AVEVA WORLD
PARIS

OCTOBER 2024

Introduction to Industrial Digital Twin

An overview for new AVEVA World attendees

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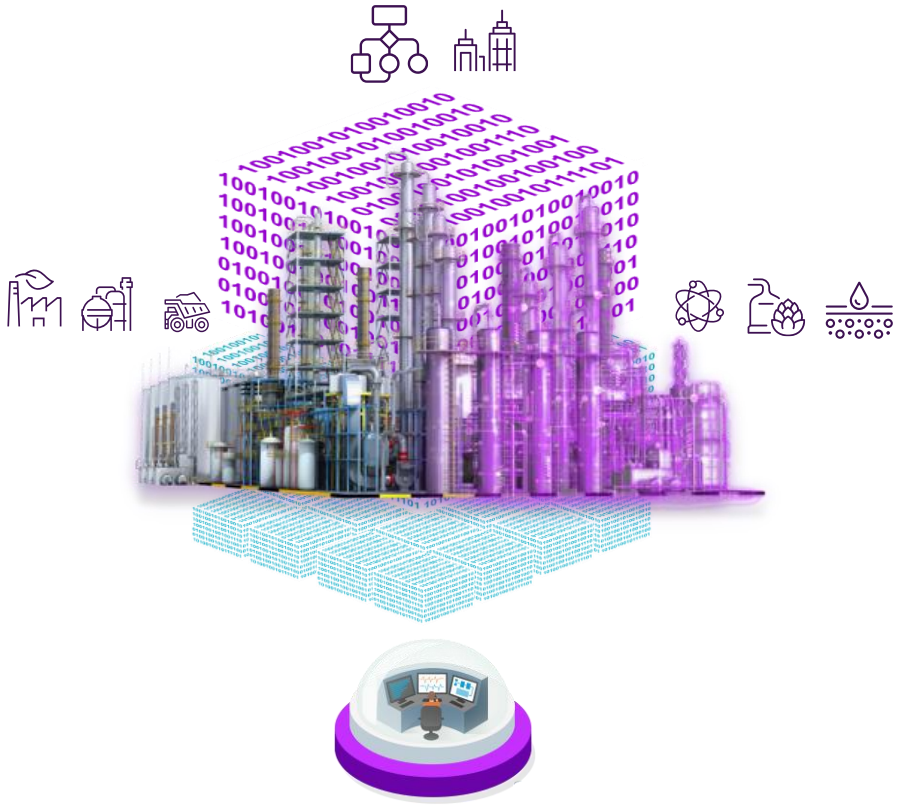
Exploring Digital Twin technology at AVEVA World

Check out related AVEVA World sessions

- Later today: Yinson—Get the Value from Real-Time Operations Data
  - Infrastructure track; SESS-102
  - Presenters: Kari Berte Bye, Manager Lifecycle Operations
  - Wednesday, 16 October @13:15 – 13:45 |Amphitheatre Bleu
- And: Evonik AI--Another Digital Twin?
  - Engineering track; SESS-99
  - Presenters: Martin Blumoehr, Michael Resch; Asset Lifecycle Operations
  - Wednesday, 16 October @14:00 – 14:30 |Room: 253
- And: Veolia: Smart Engineering Thinking in the Box
  - Engineering track; SESS-260
  - Presenter: Hakim Bouhali, Engineering Director
  - Wednesday, 16 October @15:30 – 16:00 | Room 253
- From Day 1: AVEVA: Unlocking your Industrial Digital Twin
  - CONNECT Innovation track; SESS-296
  - Presenters: Daniel Crisp and Steve Parvin



INTRODUCTION TO INDUSTRIAL DIGITAL TWINS

Agenda

- **Challenges** driving growth
- **Definition** of digital twin
- **Essential elements** of digital twin
- **Use cases and benefits**
- **Real-world examples**
  - Success for BP’s offshore platform in Caspian Sea
  - Success for Veolia’s water treatment facility bids
- **The modular, scalable approach**
- **Final thoughts**

