NOVEMBER 2022

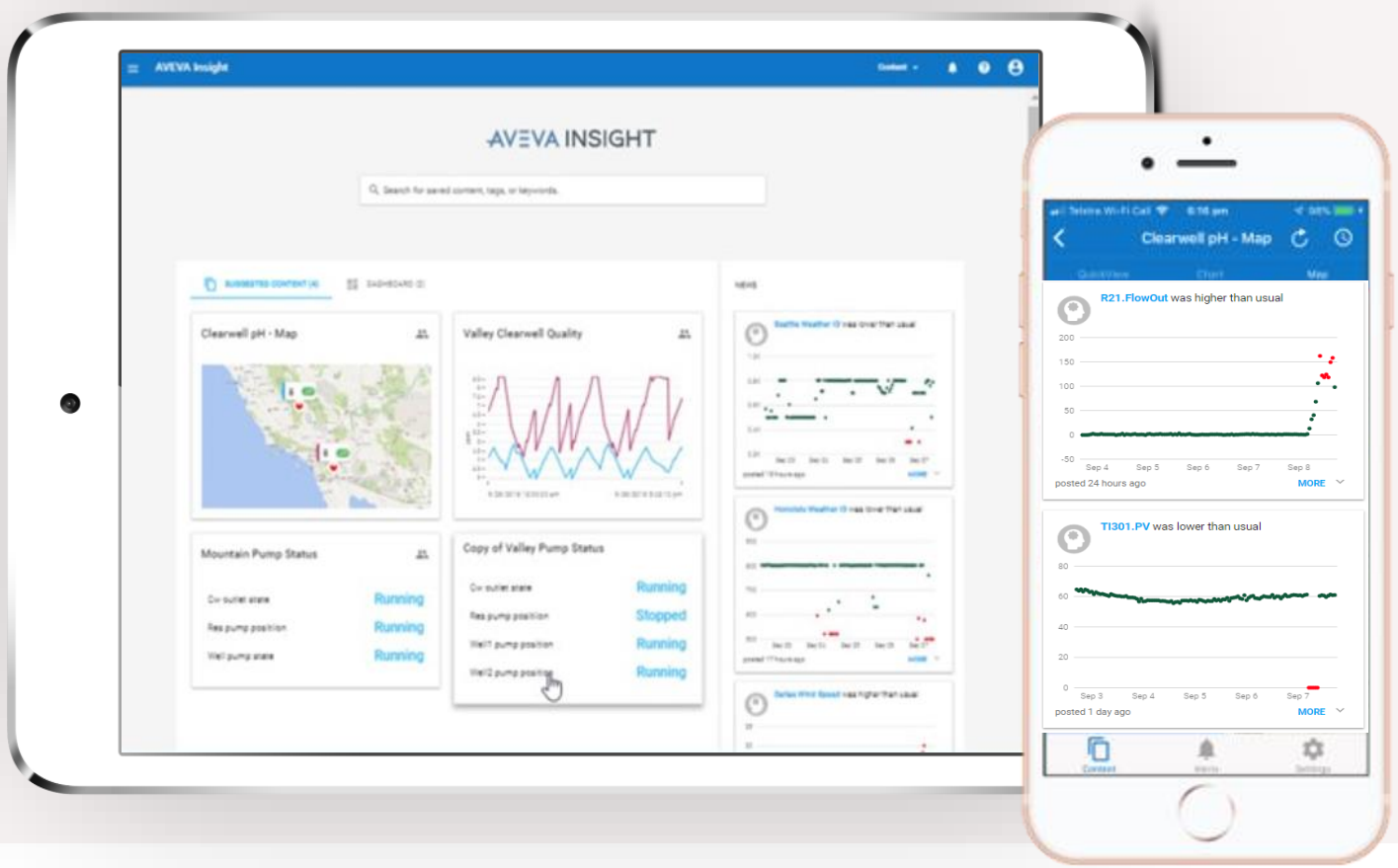
Transform data into new insights

with AVEVA Insight Analytics

Christian-Marc Pouyez, Director APM Advanced Analytics

AVEVA™ Insight

Continuously monitor real-time data to detect anomalies and optimize performance without complexity.

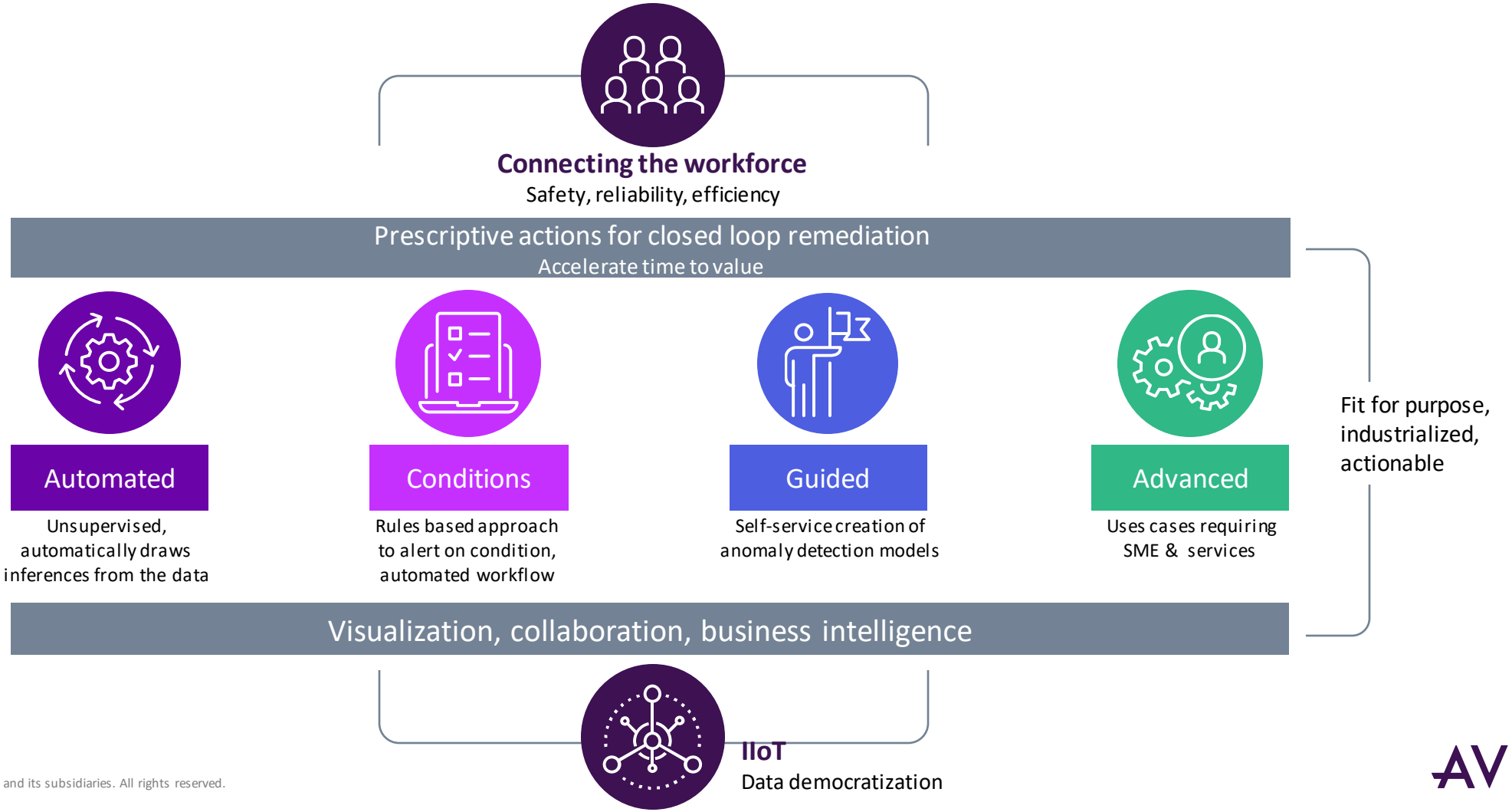


Make operational data accessible and empower your workforce with insights – anywhere, anytime, any device

- Search based navigation
- Time series analysis
- Process graphics
- Geolocation / mapping
- Customizable Dashboards
- Condition Management / Alerts & Notifications
- Predictive Analytics
- Asset efficiency & OEE Analysis
- Secure data transport and access

