

NOVEMBER 2022

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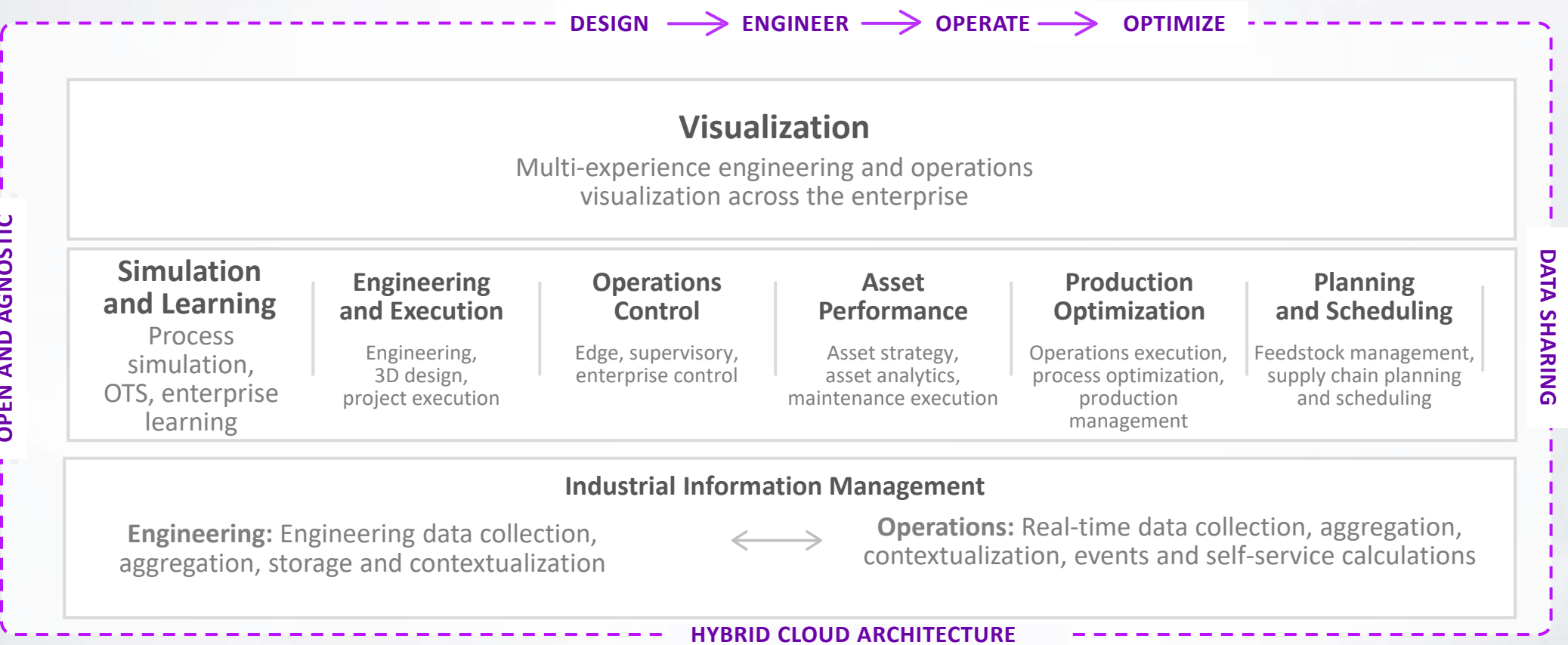
# Simulation & Learning - Portfolio roadmap for a changing world

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VP Simulation & Learning, AVEVA