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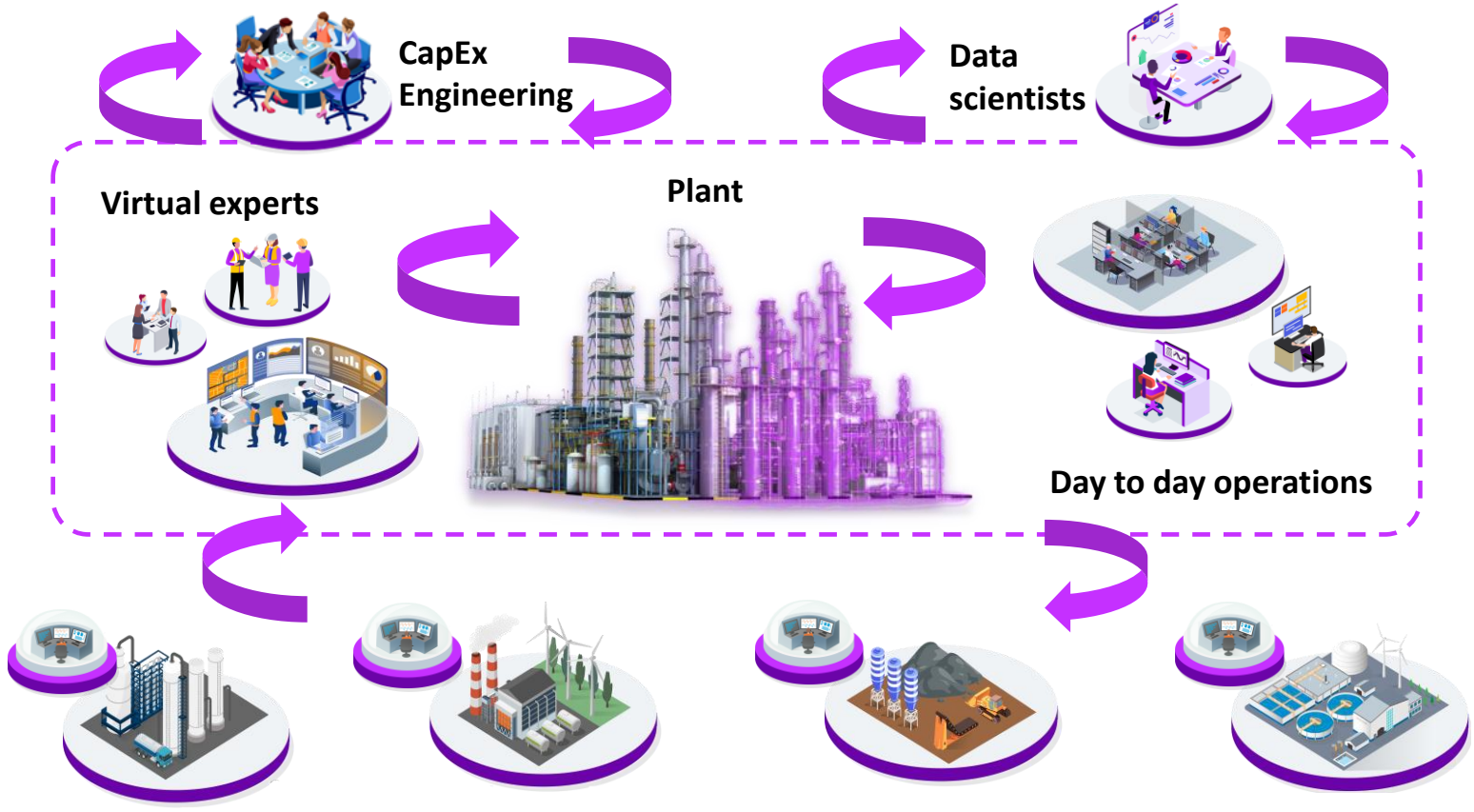
Digital industrial organizations: the new norm.

