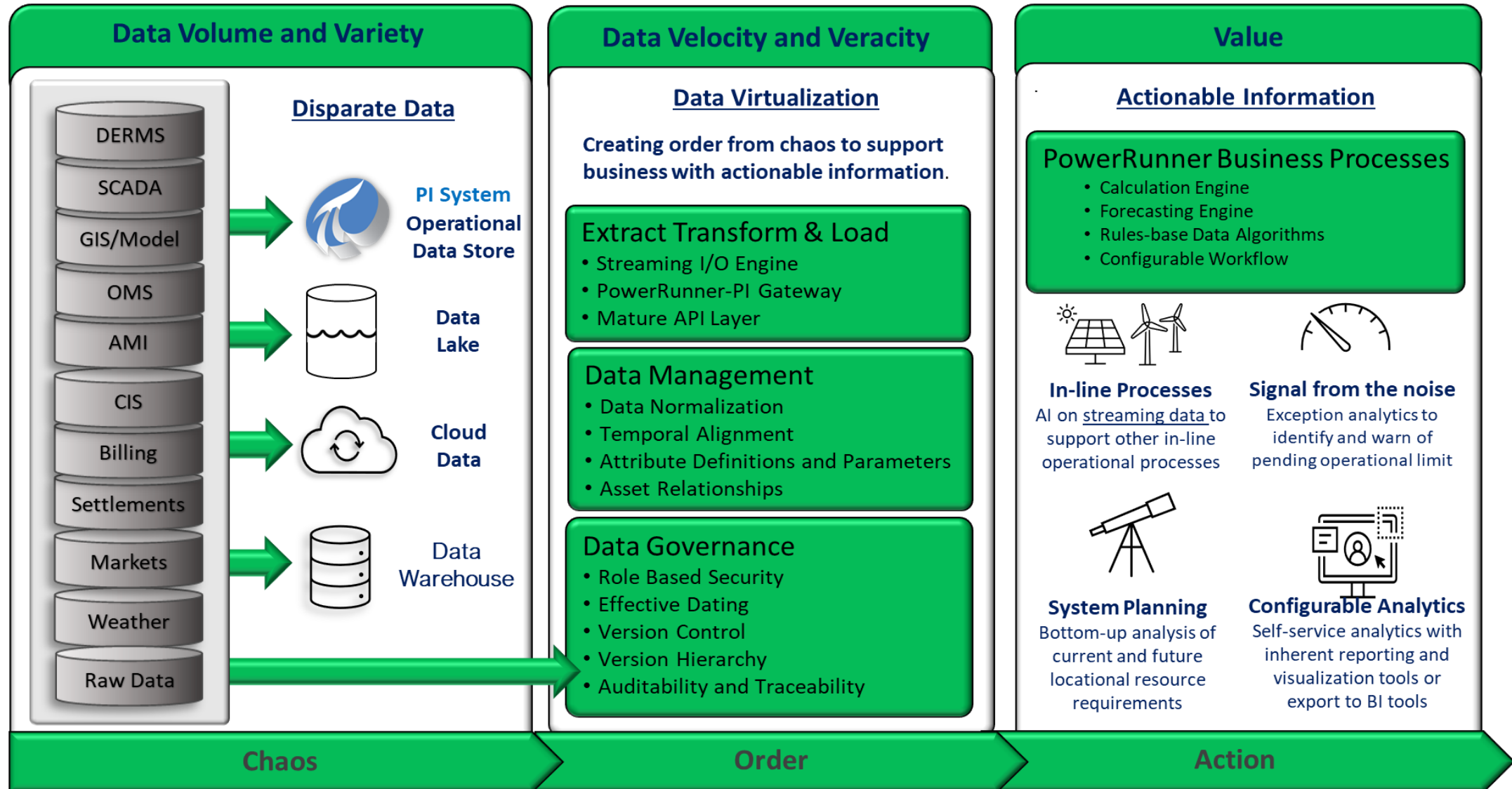
[Distribution Grid Analytics with the AVEVA PI System and PowerRunner to support exception based analytics](#)

Commonwealth Edison Company (ComEd, an Exelon Company) provides electric service to approximately 3.8M customers across northern Illinois, or 70% of the state's population. Distribution teaming schemes are becoming more advanced and the challenge is how do you monitor team status in near real-time, incorporate design changes, and keep a record of the type of event happening to the team. ComEd is using the PI System with their partner, PowerRunner, to monitor and automate team updates in an automated fashion.

# Value approach of operational analytics



# PowerRunner on the AVEVA PI System solution





---

Jason Iacobucci

President

- PowerRunner
- Jason.Iacobucci@powerrunner.com



Kevin P Walsh

Industry Principal

- AVEVA
- kevin.walsh@aveva.com

# 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.

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.



 [linkedin.com/company/aveva](https://www.linkedin.com/company/aveva)

 [@avevagroup](https://twitter.com/avevagroup)

#### ABOUT AVEVA

AVEVA is a world leader in industrial software, providing engineering and operational solutions across multiple industries, including oil and gas, chemical, pharmaceutical, power and utilities, marine, renewables, and food and beverage. Our agnostic and open architecture helps organizations design, build, operate, maintain and optimize the complete lifecycle of complex industrial assets, from production plants and offshore platforms to manufactured consumer goods.

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. The company is headquartered in Cambridge, UK.

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