AVEVA

# Simulation & Learning – An Integral Part of the AVEVA Portfolio

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



# Digital Transformation - Connecting People, Process and Assets

Insight and Knowledge to guide decisions and business value

Engineer Operate Connect Optimize



Transformation of Work

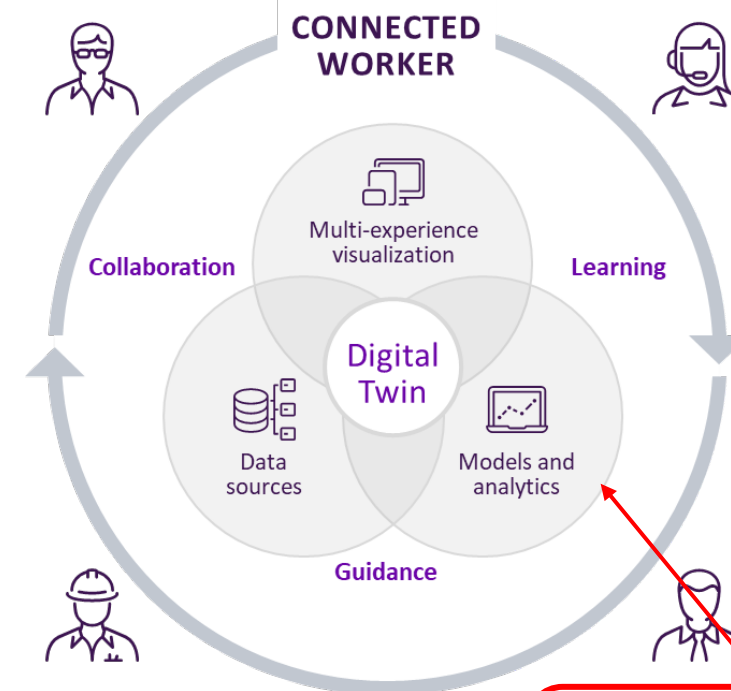


Cloud

Artificial  
intelligence

Industrial IoT  
and edge

Big data



**Content (Data)**

Engineering  
Operational  
Maintenance  
Enterprise

**Behavior**

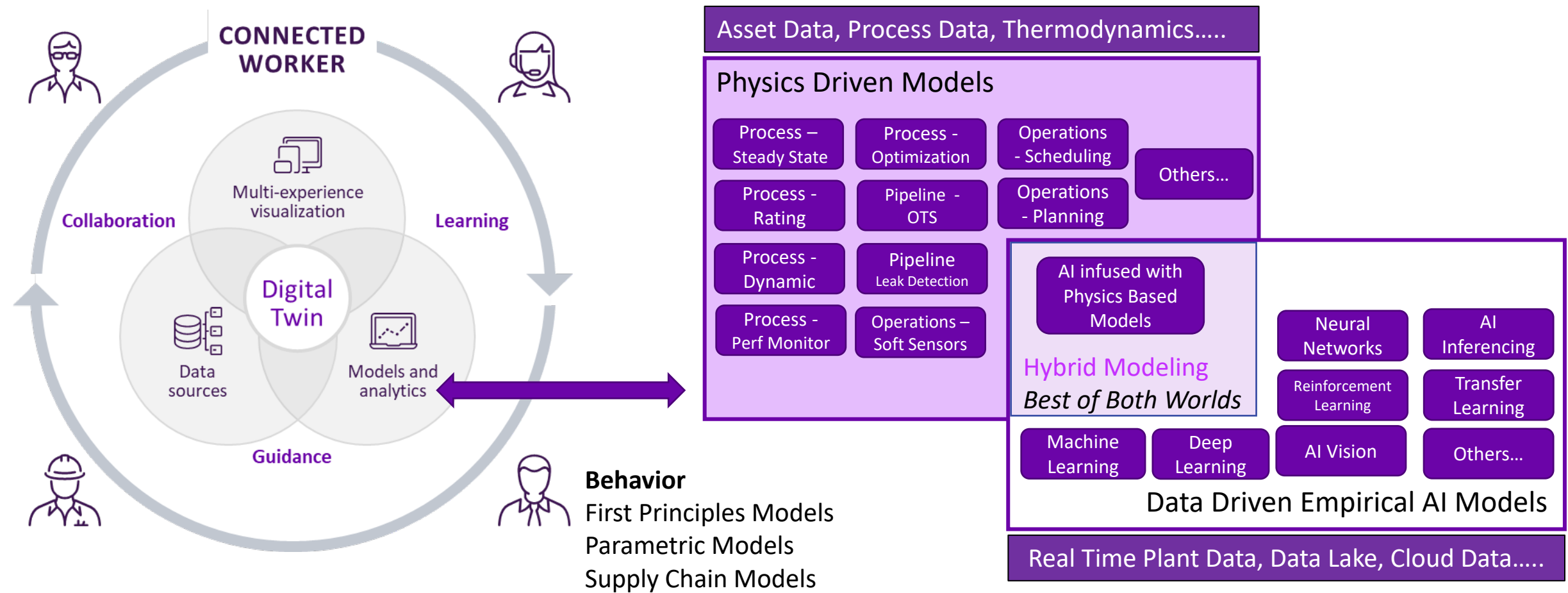
First Principles Models  
Parametric Models  
Supply Chain Models

**Digital Worker**

Remote Operations Center  
3D Visualization  
Mobile Experience

# AVEVA Process Digital Twin

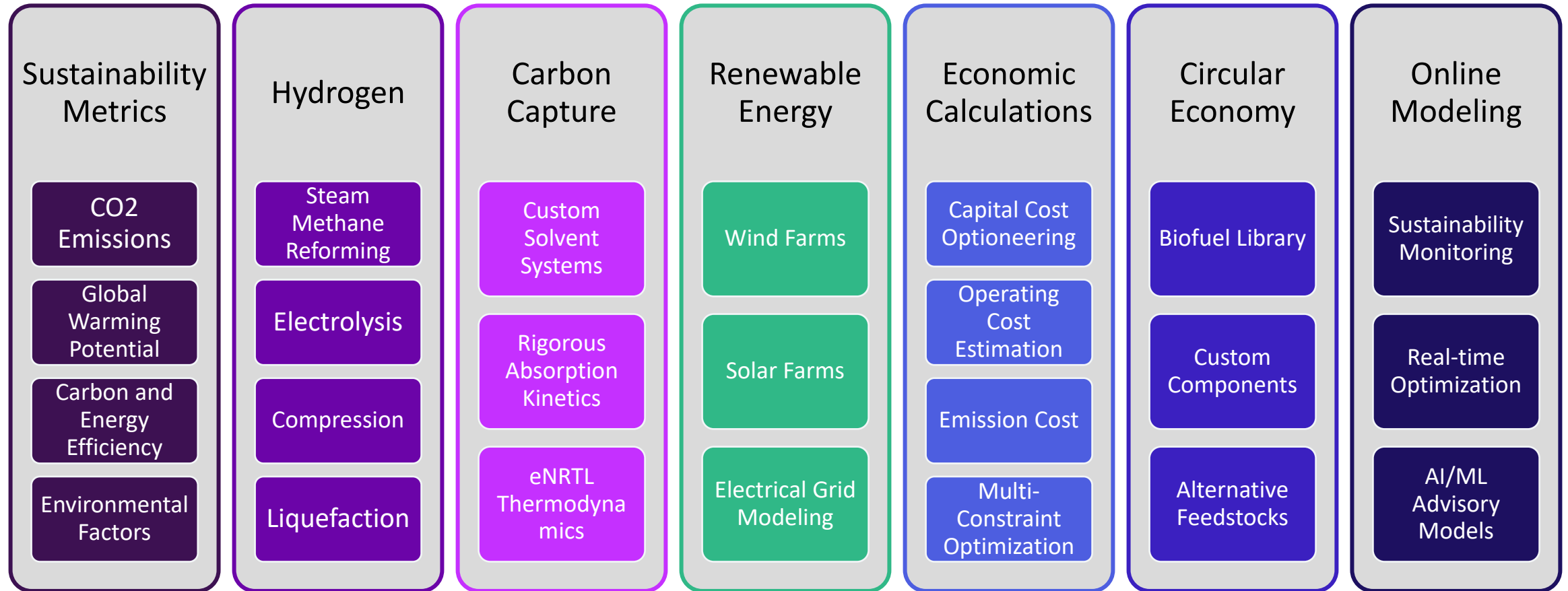
Insight and Knowledge to guide decisions and business value