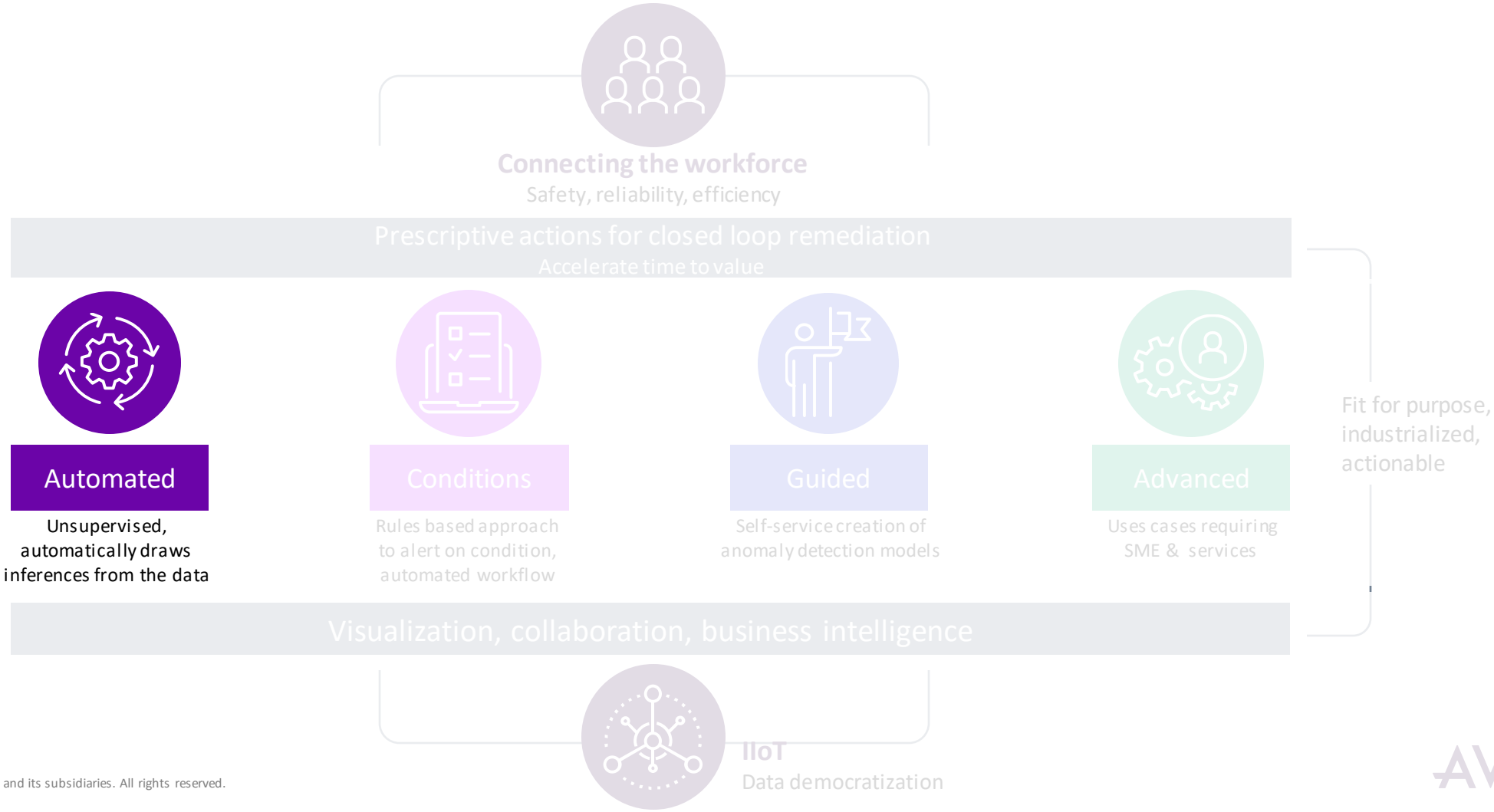
AVEVA Insight

Empowering the connected worker through predictive analytics



Unlock data and experience to drive reliable autonomous plant

The human experience meets Artificial Intelligence in the cloud



Automated Analytics

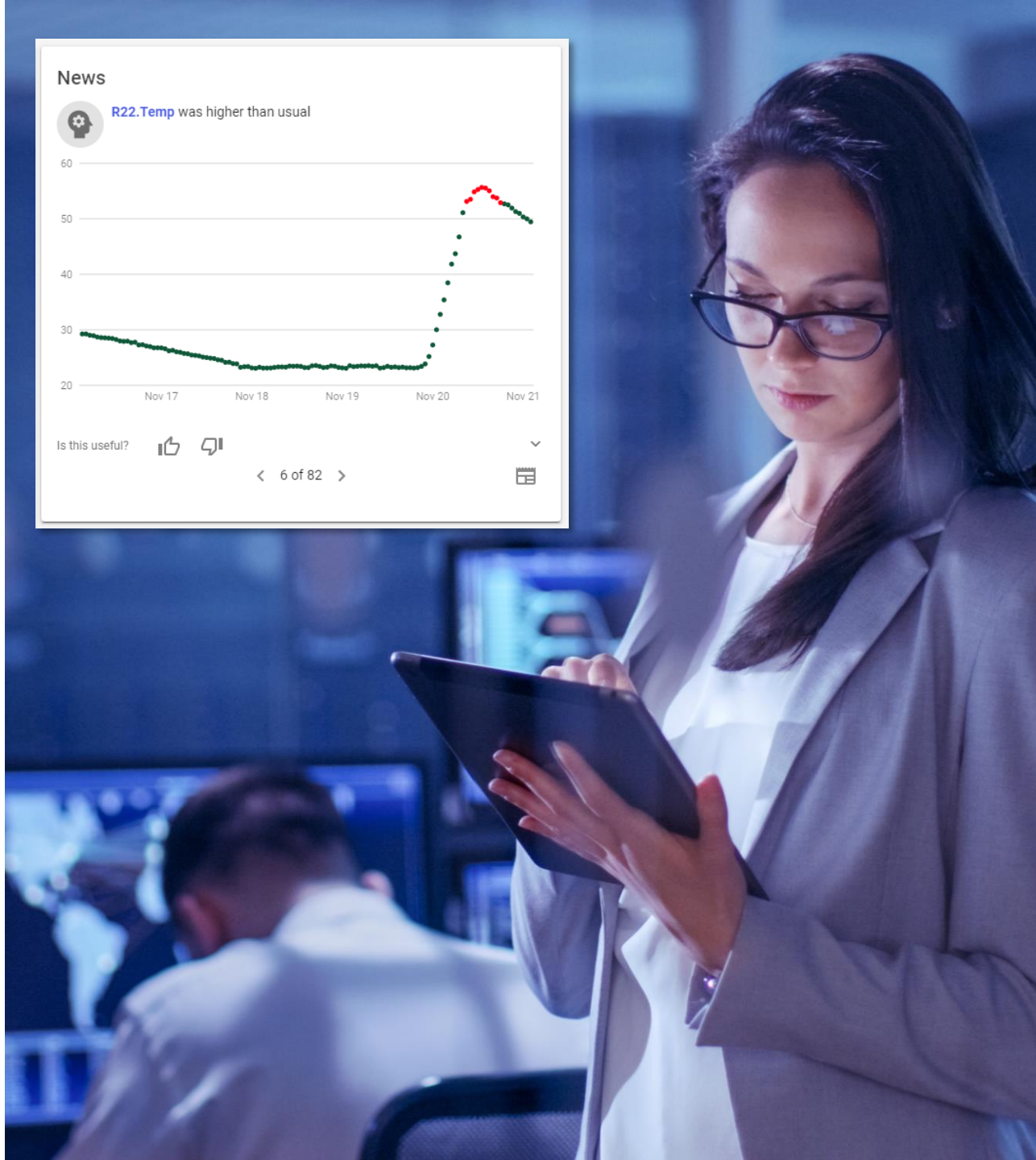
Identify potential issues in day to day processes detecting anomalies through automatic scans.

Unsupervised Anomaly detection

- Completely automatic,
- Learns from historical data with no configuration needed

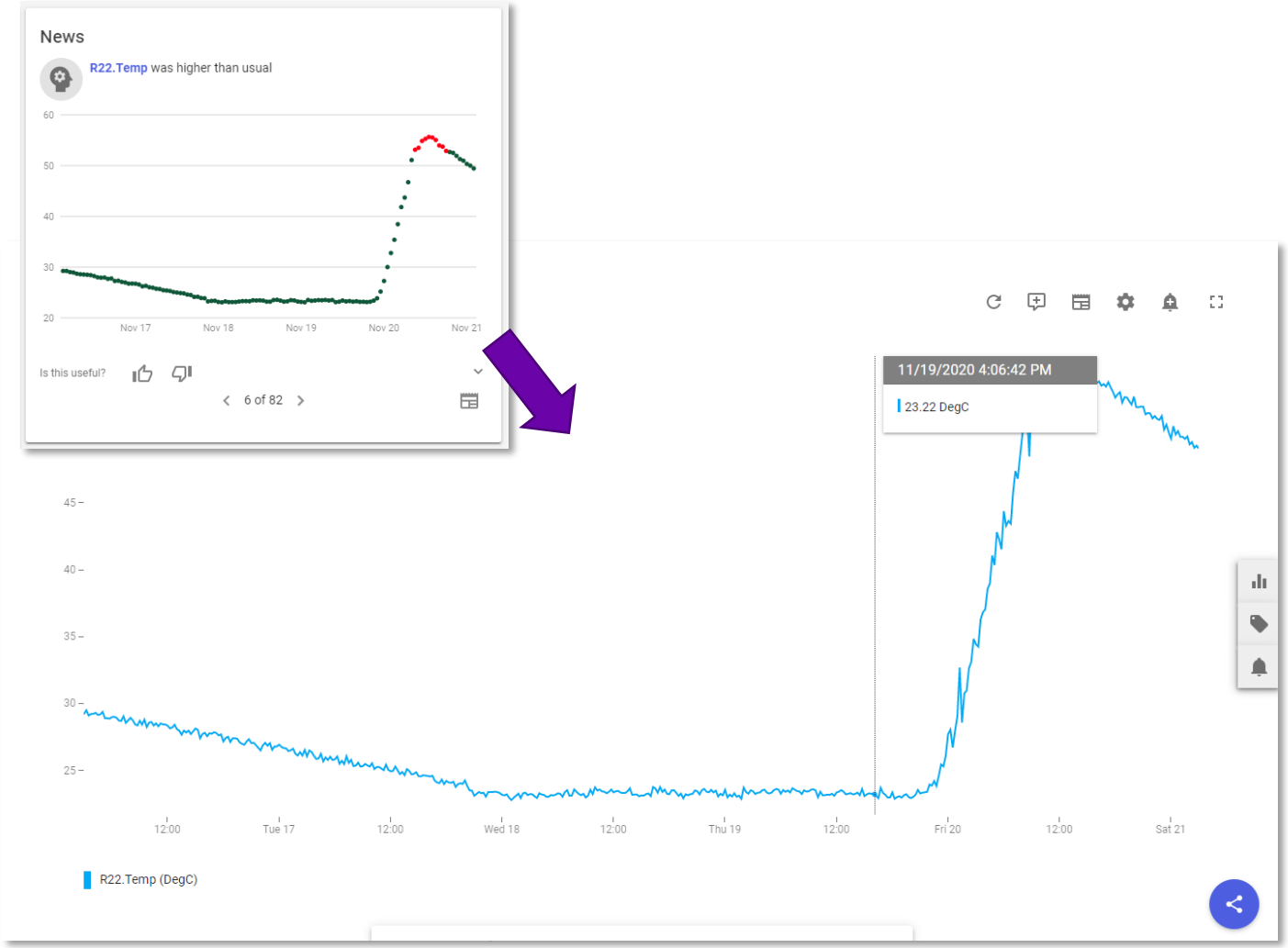
Anomalies are shown in the News Feed of AVEVA Insight

- Feedback on the usefulness will structure data for future ranking
- Users can drill through to relevant trend for further analysis



Introduction to Insight Analytics Capabilities

Automated Analytics



Unsupervised Anomaly detection

- Completely automatic; nothing to configure
- Learns from historical data

Anomalies detected sent as news feed

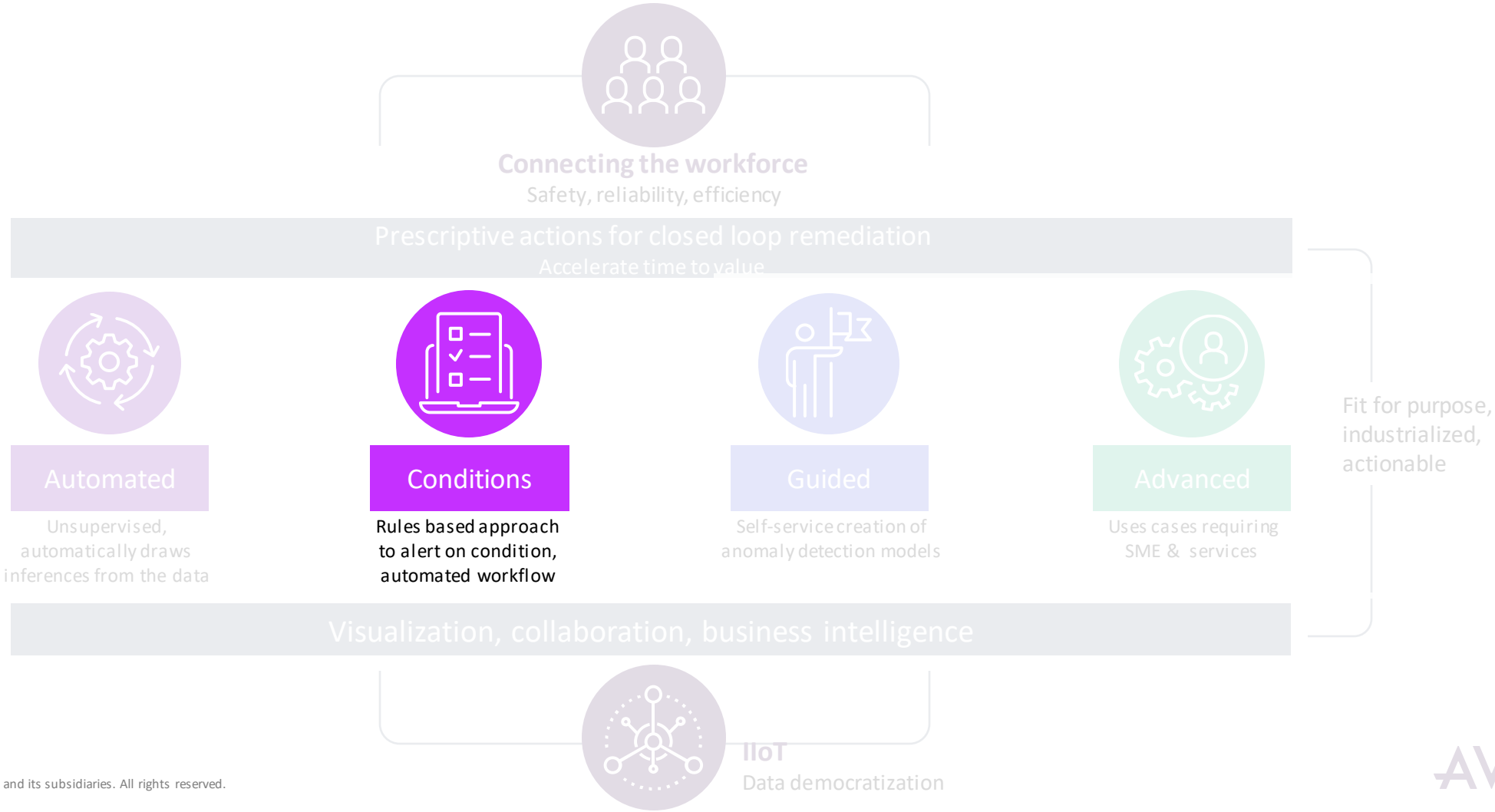
- Users can identify whether news are useful
- Users can drill through to relevant trend

Example types of anomalies detected:

- Deviation from normal values
- Flatlines
- Different cycle times
- Entropy variations
- Correlations between tags