- Critical information and data is generated in multiple functions. (aka ‘silos’)
- Sharing information typically takes time, effort and technology/money.
- Digitalization increases potential for connection and the ability to **squeeze out delays, eliminate inaccuracies and reduce costs.**



~~Challenges~~ Complications being addressed

Digital twins offer answers to questions about interconnected systems

- Simulate traffic flow to optimize city layouts.
- Optimize first responders' procedures in disaster situations.
- Optimize energy consumption across plant/ facility/ residence.
- Predict and prevent resource shortages (water, electricity, etc.)
- Integrate and manage multiple energy-generating sources to meet demand.
- Simulate agricultural conditions to optimize productions.
- Cities integrate digital twins into public safety networks to enhance service response.
- Etc…..

70% of C-suite technology executives at large enterprises are exploring & investing in digital twin (McKinsey)

Essential elements of a digital twin

Digital twins are…

- Built for specific **use case(s)**…

- …to serve **specific user(s)**

- Composed of technology solutions for:

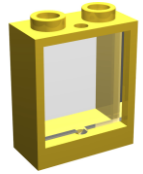
Data

- What types of data do you have to work with?

Modeling

- What can you infer about what will happen?

Visualization



- What is it you want to see, examine, explore?

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Essential Elements of a digital twin

Digital twins are…

- Built for specific **use case(s)**…
  - Project handover
  - Risk assessment
  - Performance predictions
  - Compliance

- …to serve **specific user(s)**
  - Heads of Transformation, Sustainability
  - COOs, CIOs
  - Heads of Engineering, Supply Chain, Asset Reliability
  - EPCs

- Composed of technology solutions for:

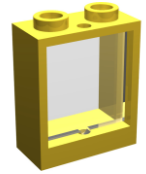
Data

- Engineering data
- Real-time data
- Transactional data
- Third-party data

Modeling

- CAD/ CAM
- Behavioral-performance
- Supply chain
- AI/ML models
- Economic relationships

