AVEVA Asset Information Management – Complying with a CFIHOS Handover Using Engineering Information Management Tools

Steve Parvin
Creating a digital thread that enables information mastery across the asset lifecycle for faster and trusted decision making

**Industrial Information Integrity** (Enterprise-wide governance for compliance, consistency and completeness)
What is CFIHOS?

CFIHOS’ aim is to offer practical standardised specifications for information handover that work for anyone involved in the:

• Making
• Operating
• Maintaining
• Decommissioning

Of industrial facilities including everyone in the information supply chain - operators, contractors and equipment manufacturers and suppliers.
CFIHOS

Capital Facilities Information HandOver Specification

• CFIHOS is managed by the International Association of Oil & Gas Producers (IOGP) under Joint Industry Programme 36 (JIP36).

• AVEVA are active members of CFIHOS
  • Members of the Backlog Team
  • Members of the Admin Team
  • Team Lead Software Vendors Team

HTTPS://WWW.JIP36-CFIHOS.ORG/
What is an Information Handover Specification and why is one needed?
Problems with Large Projects

Most (65%) mega projects run into problems:

- overrun schedule by 25% or more
- exceed budget by 25% or more
- or have continuing and severe issues during the first 2 years of operations

Typical causes are:

- Contractual Frameworks
- Aggressive Schedule
- Cost Cutting
- Poor Front End Loading
- Incomplete or Incorrect Basic Data

Financial Consequence of Poor Information

“Schedule is King”

- Average Project has **40% complete data at start-up.**
- Average of **25% employee time spent searching for information.**
  - Poor control of inventory, maintenance and plant status
Traditional Handover
Last day – First Session of the Morning Fusion last night!

Interactive Session
Information Handover - Pitfalls

Without a good Handover Specification!

• To demonstrate a few common areas where Information Handover goes wrong, we’re going carry out a few activities.

• These are analogies which can be used to help us as Information Managers explain to people why information handover doesn’t always go as planned.

• Each activity points to a course of action to help avoid common pitfalls.
Activity 1

• On the next slide is a picture of an object I want you to describe it to me.
• Any volunteers
• Ready.....
• Go.....

• I didn’t say I’d show it to you?
• Is that fair?
So was it a trick question?

• Unfortunately, No!
• Many projects start up without really understanding what the operations side of the business requires.
• It’s all about the typical timing of projects
• When the stakeholders get engaged and when the contracts are signed.
Information Supply Chain

Vendors → Design Contractor → Owner/Operator Project Team → Owner/Operator Operations Team
Information Supply Chain – Example Specifications

- Vendors: Procurement Instructions
- Design Contractor: Instructions to Suppliers
- Owner/Operator Project Team: Information Handover Specification
- Owner/Operator Operations Team: Data and Document Requirements for Operational Acceptance (DDROA)
“Begin with the end in mind.”

Stephen Covey
1. We need to know the information we want handing over
...and we need it defined early

Obvious, but often overlooked!
Activity 2

• On the next slide is a picture of an object I want you to describe it to me.
• Any volunteers
• This time I promise to show you the picture.
• Ready.....
• Go.....
We need to be very prescriptive in what we ask for?

- Deliverables from a project require accurate definition.
  - Content
  - Format
  - Structure

- We need some degree of common terminology.
  - Reference Data Library

- Even down to Units of Measure used for every attribute!
Example of Poor Information Management

- Flight System Software performed calculations using Newtons (Ns)
- The ground crew entered their course corrections using Pound-Force (lbfs)
- Cost $327.6 million

Mars Climate Orbiter
“The Metric Mixup”

It’s important we all have a common understanding and use a common language
Project Information Handover Documents

- **Information Handover Process**
  - Handover Strategy
  - Handover Standards (Tech Passport)
  - Handover Requirements
  - Handover Plan

- **Data Management**
  - Conformance to Standards (CFIHOS)
  - Integrity, Completeness, Consistency
  - Tagging Requirements
  - Tag Associations

- **Document Management**
  - Handover Process
  - Formats, Content & Templates
  - ISO 8859 Language Support
  - Archiving, Retention & Management

- **3D Model Management**
  - Model Handover Standards
  - Naming and Tagging requirements
  - EPC/Vendor skid Packages
  - As-Built Requirements
“Fast is fine but accuracy is everything”

Wyatt Earp
2. We need detailed and unambiguous requirements
Always check the quality of the deliverables

- Do the deliverables line up with what we expect?
  - Attributes
  - Units of Measure

- Are they complete?
  - Null values
  - TBA/TBC/NA

- Is the format correct?
  - Data Delivery Type.
  - Field Size. Illegal Characters
  - CSV/Native Files/CAD Frames/Symbol Sets etc.