Unlock data and experience to drive reliable autonomous plant

The human experience meets Artificial Intelligence in the cloud



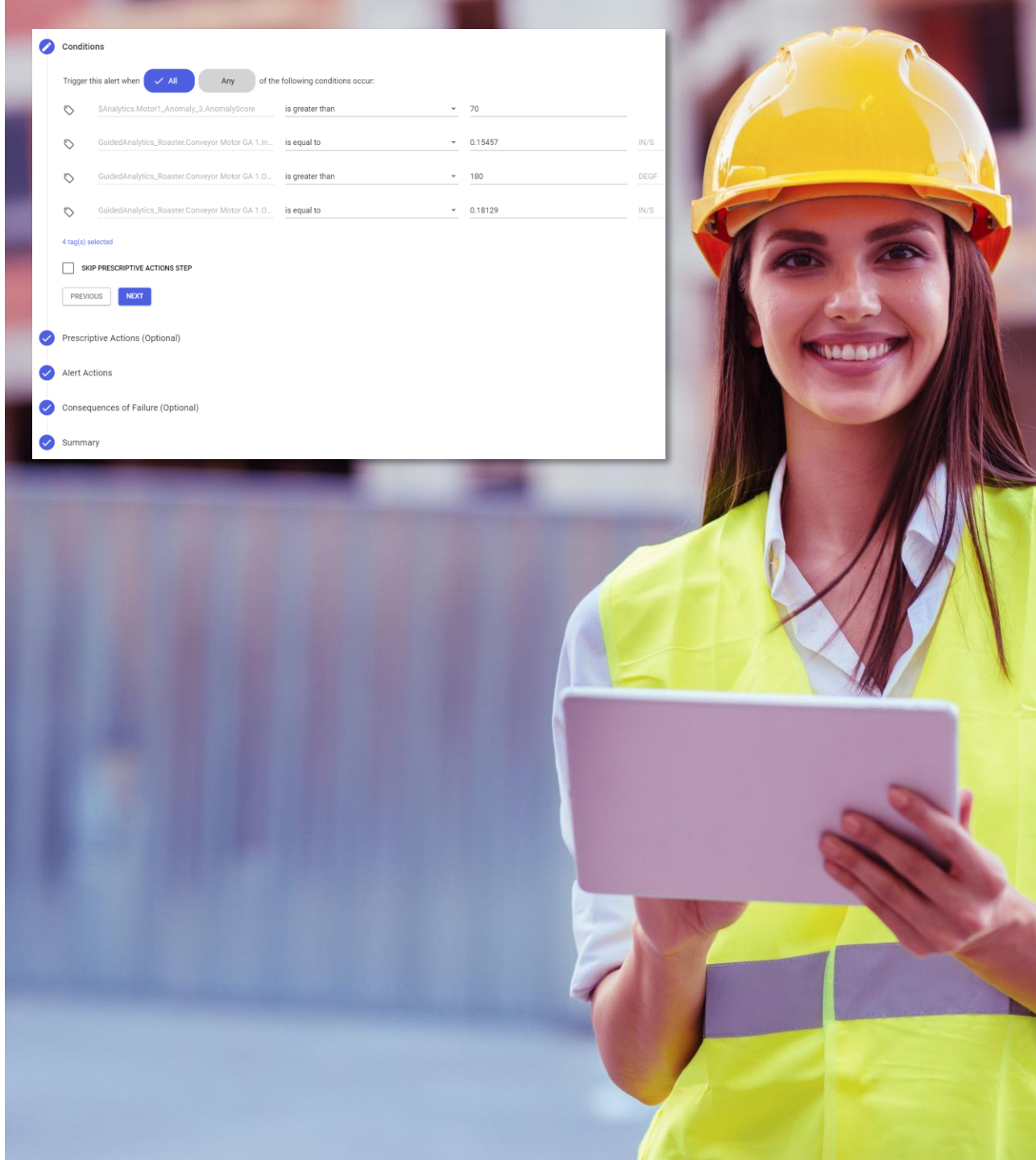
Condition-Based Rules

Detect asset conditions that have a need for a maintenance action.

- Condition-Based Multi Tag Rules triggering alerts and configured actions when the conditions are met.
- Integrate consequences of failure: Safety, Environmental and Production.
- Best used to monitor known conditions limits in assets and prevent non-desired operational conditions and downtime.

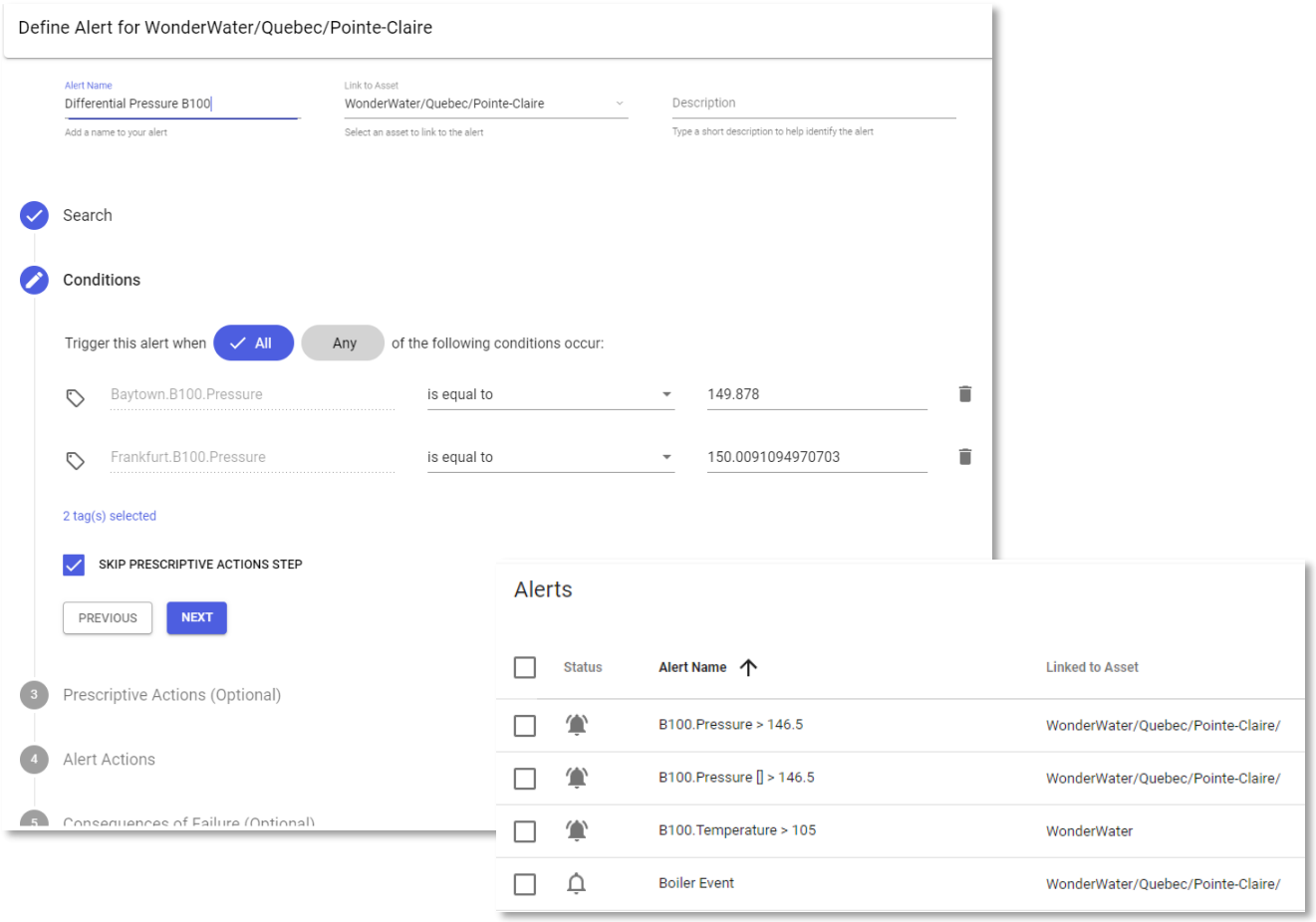
Example of configurable actions:

- Prescriptive information from Insight Asset Library
- Send alert notifications via email, Slack
- Create Work Order in EAM system



Introduction to Insight Analytics Capabilities

Condition-based rules



User-friendly configuration

- Wizard-based configuration
- Define conditions to trigger alert

Example configurable actions:

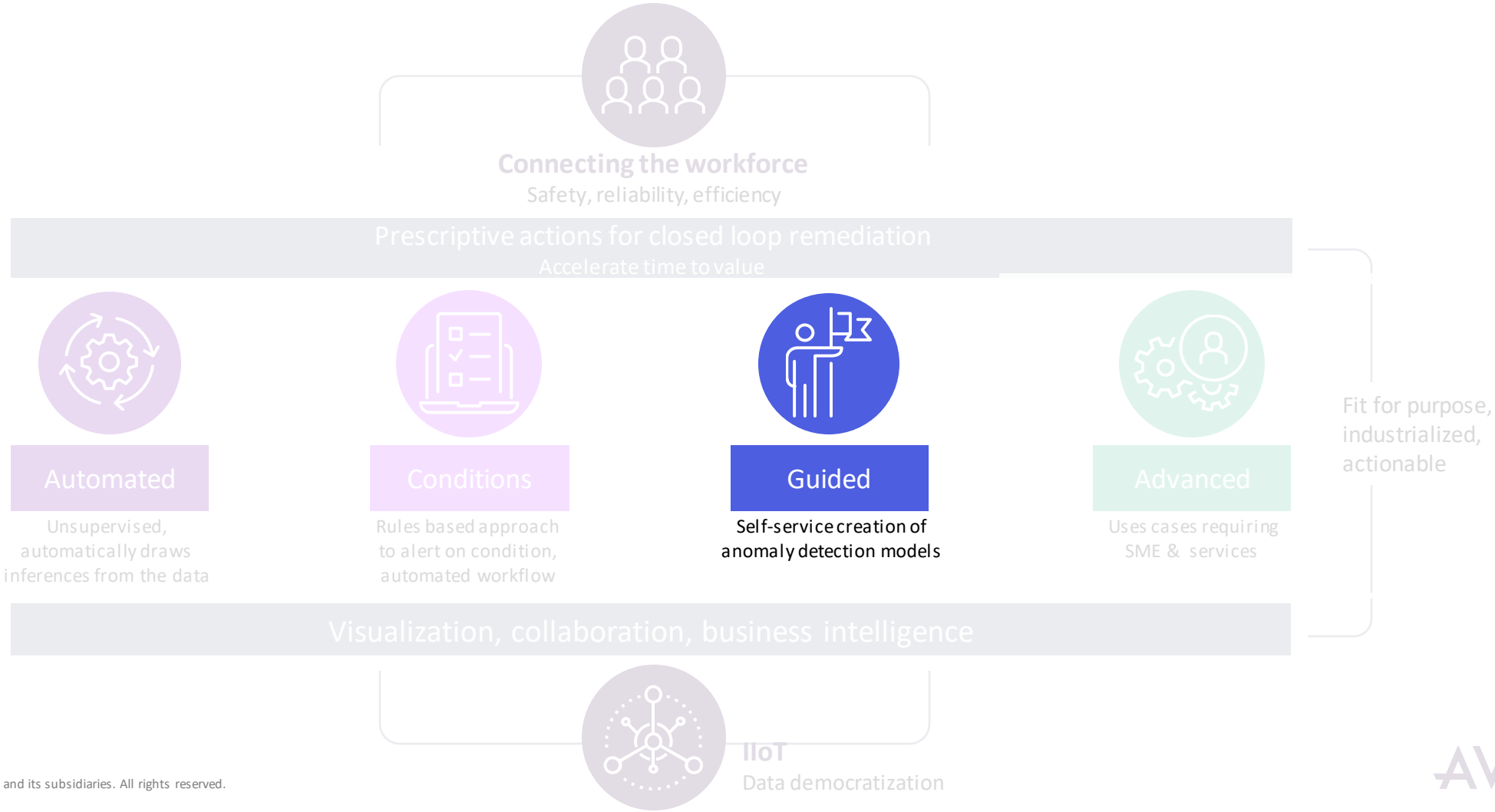
- Prescriptive information from Insight Asset Library
- Send alert notifications via email, Slack
- Create Work Order in EAM system