Visualization

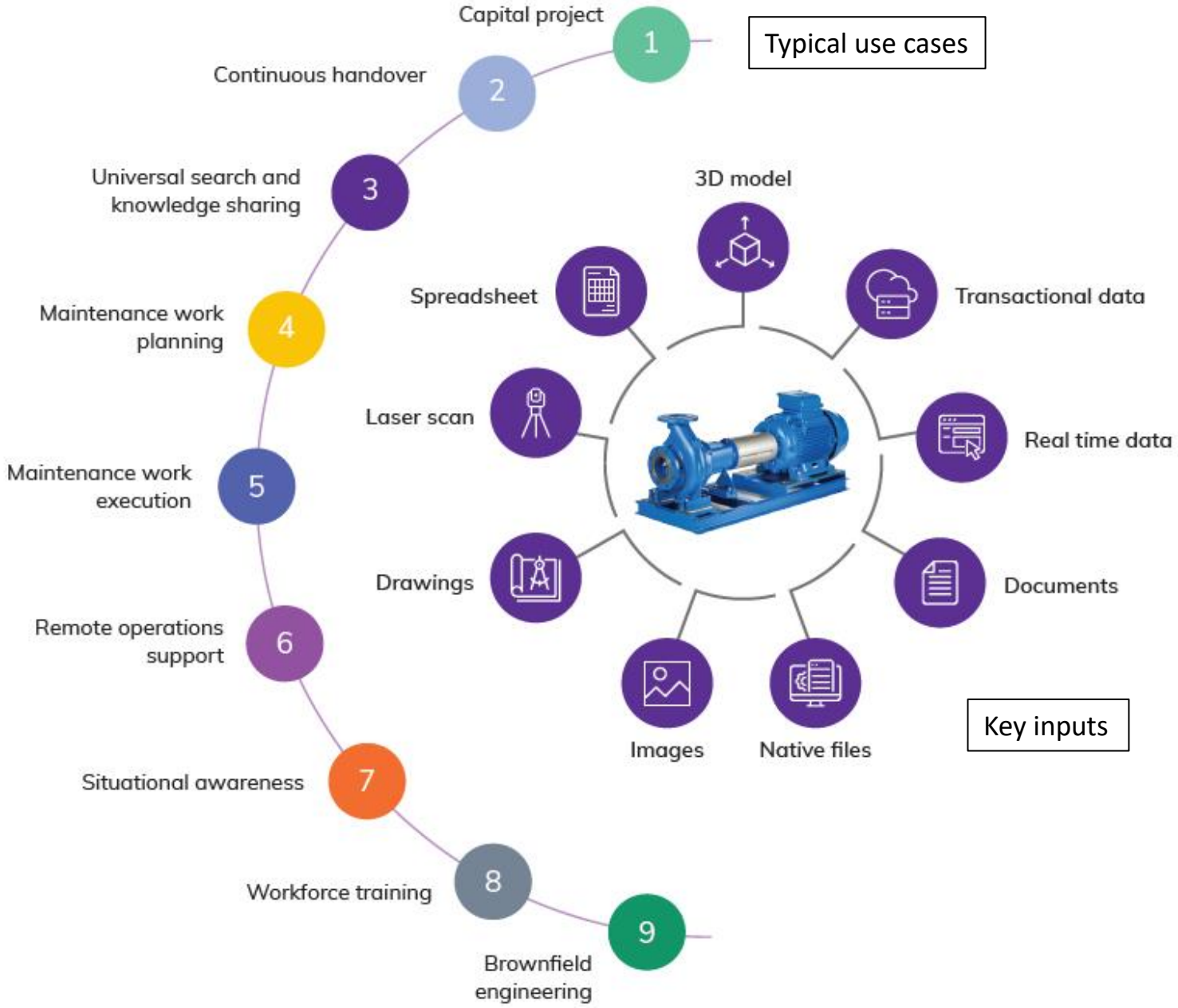


- Enterprise-wide
- Location/ Site level
- Asset level
- Process level
- Job role based

Digital twin use cases

Benefits achieved:

- Deliver on time and on budget
- Operate safely, reliably and sustainably
- Improve product quality
- Increase efficiency and production
- Avoid unexpected costs
- Reduce time-to-market
- Seamless knowledge transfer & collaboration
- Enable remote workforce
- Improve circularity and asset lifecycle management



Digital twins in the real world

Organizations that are already benefitting

- **Emirates Team, New Zealand**
  Digital twin of yachts, crew and sailing conditions to ***test performance of designs without actually building them.***

- **PETRONAS Oil & Gas, Malaysia**
  Multinational company saved millions and reduced its carbon emissions using digital twin to ***predict and resolve potential equipment failures*** before they cause a shutdown

- **Exxaro Mine, South Africa**
  Built cloud-based digital twin of their complete operations and value chain. uses digital twin of boats, crew and sailing conditions to test designs without actually building them.

- **Global Brewery**
  - A global brewing and supply chain digital twin enables producer to adjust inputs based on active conditions and compensate for bottlenecks that emerge.

Common issues with digital twin technology

High potential, but some factors can limit benefits

- Higher than expected complexity… particularly when modeling existing assets.
- Poor data quality.
- One size does not fit all.
- Unexpected costs can limit or delay ROI; digital maturity and data readiness is CSF.
- Know how to apply result and complementing with real-world testing.

Image credit: 12d Synery

Source: Mary K. Pratt, “9 advantages and disadvantages of digital twin technology.” TechTarget ERP: 30 May 2024.

OIL & GAS | AZERBAJIAN

BP optimizes design/build/commission of new offshore facility in the Caspian Sea

Challenges

- Key sources of information for BP's —laser scans, 3D design models and ….data—were distinct from one another, taking time and expertise to connect.
- Complex decision making involved offshore and onshore activities.

Solution

- Worked with KBR to create the Azeri Central East (ACE) facility digital twin.
- Deployed AVEVA™ Asset Information Management, AVEVA™ Point Cloud Manager and AVEVA™ E3D Design™

Results

- **Faster remote access to data produced faster and more informed decisions.**
- **Cloud based digital twin solution increases collaboration.**
- **Better planned maintenance reduces carbon usage and increases safey**

WATER TREATMENT INFRASTRUCTURE | NEAR & MIDDLE EAST

Veolia uses digital twin to improve tenders and ROI on design/build for customer projects

Challenges

- Stop recreating the wheel and leverage experience to accelerate speed and quality of tenders/bids and improve project ROI.
- More accurately estimate CapEx and OpEx of project.
- Use real-time information to improve project designs.