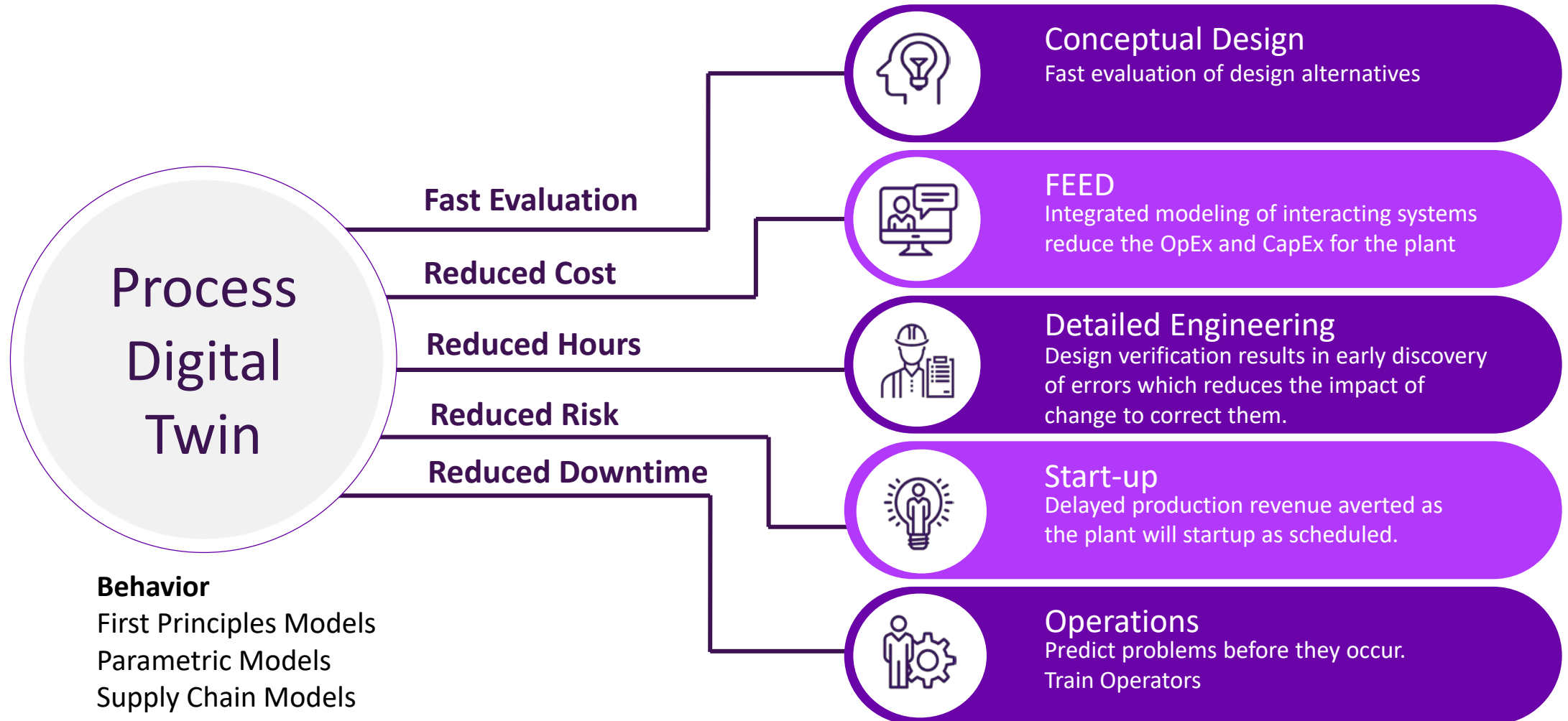
# AVEVA's Simulation Platform

## – A Focused Roadmap to Support Today's Energy Transition

A complete set of features supporting our clients' sustainability goals



# Improved business decisions throughout the process lifecycle



# Sustainable Process Design – Multi-constraint Optimization

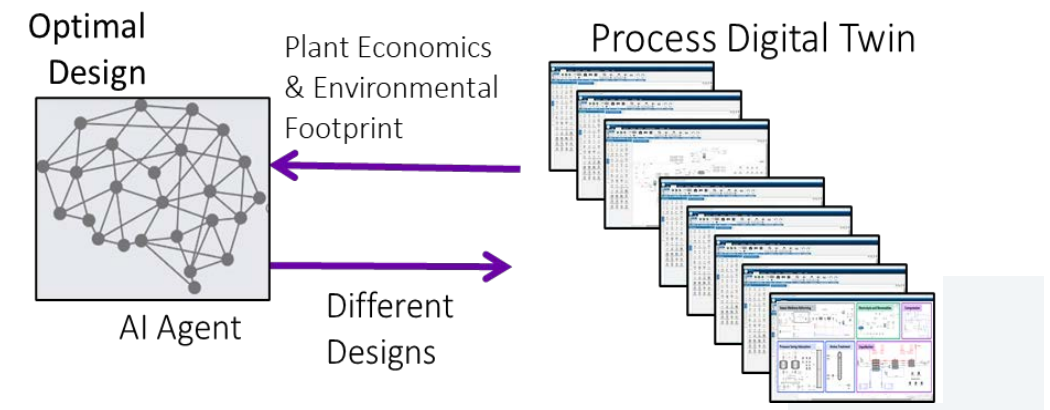
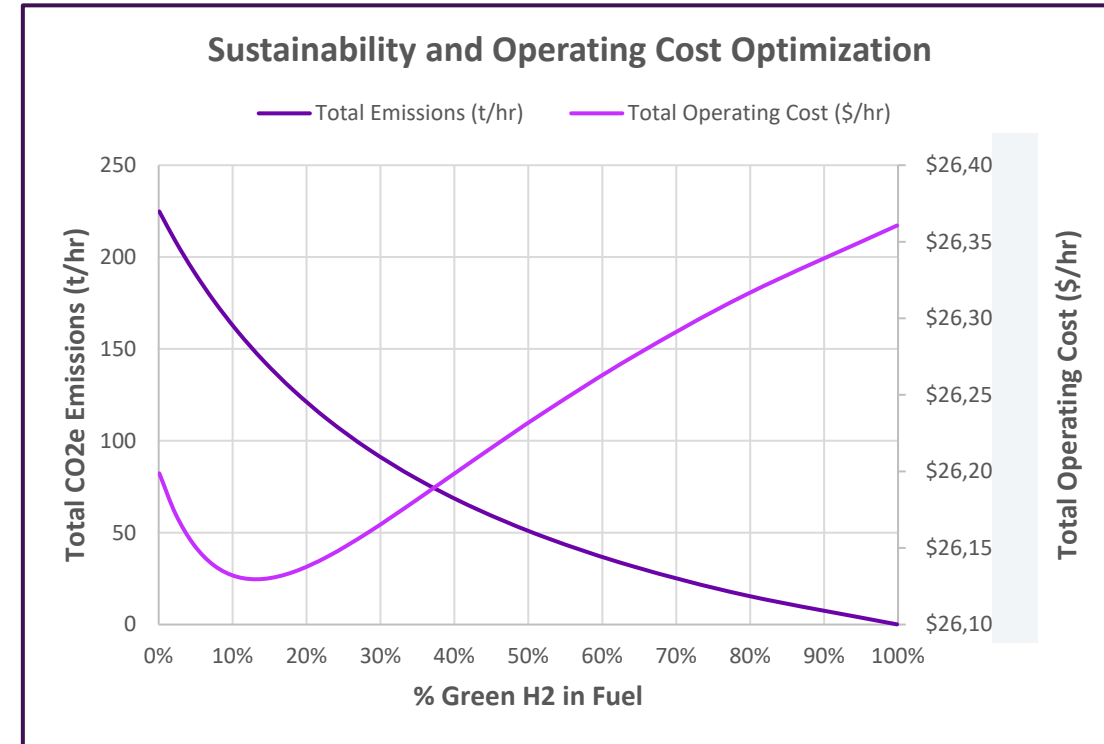
## Economic & Environmental Optimization