Identify consequences of failure

- Safety
- Environmental
- Production

Unlock data and experience to drive reliable autonomous plant

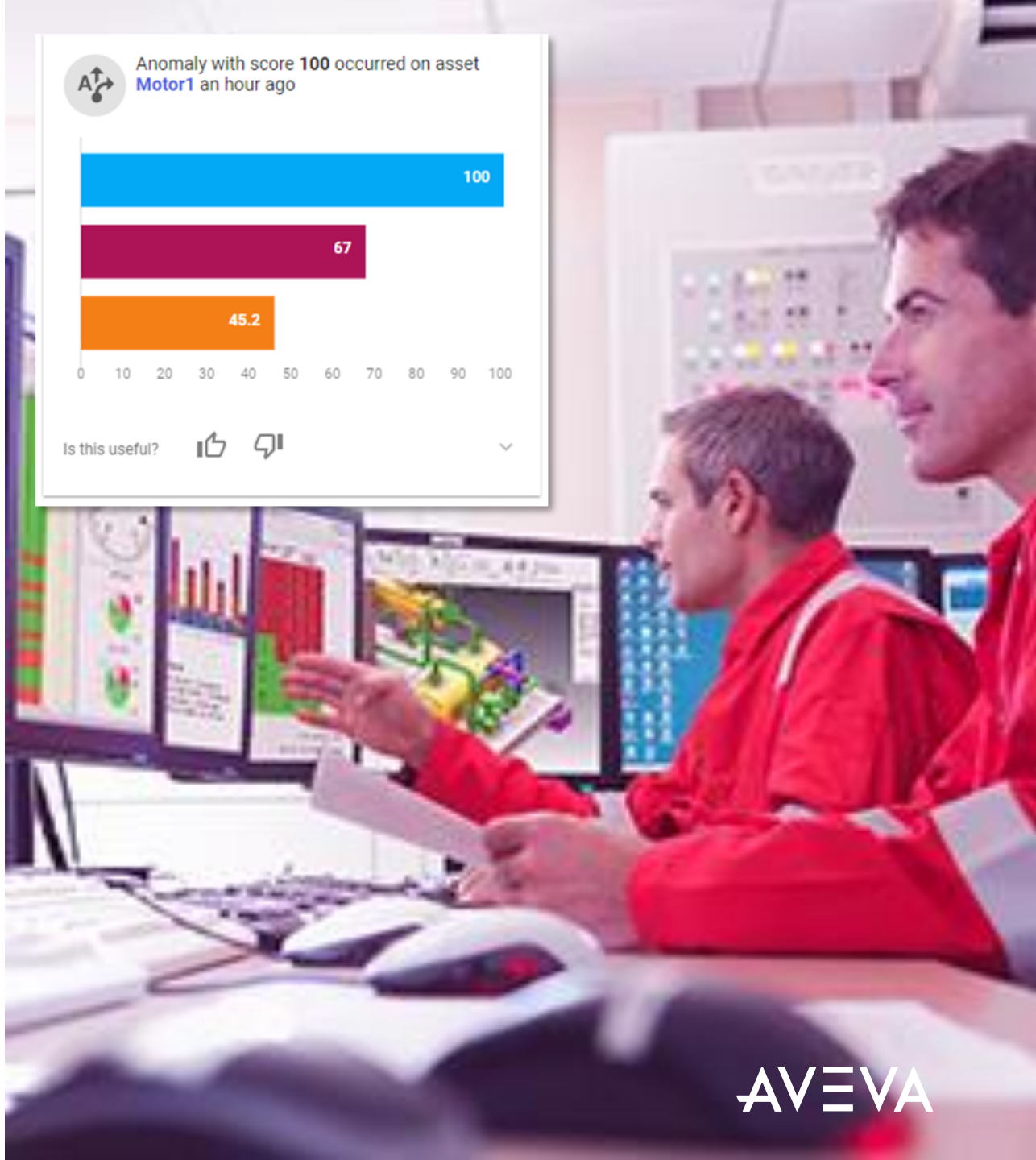
The human experience meets Artificial Intelligence in the cloud



Guided Analytics

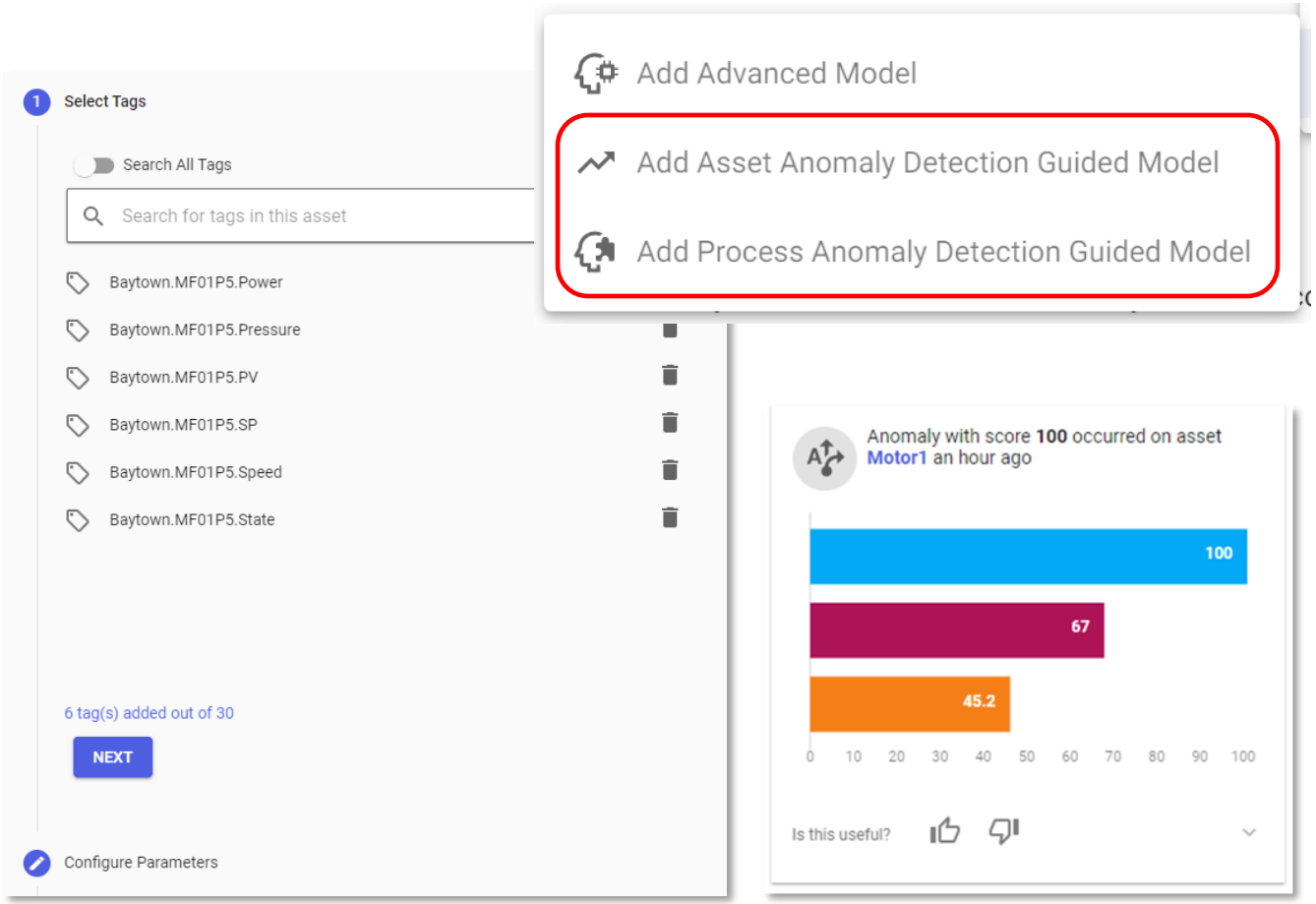
Anomaly detection on selected assets, easy to implement and interpret for Insight users.

- Simple configuration: user selects which tags to include in model and a period representing normal operating conditions.
- No data science knowledge required.
- Simple results: Anomaly score with top 3 variables contributing to the anomaly.
- Overall anomaly score generated as new tag, that can be leveraged to build rules-based alerts with prescriptive actions



Introduction to Insight Analytics Capabilities

Guided Analytics



Guided Configuration

- Two types of algorithms:
  - Asset Anomaly Detection
  - Process Anomaly Detection
- Select tags to include in model
- Choose model training period
- Optionally identify filters, operational modes

Anomalies detected sent as news feed

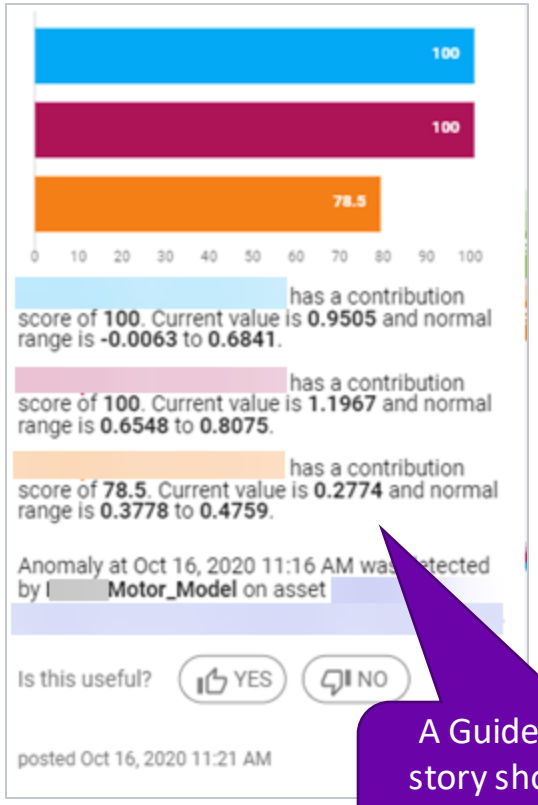
- Identifies top 3 variables contributing to anomaly
- Users can identify whether news are useful
- Users can drill through to relevant trend

Anomaly score

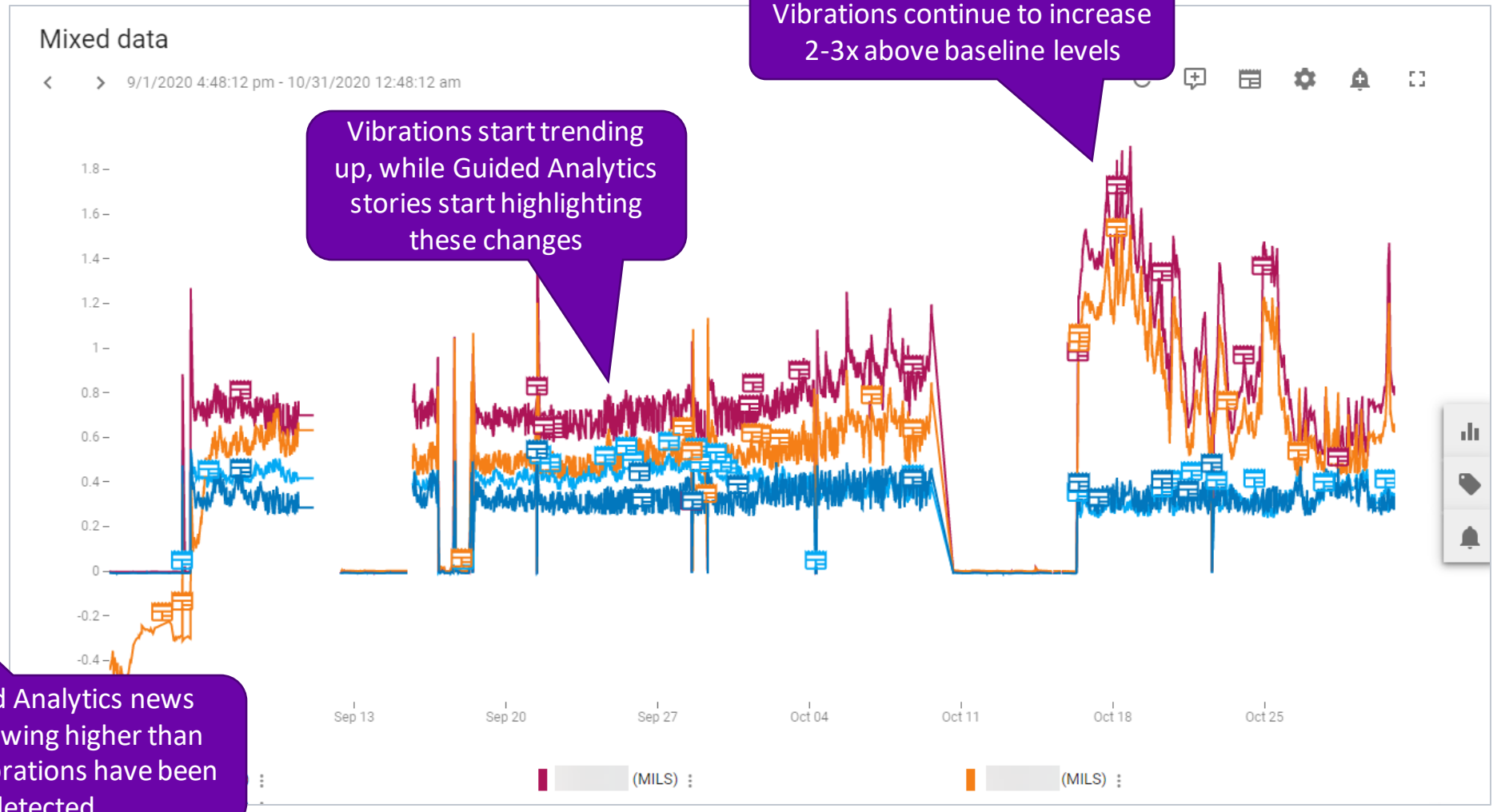
- Overall anomaly score available in a tag
- Type of anomaly identified for each contributor

Motor Driven Pump

Guided Analytics Case



A Guided Analytics news story showing higher than normal vibrations have been detected.