Solution

- Implement digital twin using multiple, integrated AVEVA components: CONNECT industrial platform, Unified Engineering, Diagrams, P&ID, Instrumentation, Asset Information, PI System and Simulation.
- All tools accessible via the cloud to staff in any location.
- DT templates provide efficient starting point and drive Virtual Reality Simulations.

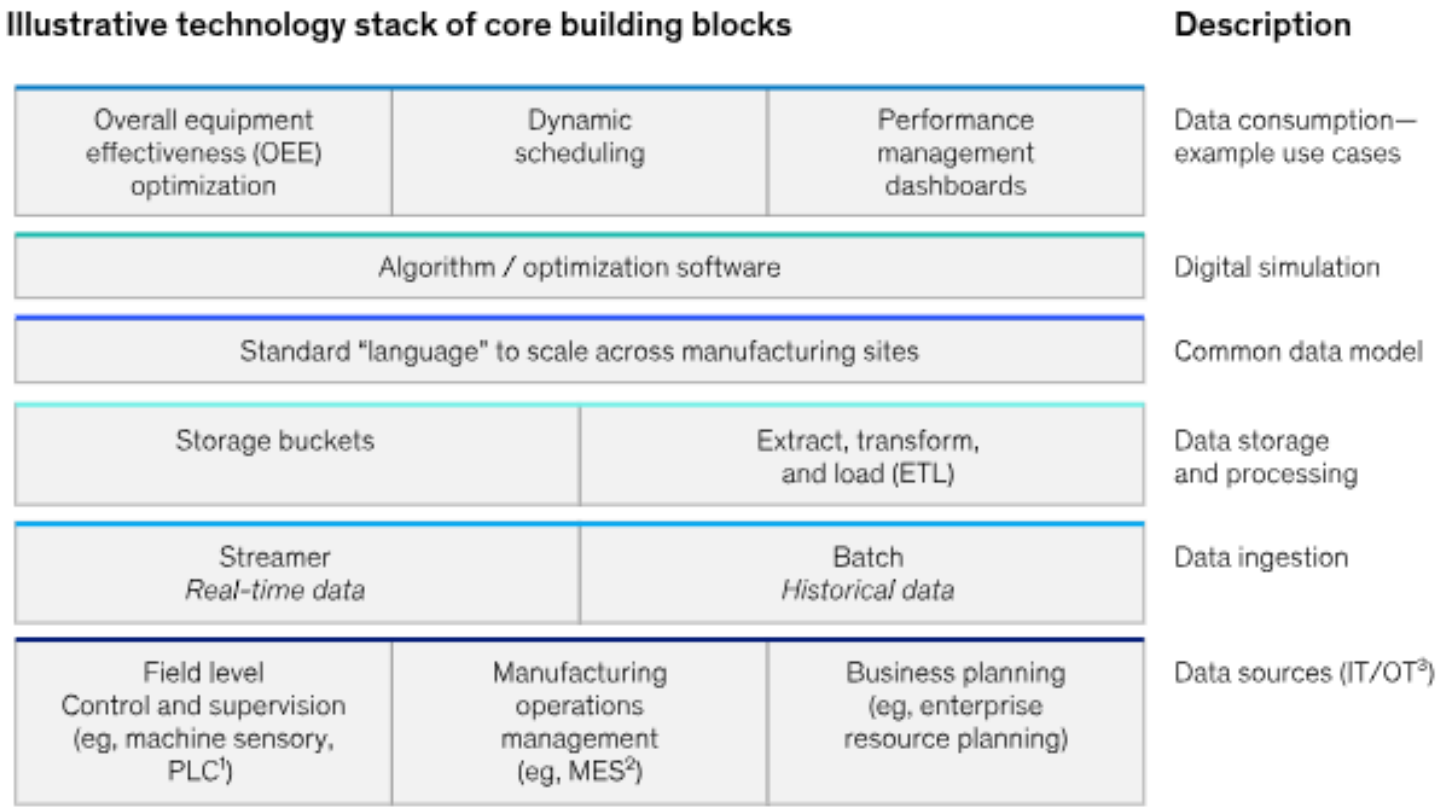
Results

- **Engineering design for tender can be completed in 24 hours vs. previous 1-4 weeks, a decrease of 80%.**
- **Optimization of design, build and operating processes expected to reduce energy consumption by 15-30% and chemical consumption by 10-25%.**
- **Increased trust and satisfaction of both clients and company headquarters.**