- AVEVA's simulation portfolio allows you to design with sustainability in mind
- Metrics designed to give engineers a sense of the overall process sustainability:
  - CO2e Emissions, Global Warming Potential, Carbon Efficiency, Environmental Factor, etc.
- Combine sustainability metrics with built-in capital and operating cost calculations to find sustainable operating points that lower your overall costs
- Simplify permitting and reporting by replacing complex spreadsheets with simple drag-and-drop calculations



## Conceptual Design

Fast evaluation of design alternatives



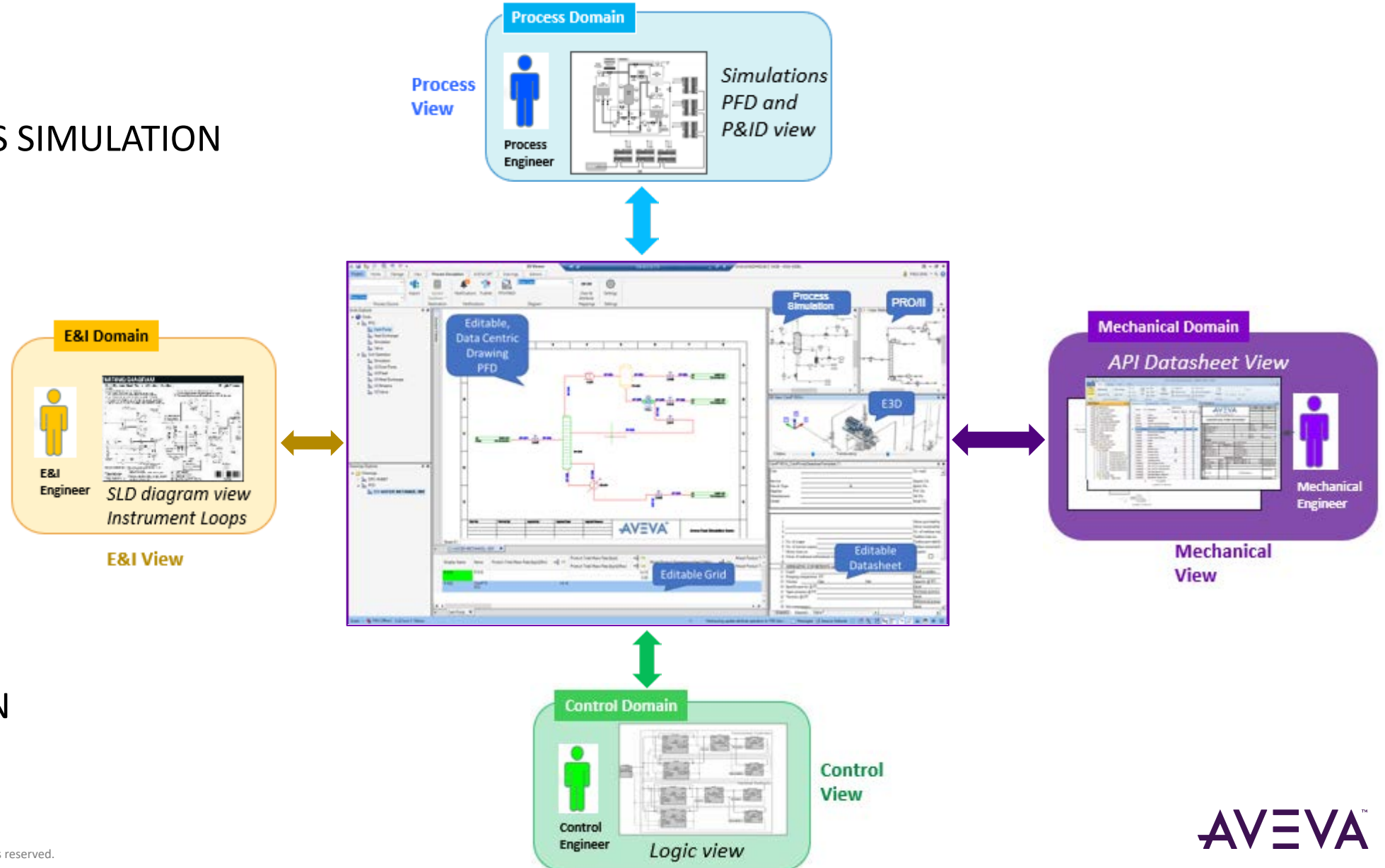


# Unified Engineering – Common Database, Shared Data

CONCEPTUAL  
DESIGN/PROCESS SIMULATION

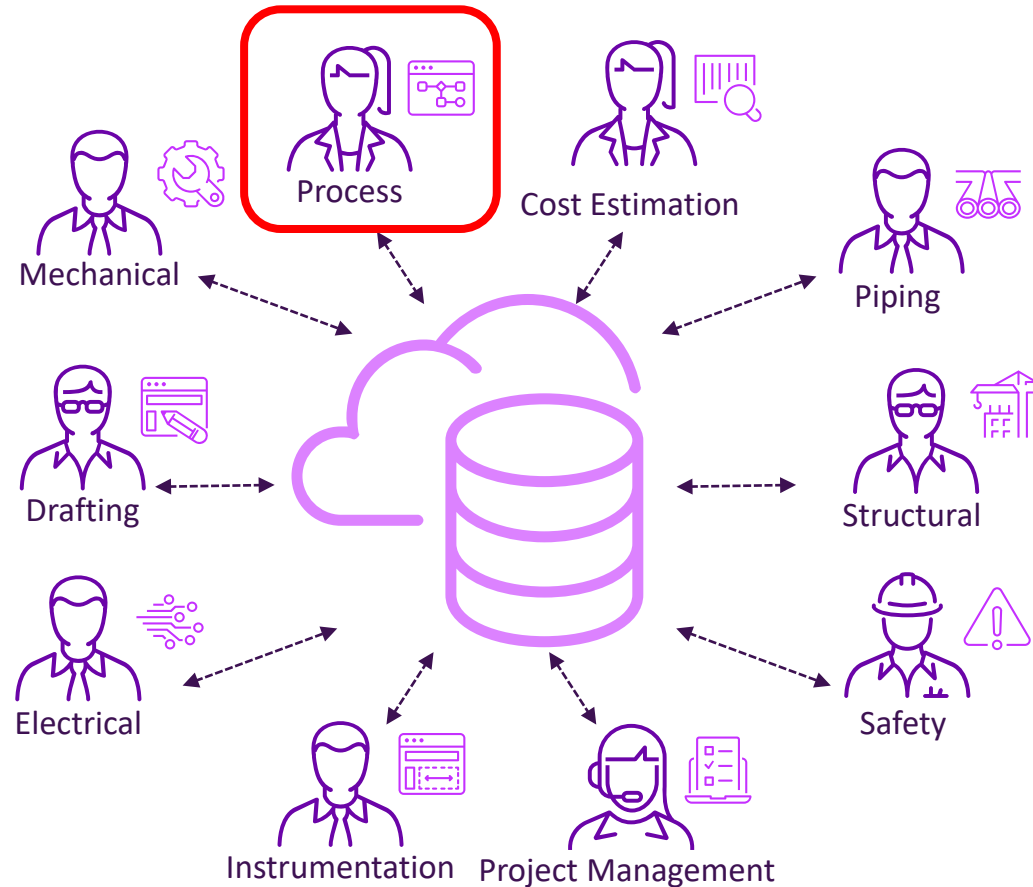
FRONT END  
ENGINEERING  
DESIGN (FEED)

DETAILED DESIGN





# AVEVA Unified Engineering



## FEED

Integrated modeling of interacting systems reduce the OpEx and CapEx for the plant