Industries and Asset candidates for Guided Analytics

Oil and Gas Chemicals

- Pumps
- Expanders

Food, Beverage, CPG

- Agitators
- Blender
- Mixer
- Fans
- Blowers
- Boiler
- Oven
- Pumps
- Air heaters

Mining

- Emission systems
- Pulveriser
- Crusher
- Gearbox
- Kiln

Infrastructure

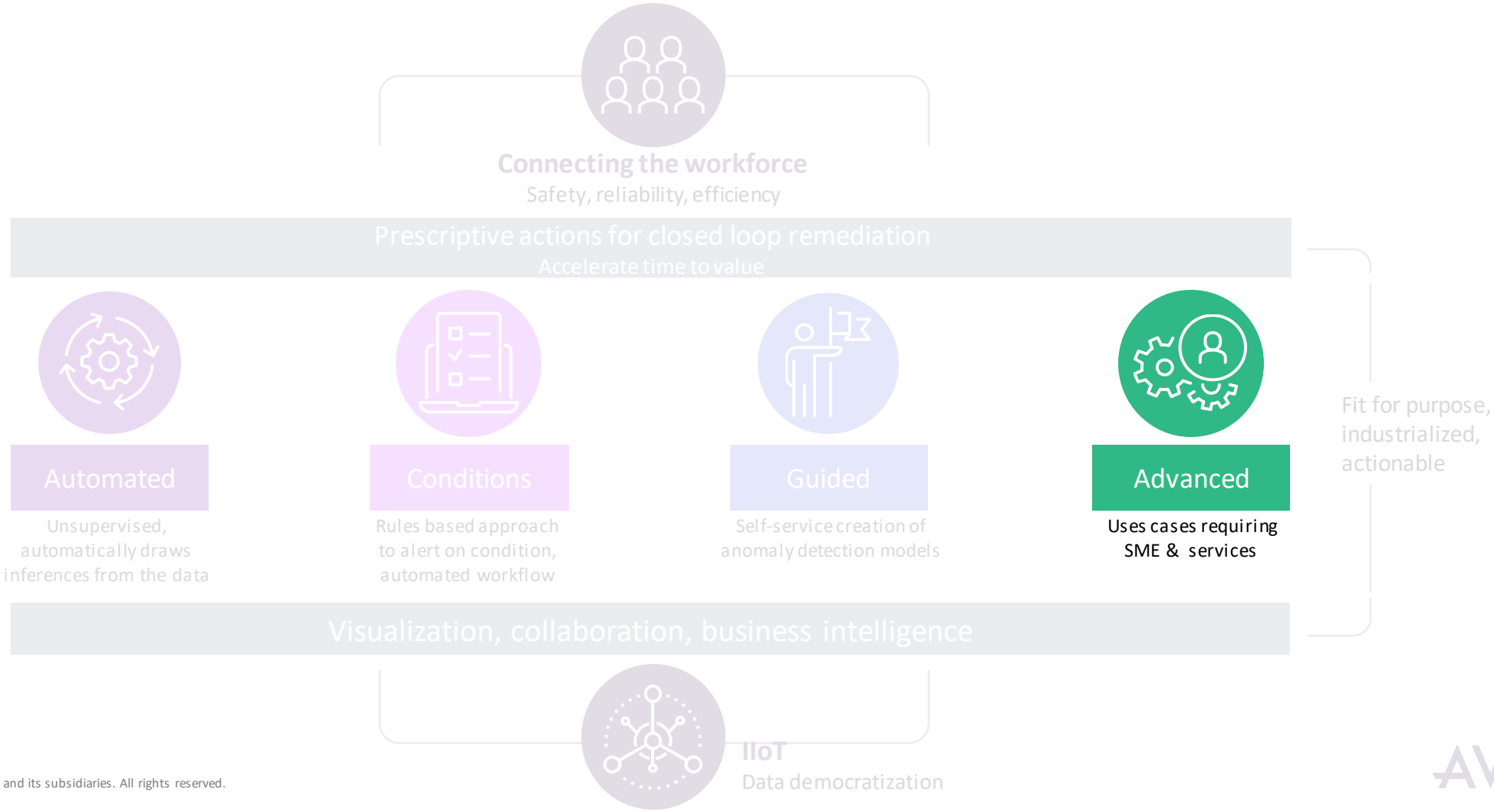
- Pumps
- Variable Frequency Drives (VFD)
- Heat exchanger
- Chillers

Water & Waste Water

- Pumps
- Motors
- Blowers

AVEVA Insight

The human experience meets Artificial Intelligence in the cloud



AVEVA Insight Advanced Analytics

Predictive Quality
- Run CpK
- First Pass Quality %

Predictive Uptime
- Uptime %
- Remaining Time to Downtime
- Probability of Downtime

Predictive Throughput
- Production Rate
- Run Length
- Cycle Time
- Material Cost/Unit Production

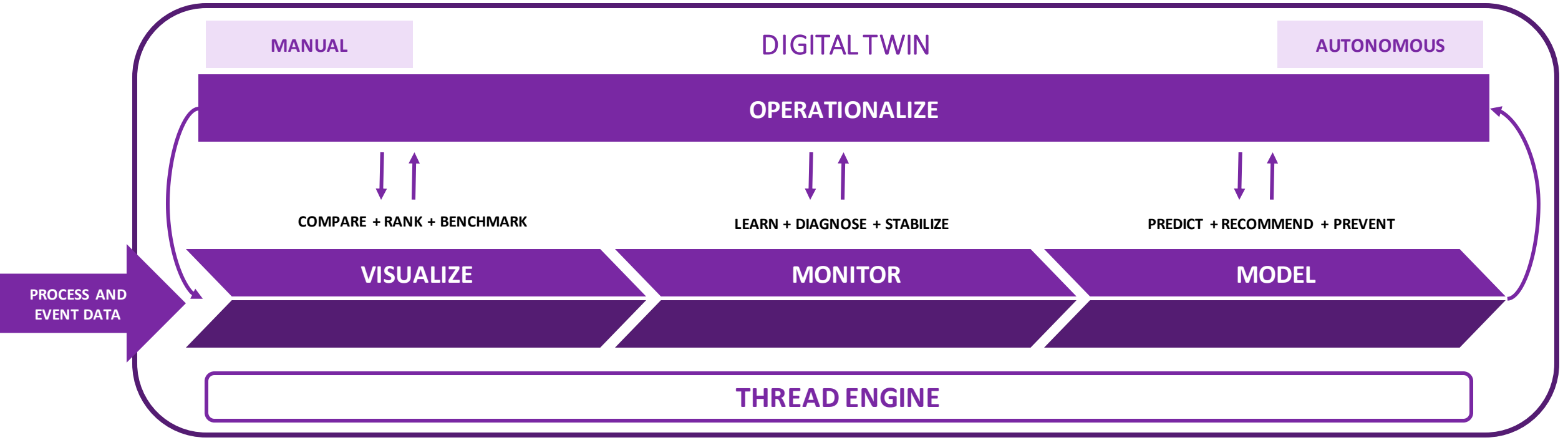
Predictive Asset Reliability
- Mean Time Between Failure
- Remaining Time To Failure
- Probability of Failure

Predictive Energy Efficiency
- Energy Cost
- Unit Production

Predictive Asset Life
- Remaining useful life
- Total life

Providing an accelerated journey to autonomous operations

Proven, continuous innovation process that drives rapid value at each point in the journey



Case Study: Predictive Quality

Problem

Premium Pet Food Manufacturer wanted to reduce scrap from frequent line startups / formulation changes and reduce reliance on in-process testing. Due to 30-60min process lag times between key unit operations and finished product quality tests, the potential for scrap from off-quality product was very high.

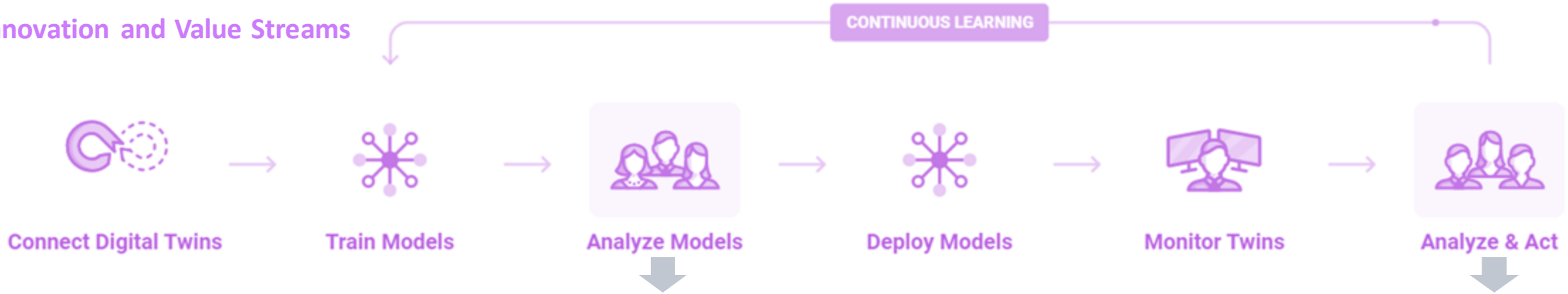
Solution

Implement predictive models for "middle of line" quality for finished product Density, Moisture, Fat, and Protein content. Monitor more than 75 process variables from across the production process to make accurate predictions for all four quality parameters in real-time, plus provide recommendations to operators to keep quality on-target.

Payback

Payback periods between 15-60 days (implementation + 1yr subscription).