Building a modular, scalable digital twin

Evaluating your strategy against the McKinsey model

- Do you have a full-featured, high performance data foundation?
- Will you be able to seamlessly connect the components in your stack?
- Is your stack optimized for industrial use cases?
- Is your stack optimized for scale?
- Is your stack vendor-neutral?
- Will you be able to expose results easily to your key decision makers, wherever they are located?



Source: "Digital twins: The next frontier of factory optimization," McKinsey. January 10, 2024.

Coming: your industrial AI assistant

The next level for industrial intelligence

- What if your industrial cloud platform could automatically propose actions to increase your operational excellence and deliver sustainability?
- Could it give you a competitive advantage? Could you experience more “bang” for your “buck”?
- AVEVA Industrial AI Assistant is currently in preview with early adopter customers for a targeted general release next year.
- What to know:
  - Industrial AI Assistant is a digital chat feature that will be included with CONNECT visualization services.
  - It will provide summarized responses from multiple data sources and will provide you with ‘citations’ to back up its recommendations (visualizations and links).
  - Users interact using natural language (based on large-language-models from Open AI and hosted in Microsoft Azure).
  - Data integrity and privacy are an essential part of its design. Your data is never shared with AVEVA.

Final thoughts

The digital twin journey

- Digital twins are the culmination of advanced and mature digital transformation… not point solutions.
- Your digital twin applications will expand and multiply with practice and success.
- Work with partners who have experience across industrial technology solutions.
- Explore the advantages of connected industrial platforms in accelerating ROI and maximizing outcomes.

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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

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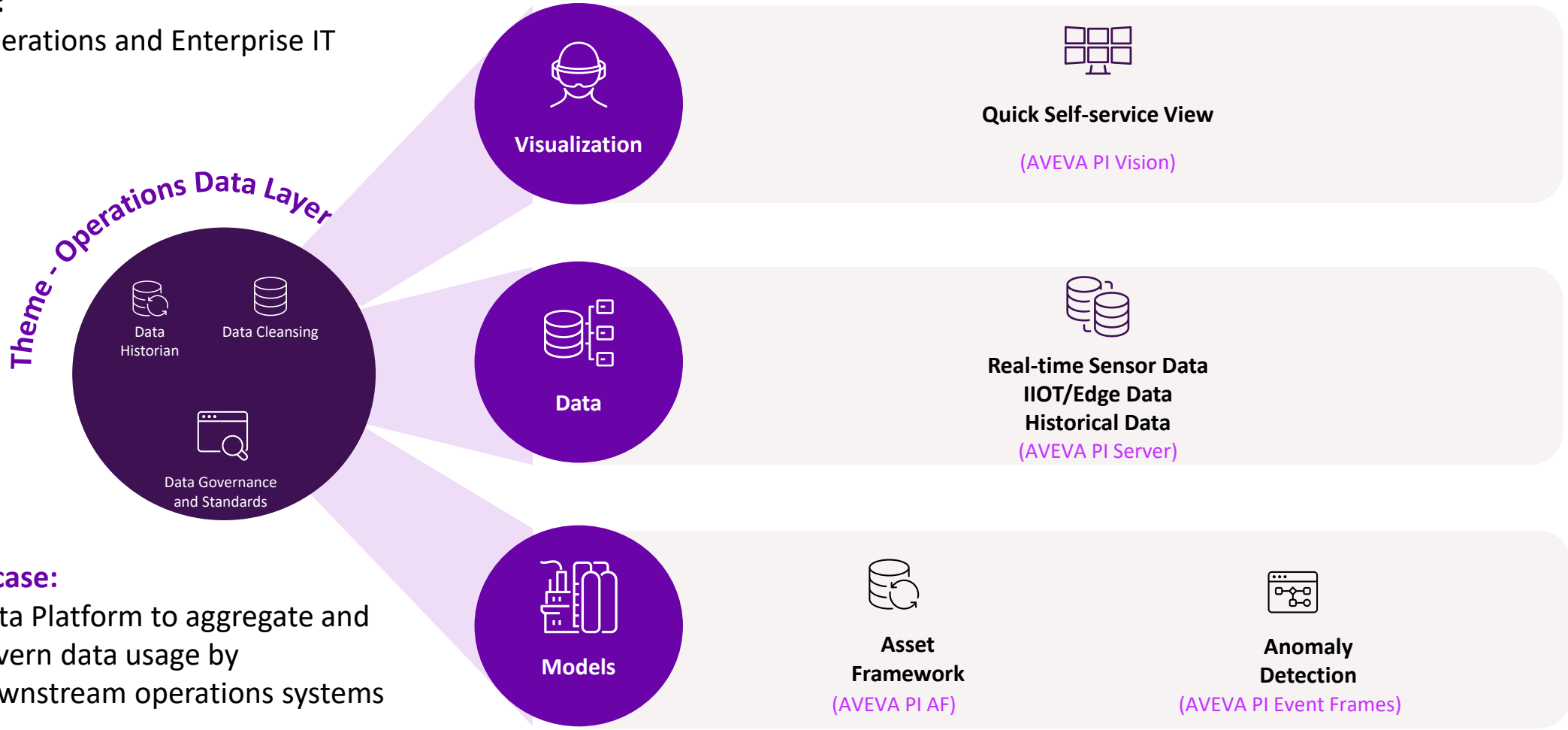
Day 1 – AVEVA digital twin components for operations