## Detailed Engineering

Design verification results in early discovery of errors which reduces the impact of change to correct them.

## Multi-discipline teams sharing a data-centric cloud environment

- Accelerate time to project start-up
- Communicate and collaborate effectively
- Share information seamlessly
- Quickly and easily find the right data
- View and validate changes in real-time

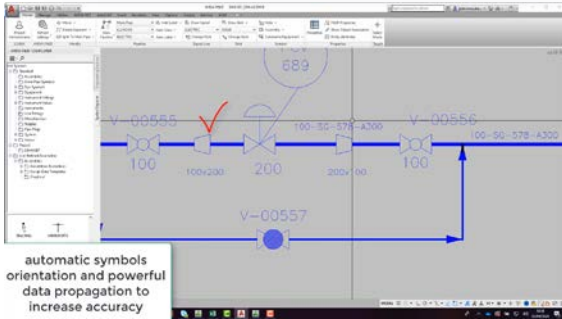
# Leveraging Intelligent P&IDs and Engineering Data for Simulation



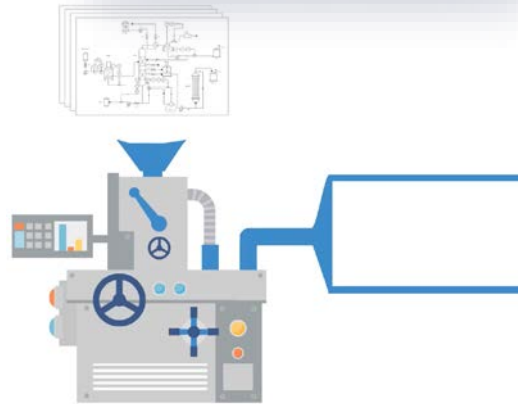
## Start-up

Delayed production revenue averted as the plant will startup as scheduled.

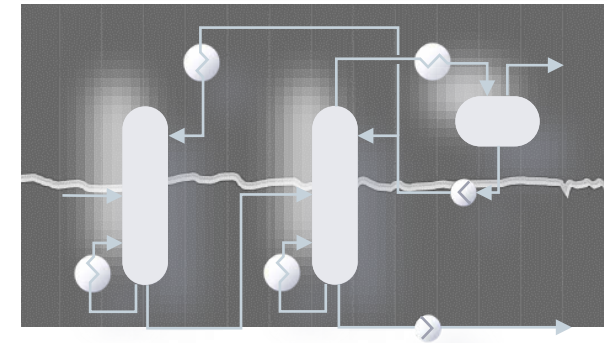
### Intelligent P&IDs



### Model Generator



### Dynamic Simulation



- Converts intelligent P&IDs (as SVG or DEXPI format) into an equivalent dynamic simulation
- The tool also can import data from the Unified Engineering database raising data quality
- Significant reduction in time and cost required to deliver an OTS, up to 40%