Innovation and Value Streams



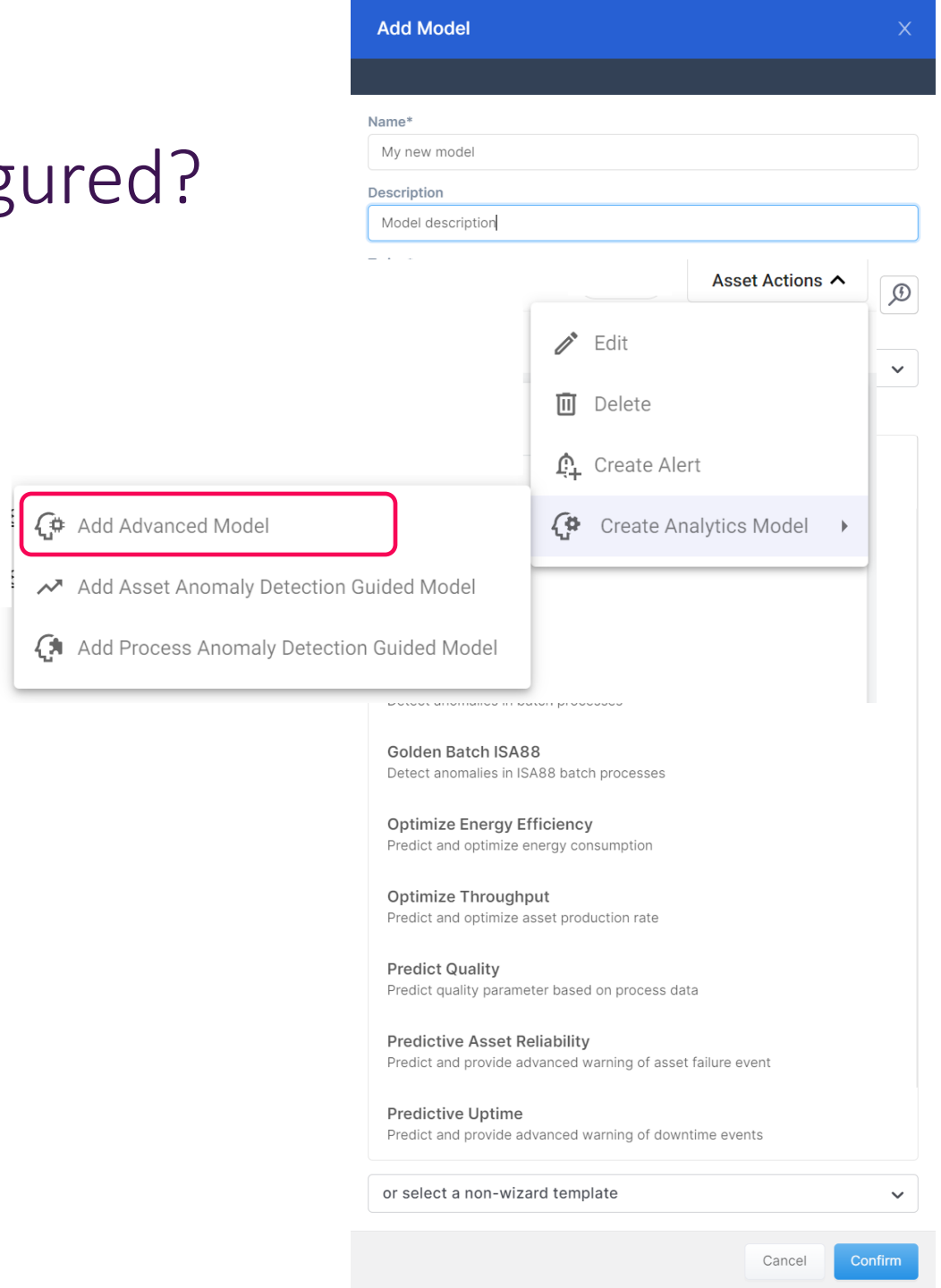
- Top quality drivers
- Best recipe / centerlines
- Automation opportunities
- Recipe simulation

- Soft Sensor / Real-time Prediction
- Real-time Anomalies
- Real-time Recommendations

AVEVA

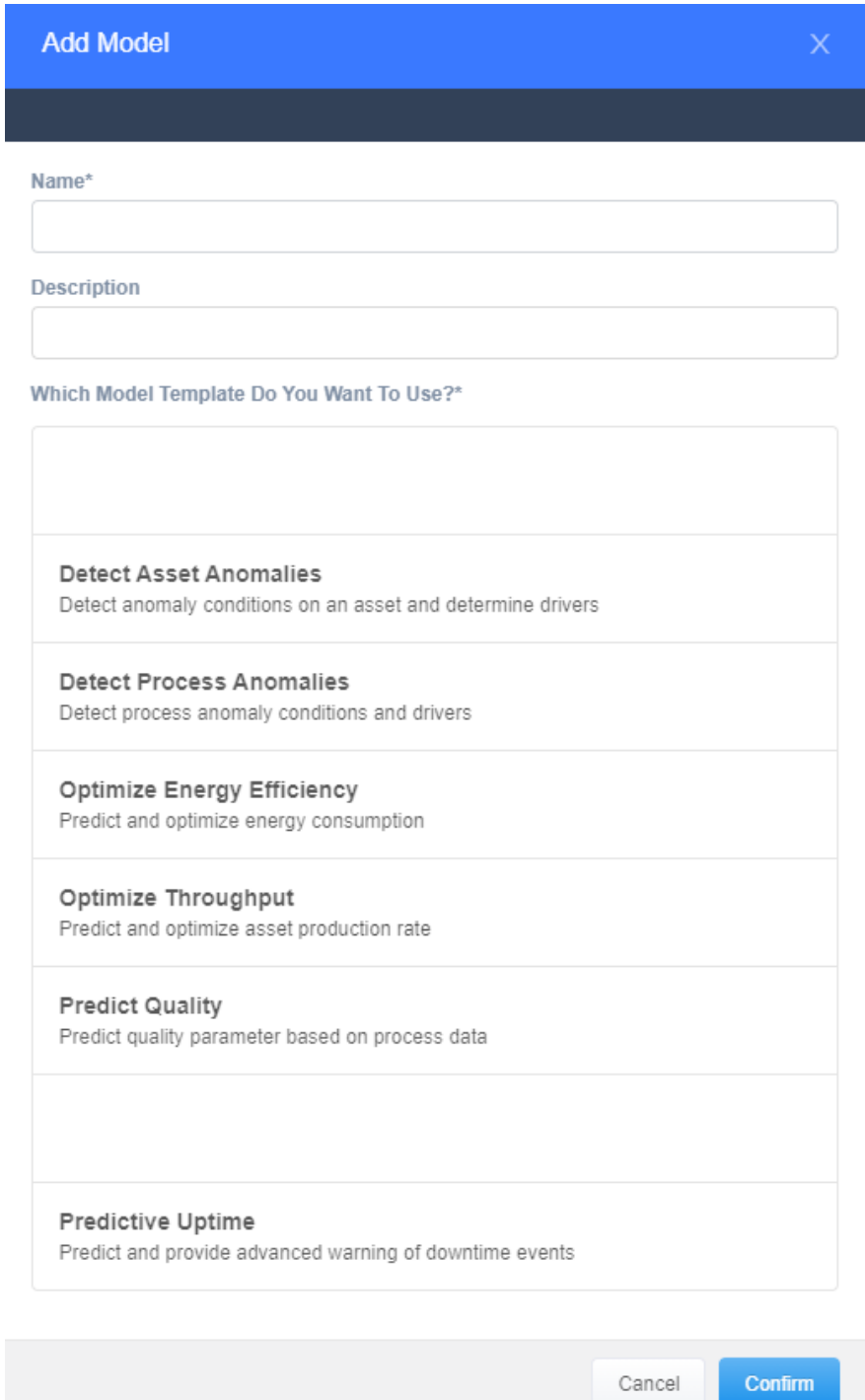
Advanced Analytics : How is it configured?

- Launch configuration from the Insight Asset page
- Single sign-on to the Advanced Analytics portal
- Authorized users can create/modify models
- Assets and tags are synchronized from Insight
- Upon saving a model, meta-data is sent to Insight, visible in Asset and Admin pages
- At runtime, model results are sent to Insight News Feed, tags, and selected charts



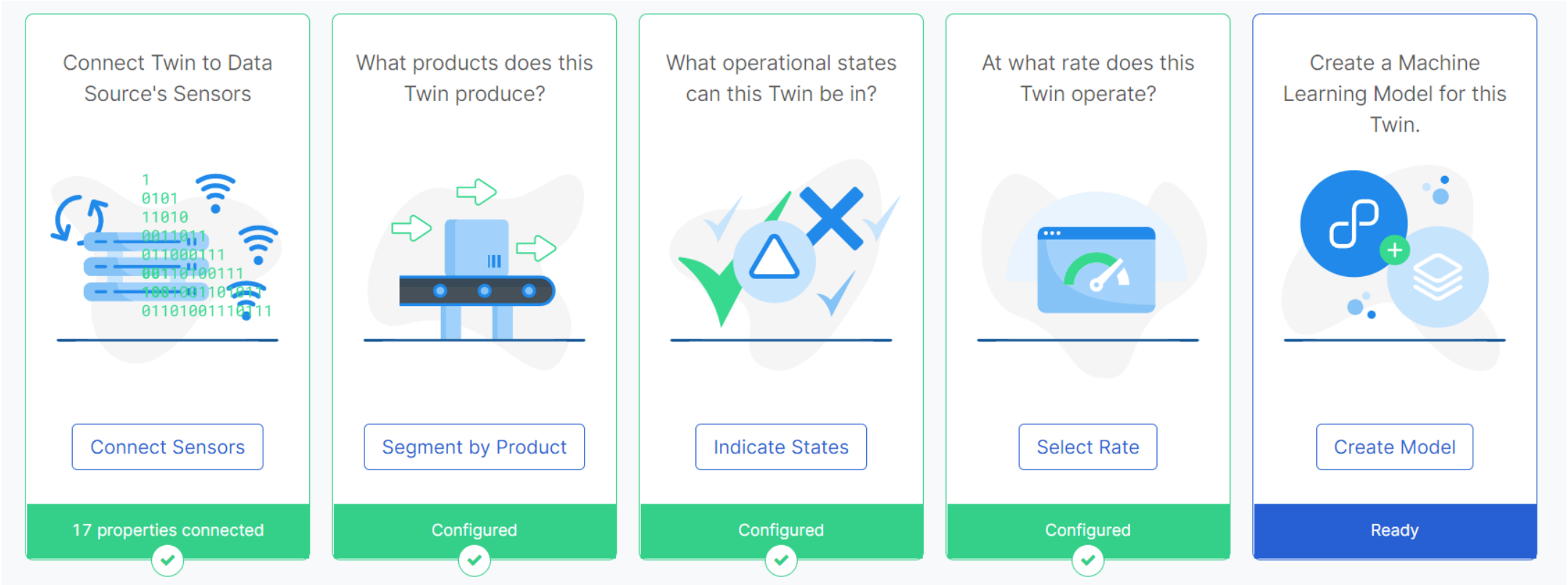
Advanced Analytics : How is it configured?

- Pick one of the models
- Other models are available but those on the right have been validated for the first integration release
- Guided configuration