= AVEVA Solutions

User:

- Operations and Enterprise IT



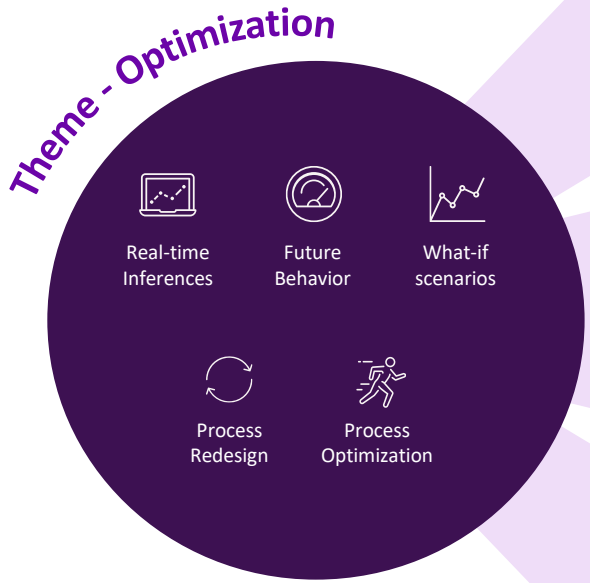
Use case:

- Data Platform to aggregate and govern data usage by downstream operations systems

Day 2 – AVEVA digital twin components for optimization

= AVEVA Solutions

User:
- Process Engineering teams



Use case:
- Conduct root-cause analysis
- Infer unmeasured data
- Optimize processes
- Plan and schedule supply chain

Visualization

Simulation, Optimization, Operator screens
(AVEVA UOC, AVEVA Connect Visualization Services, AVEVA PI Vision)

Data

Simulated Data
Supply Chain Data
(AVEVA PI Asset Framework, AVEVA Connect Data Services)

Models

First-Principle – Steady-state
(AVEVA Process Simulation)

First-Principle – Dynamic
(AVEVA Dynamic Simulation)

First-Principle – Optimization
(AVEVA Real-time Optimization)

ML
(AVEVA Predictive Analytics)

Supply Chain
(AVEVA Unified Supply Chain)