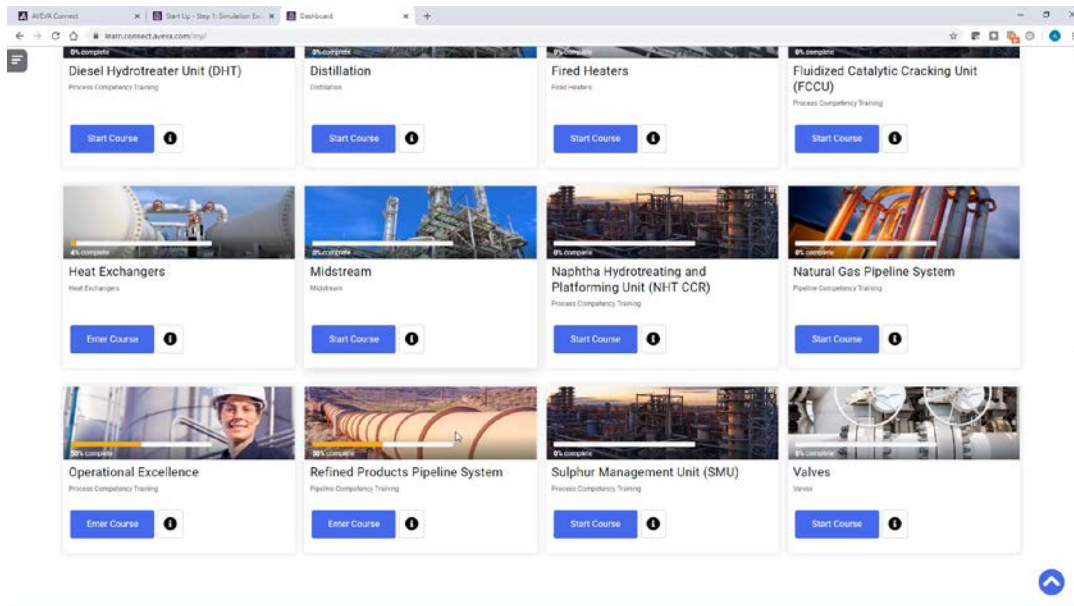
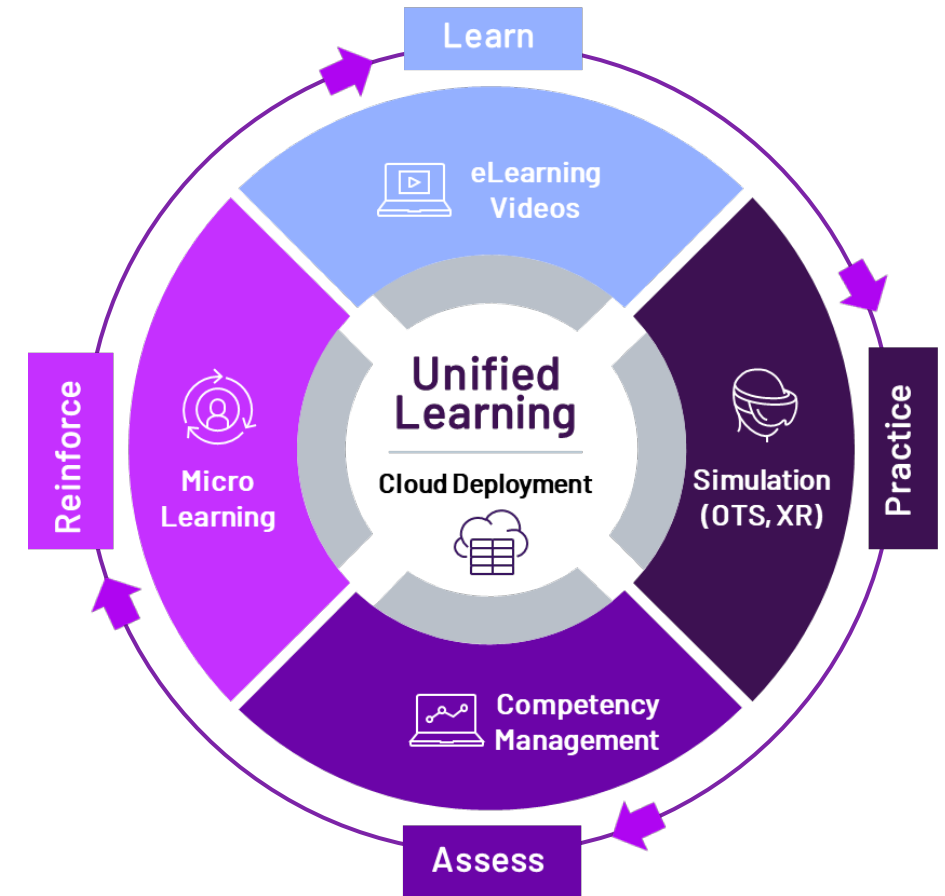
# Develop workforce competencies for sustainable operations with OTS & Unified Learning



**Operations**  
Predict problems before they occur.  
Train Operators

Use first principles dynamic models and virtual reality for experiential learning including:

- Virtual controls commissioning
- Validation of startup and shutdown procedures
- Learn how to mitigate abnormal situations in a safe environment
- Prevent pipeline leakages and associated environmental impact
- Accident avoidance



# Leveraging the Digital Twin on your O&G Pipeline Assets



## Operations

Predict problems before they occur.  
Train Operators

## Pipeline Leak Detection

*“Environmental protection & meeting gov. regulation mandates”*



Gas & liquid pipelines (regs for leak detection on all pipelines by Oct. 2024)

Multiple leak detection methods available in a single app. suite  
Integrates with all SCADA technologies

## Operator Training Simulator

*“Improved safety and reduce downtime”*



Meets more stringent government regs for operator training  
Expose operators to both normal and abnormal operating conditions

Significantly reduce on-boarding and re-qualification costs

## Pipeline Management & Optimization

*“Efficient operation, addressing growing sustainability demands”*



Gas Pipeline Management (real-time management, off-line operational forecasting)

Energy Management & Optimization – reduce your carbon footprint  
Operational insight for improved efficiency

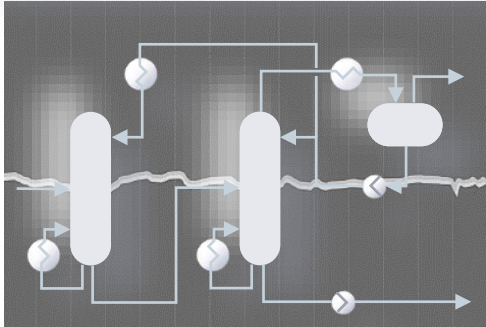
# Dynamic Simulation & Deep Reinforcement Learning