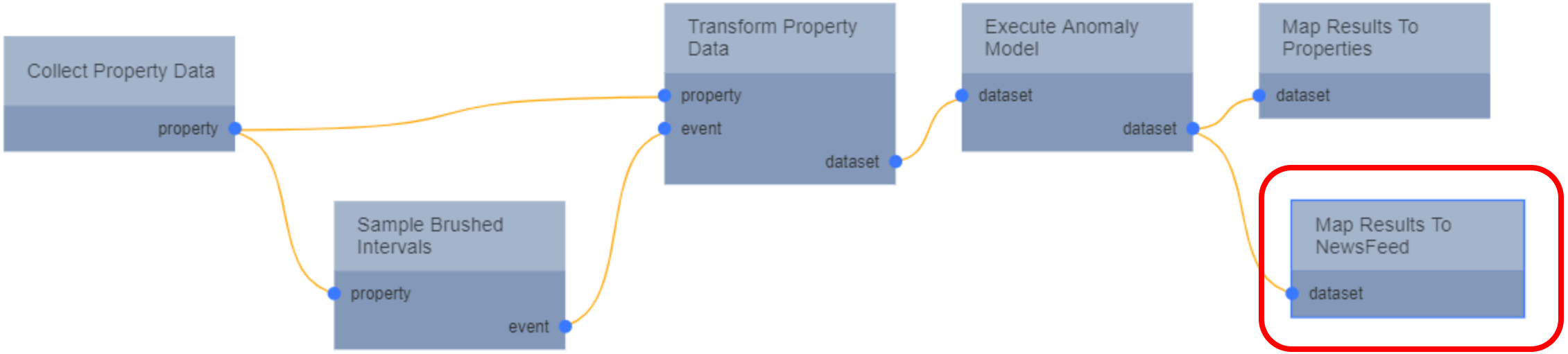
Advanced Analytics Configuration

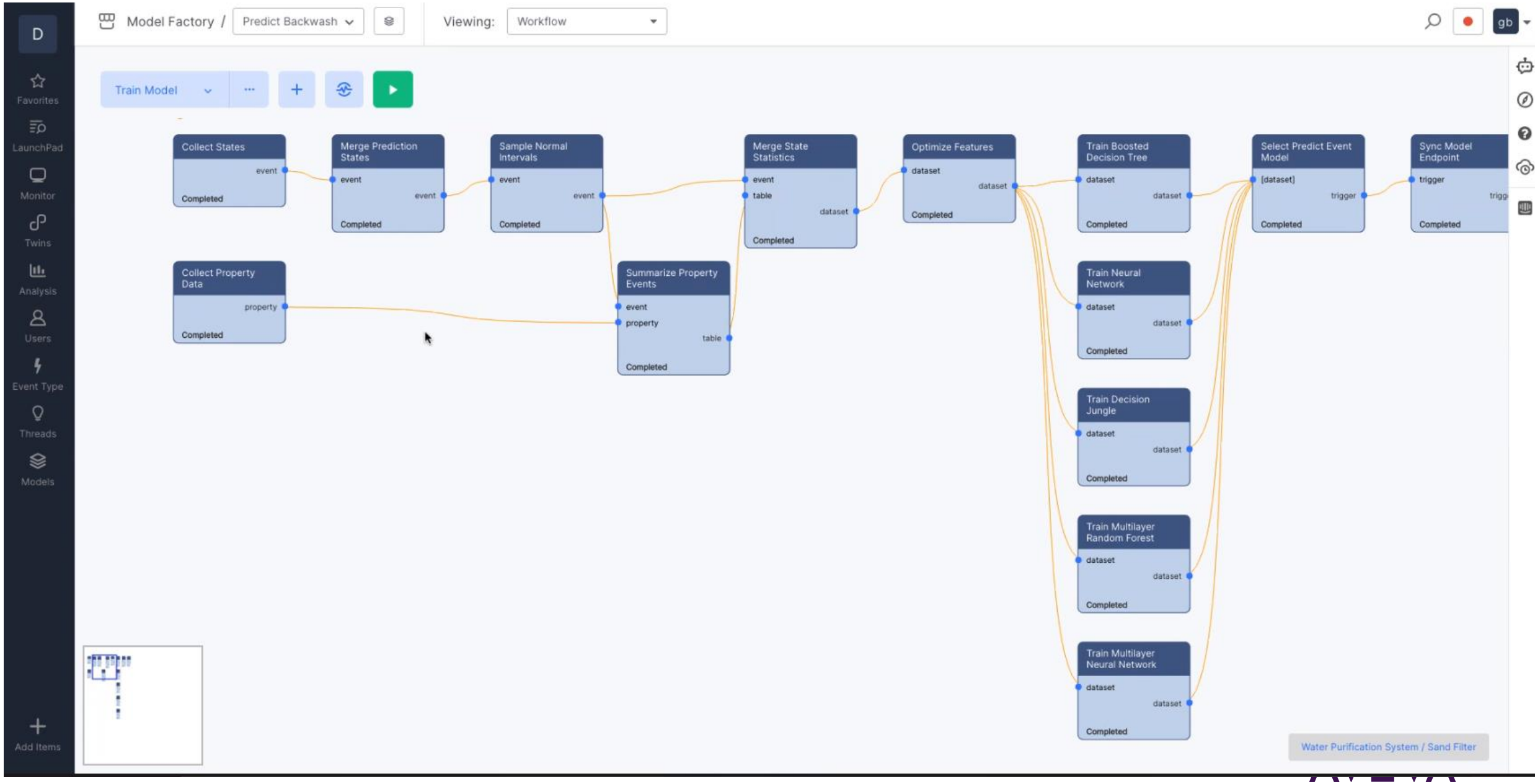
Guided configuration



Advanced Analytics Configuration

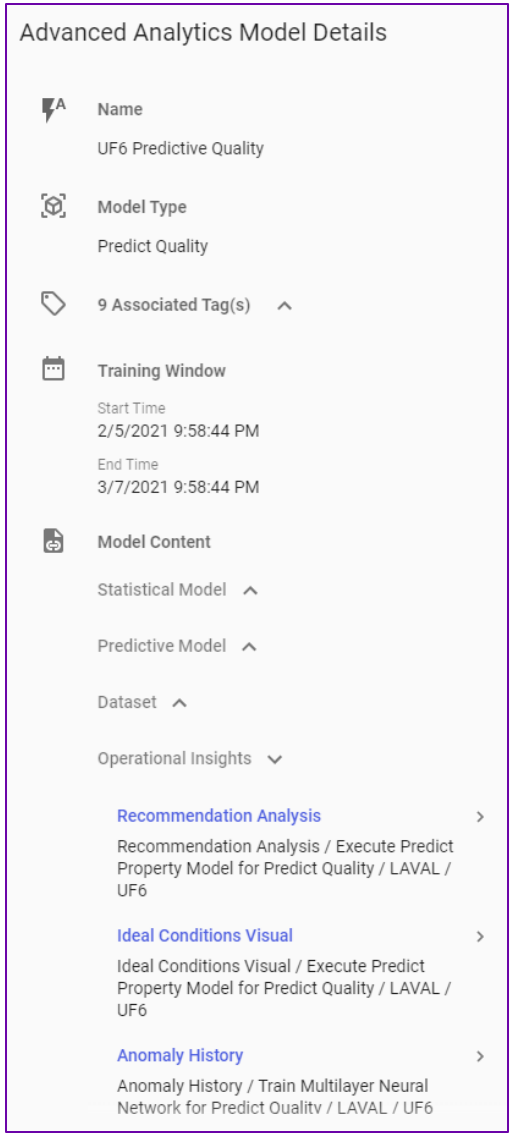
Workflow

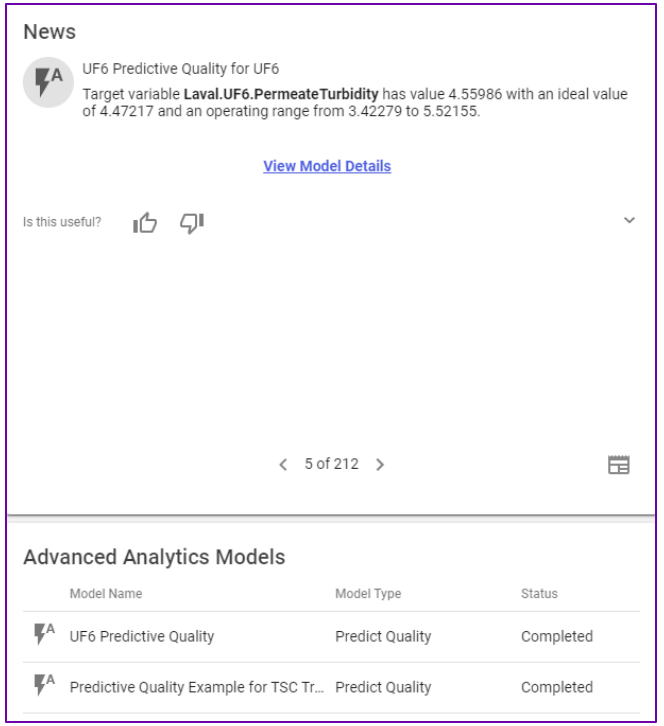




Advanced Analytics: How do you get results?

- Model messages can be sent as News items.
  - News Feed entry shows text entry configured in model.
- Model results can be sent to tags
- Charts can also be viewed in Insight
- The Asset page also provides:
  - News Feed items related to asset
  - List of models associated to asset

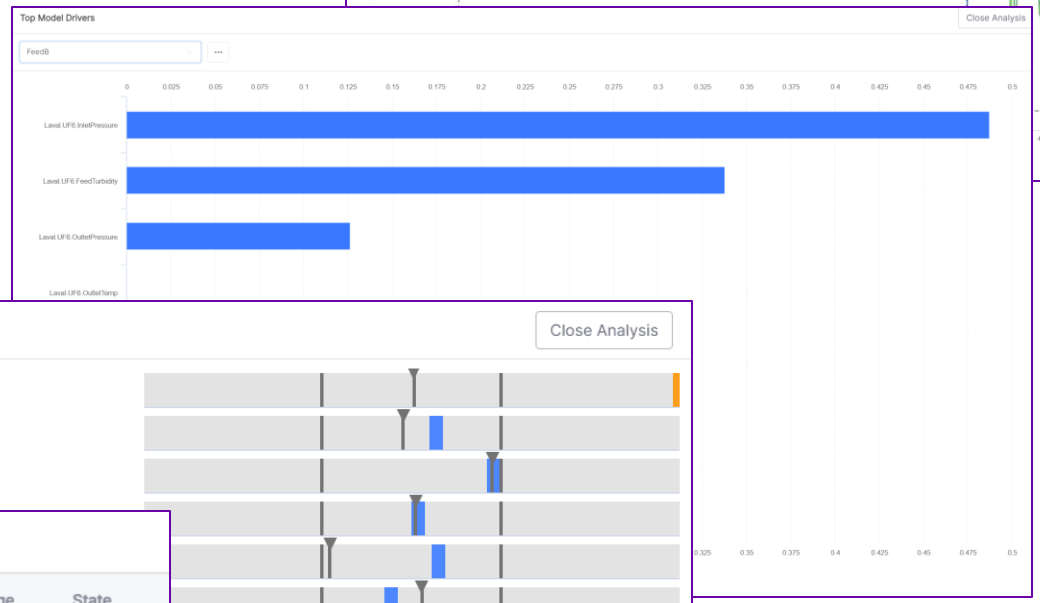




Advanced Analytics

Model Analysis

- “Predicted Quality Value” & “Model Anomaly Score”
- “Top Model Drivers”
- “Ideal Conditions Visual”
- “Anomaly Status” and “Anomaly Timeline”
- Recommendations



Anomaly Status

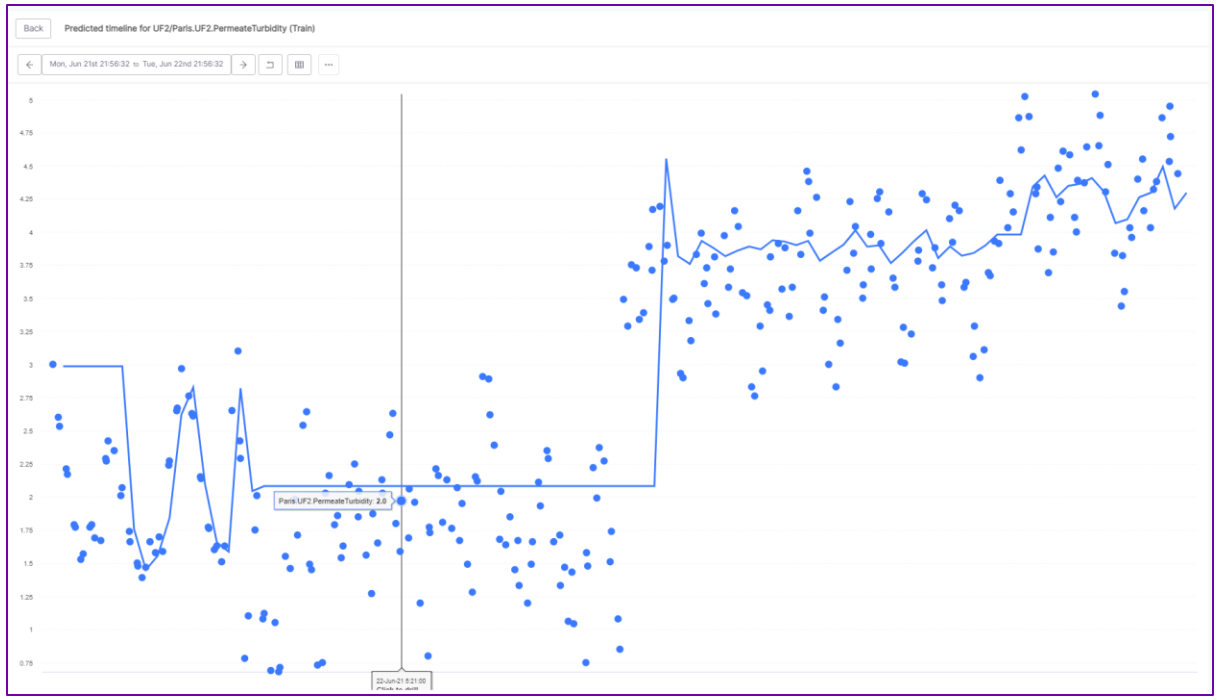
Name	Value	Ideal	Difference	Ideal Range	State
Laval.UF6.FeedTurbidity	420.3	407.5	+12.9	403.9 to 410.9	High
Laval.UF6.PermeateTurbidity	4.5	4.3	+0.1	3.8 to 4.9	Normal
Laval.UF6.FlowRate	105.4	105.1	+0.2	25.1 to 109.0	Normal
Laval.UF6.InletPressure	107.5	107.4	+0.06	103.9 to 110.6	Normal
Laval.UF6.InletTemp	106.3	99.5	+6.9	99.0 to 110.3	Normal
Laval.UF6.OutletPressure	104.8	106	-1.2	102.1 to 109.1	Normal
Laval.UF6.OutletTemp	108.7	102.5	+6.2	102.1 to 113.0	Normal
Laval.UF6.PumpMotorCurrent	321.7	316.9	+4.7	190.8 to 325.2	Normal

Advanced Analytics

Model Analysis

- “Anomaly Breakdown”

- “Predictive Timeline “



Industry, Asset and metric candidates for Advanced Analytics

Oil and Gas Chemicals

- Reciprocating and centrifugal compressors
- Pumps
- Expanders
- Turbines
- Heat recovery steam generators
- Energy Efficiency
- Reliability
- Uptime
- Asset Life
- Yield management

Food, Beverage, CPG

- Agitators
- Blender
- Mixer
- Fans
- Blowers
- Boiler
- Oven
- Pumps
- Air heaters
- Quality
- Asset Reliability
- Uptime
- Asset Life
- Throughput

Mining

- Emission systems
- Pulveriser
- Crusher
- Gearbox
- Kiln
- Asset Reliability
- Uptime
- Asset Life

Infrastructure

- Pumps
- Variable Frequency Drives (VFD)
- Heat exchanger
- Chillers
- Reliability
- Uptime
- Asset Life
- Energy efficiency

Water & Waste Water

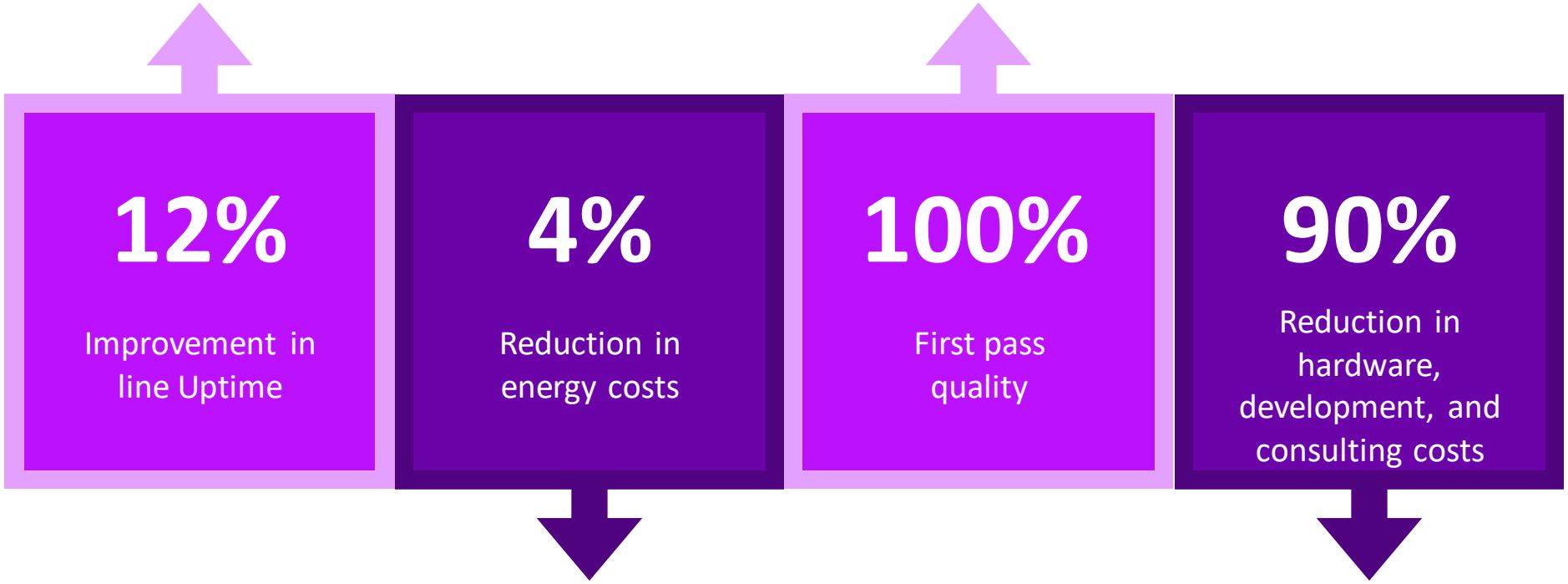
- Pumps
- Motors
- Blowers
- Reliability
- Uptime
- Asset Life
- Energy efficiency

Power

- Steam and gas turbines
- Generators
- Fans
- Mills
- Boilers
- Feedwater pumps and heaters
- Condensers
- Circulating water pumps
- Emissions systems
- Transformers
- Breakers
- Capacitors
- Asset Reliability
- Uptime
- Asset Life
- Energy efficiency

Customer Achievements

Typical deployments enjoy 10x ROI on subscription investment



Case Study: Predictive Energy Efficiency

Challenge

- Large consumer products manufacturer committed to reducing global manufacturing energy footprint by 5% across all utilities including Water, Air, Gas, Electricity, and Steam.

Solution

- Implement predictive energy models for each “process type” across making, converting, and packaging. The goal of the predictive models are to find best operating conditions / centerlines that minimize energy while running plus identify procedures to minimize energy while not running.

Result

- Payback periods between 60 days (implementation + 1 year subscription).

Case Study: Predictive Uptime

Challenge

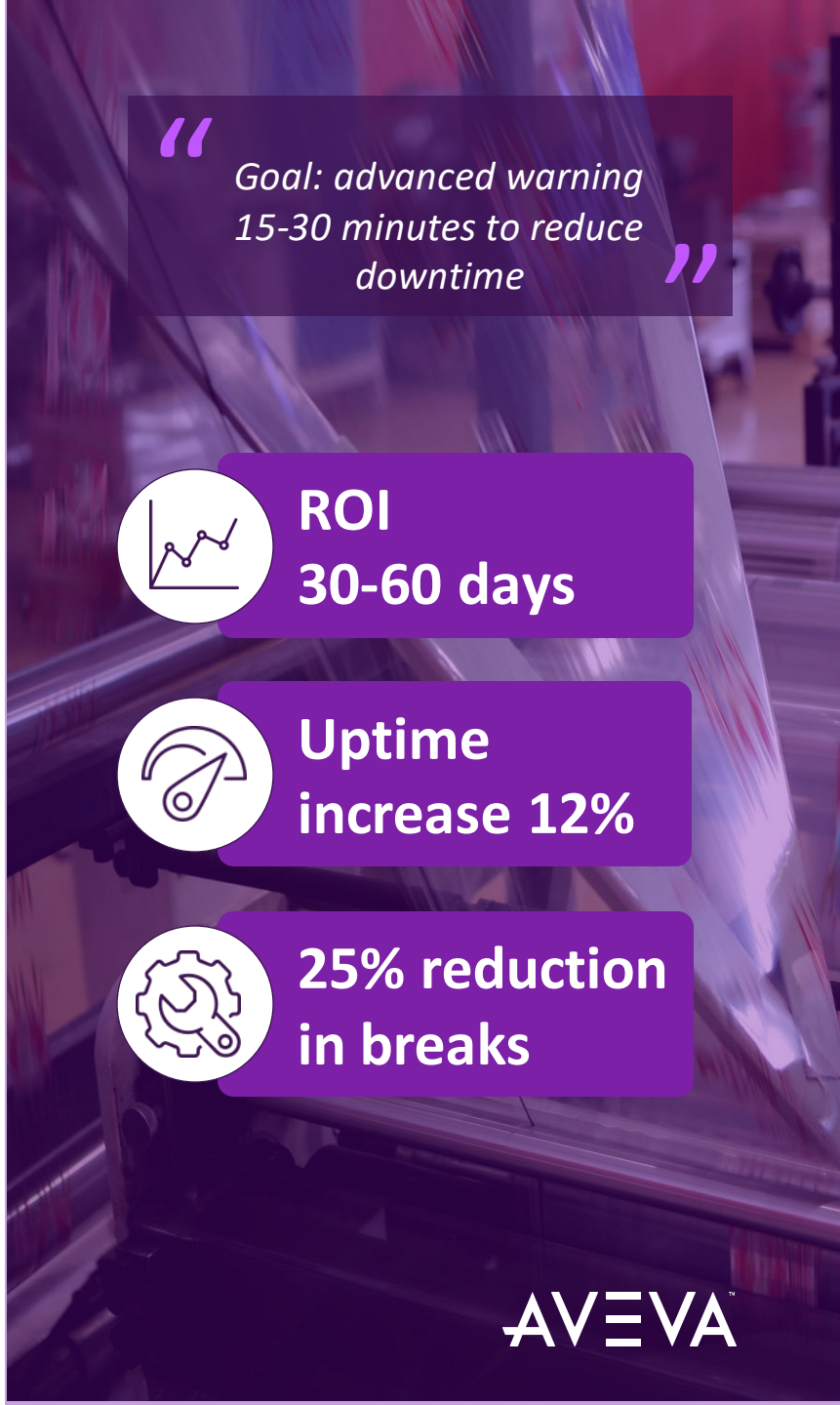
- Specialty film manufacturer wanted to reduce costly film breaks and improve uptime by using data from existing Historian and MES Systems.

Solution

- Implement predictive uptime models to continuously monitor line stability across nearly 500 process variables and provide advanced warning of high probability downtime causes to on-shift process engineering resources.

Result

- Payback periods between 30-60 days (implementation + 1 year subscription).



Check out these great presentations!

Underscoring the value and driving into the details

Tuesday recordings:

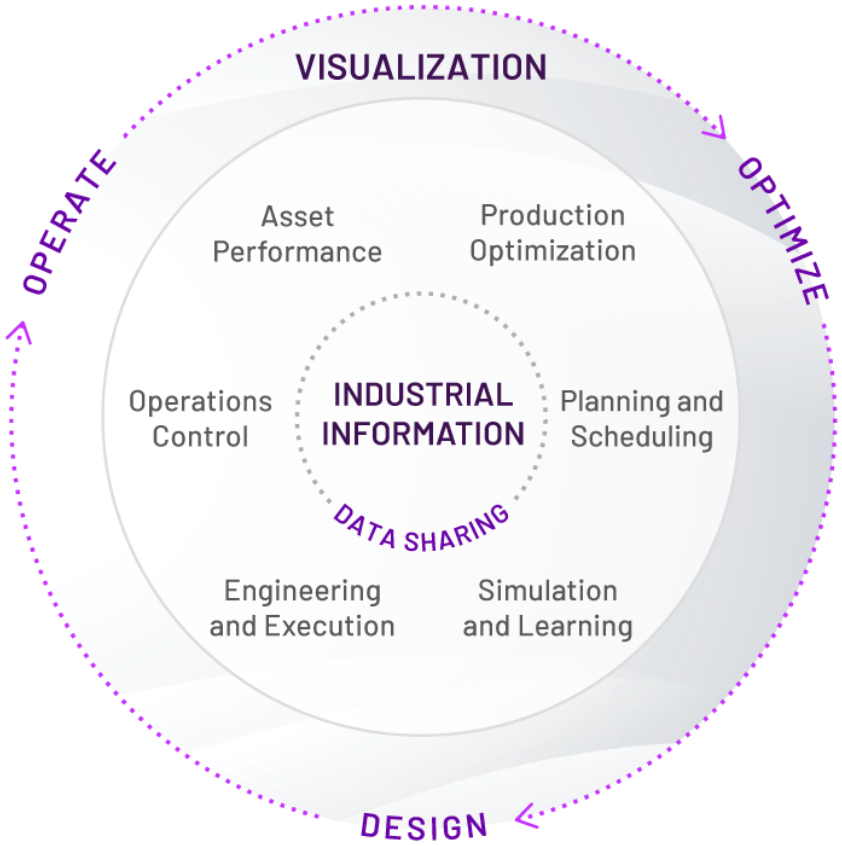
- Optimize Asset Utilization & Efficiency with AVEVA Insight OEE and Guided Analytics

Wednesday recordings:

- AI to improve efficiency and unplanned downtime at Schneider Electric
- Value Discovery at Nestlé
- Gwinnett County's unified platform to improve performance and optimize water production

Thursday:

- Enabling your Digital Connected Landscape with AVEVA Insight
- Unlock Your Plant's Data and Enable A Connected Workforce



Christian-Marc Pouyez

Director – APM Advanced Analytics

- AVEVA
- christian-marc.pouyez@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

AVEVA

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

@avevagroup

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

AVEVA