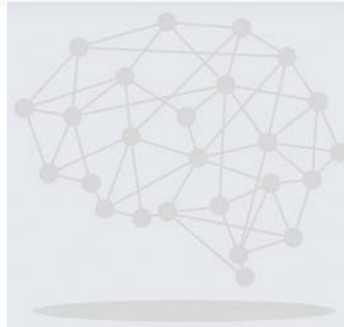
## Operations

Predict problems before they occur.  
Train Operators

### Dynamic Simulation



### Artificial Intelligence



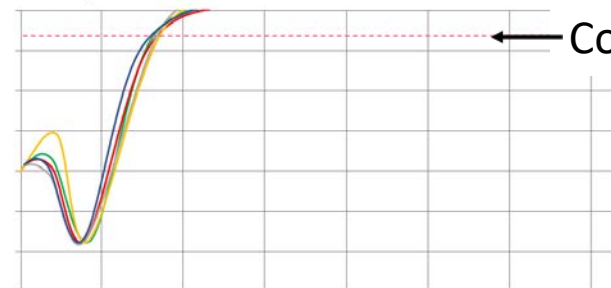
### Optional Online Advisor



- AVEVA dynamic simulation is used to train artificial intelligence agents to identify the optimal trajectory between two operating conditions
- The AI tries different strategies running parallel sessions of the model on the Cloud to identify the one which, for example, can be completed in less time, with less alarms and with no flaring
- This translates into higher production, safer operations, and lower environment impact

### RESULTS AFTER 678 EPISODES

C101 top C3 concentration

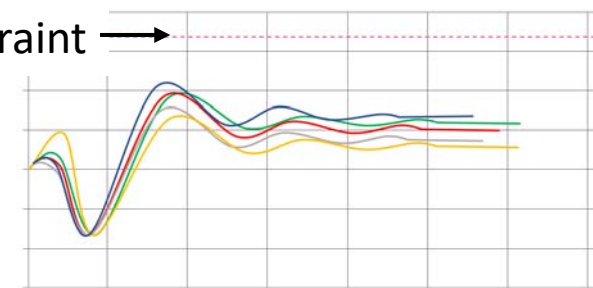


Improved  
Operational  
Strategy

From this...

### RESULTS AFTER 3705 EPISODES

C101 top C3 concentration




To this

← Constraint →



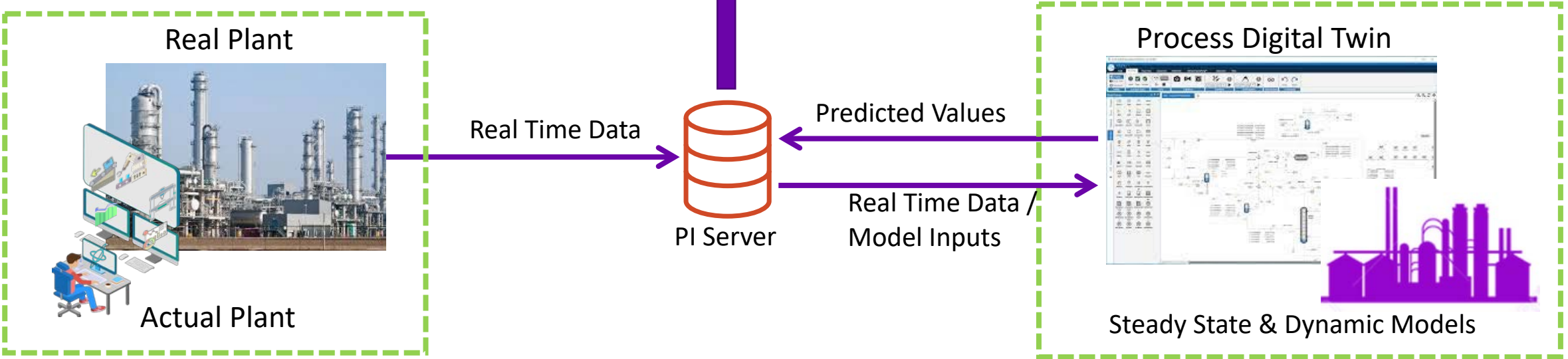
# Process Digital Twin On-Line



## Operations

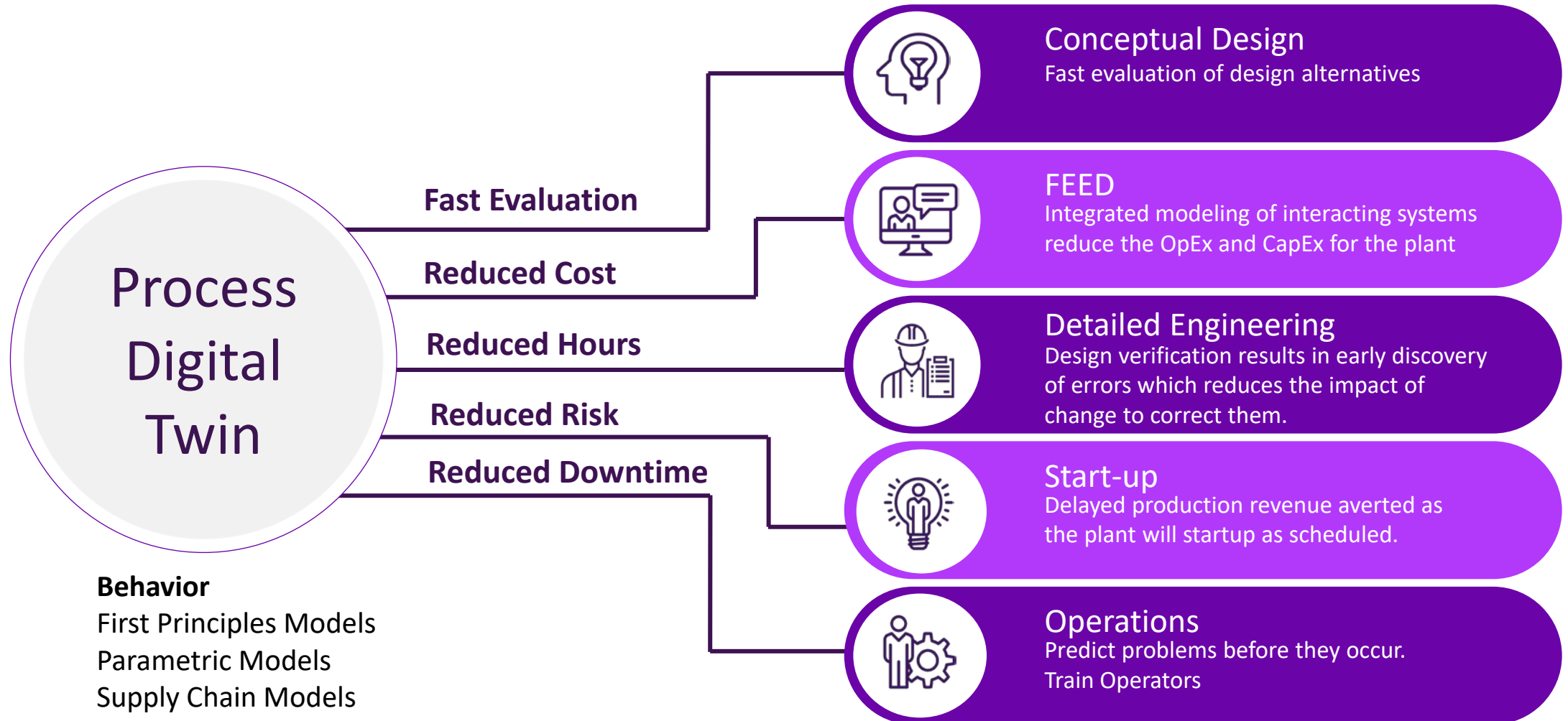
Predict problems before they occur.  
Train Operators

1. Inferential Measurements (soft-sensors)
2. Advisory setpoints for improved operation (open loop optimization)
3. Equipment Health KPIs for Model-led Reliability
4. Look-ahead troubleshooting – running into the future





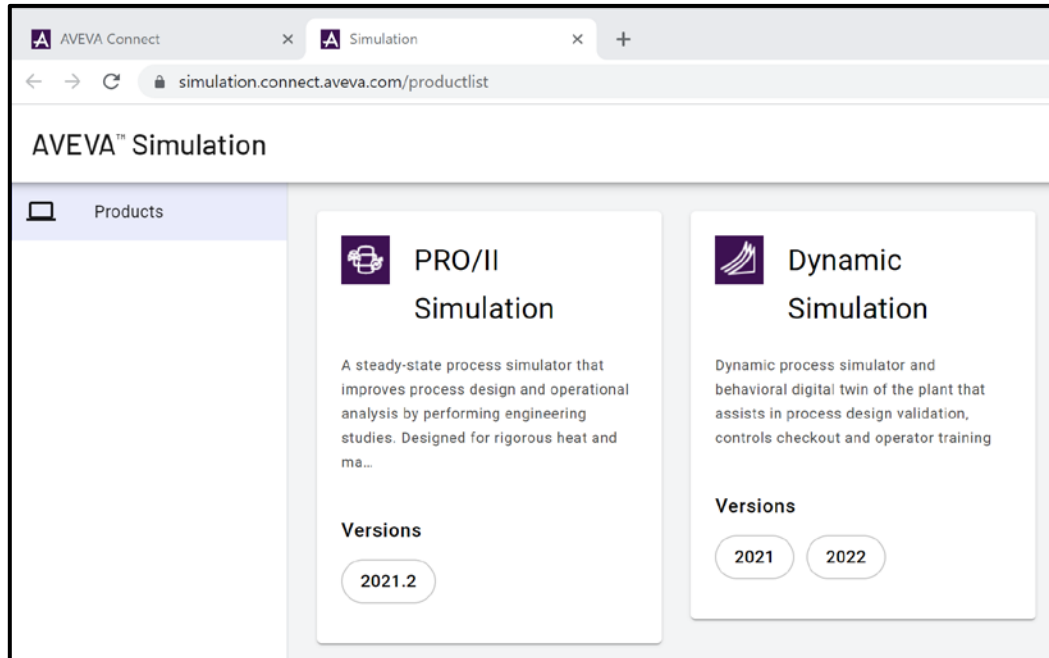
# Improved business decisions throughout the process lifecycle



# AVEVA Connect – Simulation on the Cloud

## AVEVA Simulation

- AVEVA's Flagship Simulation products are now available on AVEVA Connect
- Run multiple sessions in parallel leveraging the power of the Cloud versus local PC resource constraints



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## OTS – From On-premise to the Cloud



**AVEVA**

# AVEVA WORLD

SAN FRANCISCO 2022

Moscone West, San Francisco

## Day 1 Spark your ingenuity

- 👤 Airbridge on CCUS
- 👤 PG&E on Pipeline OTS
- 👤 ExxonMobil on Multi-purpose dynamic simulation
- 👤 TechnipEnergies on Blue & Green Hydrogen

## Day 2 Customer insights

- 👤 NRG on Power plant OTS
- 👤 Microsoft AI & DYNsIM
- 👤 Tracks for Chemicals, Power, Oil & Gas, Digital Twin, and AI
- 🔧 Learning lab – AVEVA PRO/II Simulation

## Day 3 Innovation

- 👤 ESTECO on Sustainable Design
- 👤 Atkins on Nuclear Fusion
- 👤 Refinery Simulation
- 👤 PI & Simulation integration
- 👤 Utilities modeling & optimization
- 👤 Pipeline leak detection
- 🔧 Learning lab – AVEVA Process Simulation

## Expo Booths

(Reception evening of Day 2, also open outside keynote times)

### Simulation & Learning

- 🔧 Demo: Online modeling – sustainability & performance
- 🔧 Demo: Unified Learning for the energy transition

### 3D Visualization & Extended Reality

- 🔧 Hands-on XR for Training

### Energy Transition & Circular Economy

- 🔧 Demo: Unified Engineering for green hydrogen production



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# Ian Willetts

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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!

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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)