- Are we confident that we can use them?
  - Aligned with target systems
  - Gives the information we want at the right level of detail
Check the Quality and Completeness
Timing – Don’t wait for the end of the project

- If you build up your picture of the quality of the data early, **You can address it early.**
- Support can be provided to focus on gaps in data or address poor data quality
- Bringing data in early and checking it will help with other activities
- As data develops against the requirements it can be used to assess readiness for key project activities
  - Procurement
  - Construction
  - Completions
  - Commissioning
- In the same way it can identify data gaps that will potentially impact project schedule
Project Timeline and Stakeholder Disengagement

- OEM
- Vendors
- Design Contractor
- Owner/Operator Project Team
- Owner/Operator Operations Team

Project Timeline
Let’s go back to an earlier statement

• **Average plant has 40% complete data at start-up.**
• **What we need to do to avoid this is:**

  • **Assure Project Data Quality for Operational Readiness**
    • Data gathering during project execution
    • Measuring data integrity across sources
    • Publishing validated information to target systems

  • **Control Project Data Handover and Information Quality**
    • Progress and status monitoring
    • Validation of project standards
    • Engineering register / Master data management
Summary of Key Points

• Know what information is required to support your business.

• Ensure that it is asked for at the correct level of detail and supported by an appropriate contractual framework.

• Measure the quality and completeness of the deliverables against your defined standards.

• Don’t wait until the end of the project. Measure the quality and completeness frequently.
Questions
How can CFIHOS help?

Back to CFIHOS.
CFIHOS

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HTTPS://WWW.JIP36-CFIHOS.ORG/
CFIHOS purpose is to create a handover specification that can be implemented by operators, contractors and equipment manufacturers and suppliers to standardize the specification of information handover requirements for a project. That will significantly lower the lifecycle cost associated with incorrect and missing information required to operate a facility.
## CFIHOS at a Glance

<table>
<thead>
<tr>
<th>What is it?</th>
<th>Why now?</th>
<th>What is it not?</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFIHOS (pronounced see-foss) is an information standard delivering a common language for equipment and engineering deliverables across the supply chain. The goal of CFIHOS is to eliminate the friction in getting the right information (data and documents) to start, operate, maintain, and decommission your facilities.</td>
<td>As CFIHOS matures, it provides an important service as a Rosetta Stone* to translate company specific terminology and requirements to industry language. In industry we’ve not previously focused on efficiency as much as we do today. CFIHOS will bring us the ability to increase efficiency, reduce duplication and retain the value of information as it transfers across a project lifecycle.</td>
<td>CFIHOS is not cost plus. What CFIHOS specifies is a common language and structure to turn over information that already exists in EPC systems. It is not above and beyond what we have asked for before – this just elevates it from PDF to true data.</td>
</tr>
</tbody>
</table>

*The Rosetta Stone was created in 196BC to translate between different languages and when it was rediscovered by archeologists it was key in deciphering Egyptian hieroglyphs.
How does it add value?

- CFIHOS will change the way major capital and regional projects facilitate and manage their digital data.
- Improves the speed, quality, and consistency of your design; reducing change in the field.
- Increases data quality and completeness for your operations; enabling flagship assets of the future.
- Common language allows computers to do what computers do best; and allows our engineers to focus time where critical thinking and technical expertise are needed (e.g. automate and centralize surveillance).

What does it take to implement?

- Standardized implementation and centralized support.
- Engineering culture shift to leverage data.

What is our ask?

- That you help us develop the standard by getting involved in working groups.
- That you help us decide what is included in the standard by voting to approve or reject suggested features in the standard.
CFIHOS Elements

Technical Specification Document
Requirements, rules and principles for information handover

Data Model
For structuring data and documents about assets

Process & Guidance Documents
Outlining implementation steps (and do’s & don’ts)

Reference Data Library (Dictionary)
Consistent naming of equipment, properties & documents
CFIHOS V1.5 can be found on the CFIHOS Website. This version is considered to be the minimum viable product that can be successfully implemented either in parts or in its entirety.

<table>
<thead>
<tr>
<th>CFIHOS Standard Documents</th>
<th>Download Link</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Narrative Documents</strong></td>
<td></td>
</tr>
<tr>
<td>Scope and Procedures (C-TP-001) (V.1.5)</td>
<td>CFIHOS Scope and Procedures</td>
</tr>
<tr>
<td>Specification Document (C-SP-001) (V.1.5)</td>
<td>CFIHOS Specification Document</td>
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<tr>
<td>Implementation Guide for Contractor (C-GD-002) (V.1.5)</td>
<td>CFIHOS Implementation Guide for Contractor</td>
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<td><strong>Reference Data Library</strong></td>
<td></td>
</tr>
<tr>
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<td>Reference Data Library (Excel version)</td>
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<td>Reference Data Library (csv zip file)</td>
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<td><strong>Data Model</strong></td>
<td></td>
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<tr>
<td>Using the Data Model (C-DM-001)</td>
<td>Using the Data Model</td>
</tr>
<tr>
<td>Data Dictionary (C-DM-002) - Full version (V.1.5)</td>
<td>Data dictionary (full version)</td>
</tr>
<tr>
<td>Data Dictionary (C-DM-002) - Light version (V.1.5)</td>
<td>Data dictionary (light version)</td>
</tr>
<tr>
<td><strong>Supporting Templates</strong></td>
<td></td>
</tr>
<tr>
<td>v.1.5 CFIHOS Contract Scenario Templates</td>
<td>CFIHOS Contract Scenario Templates</td>
</tr>
</tbody>
</table>

- We will continue to develop and improve the content through point releases as we work towards our next version.

https://www.jip36-cfihos.org/cfihos-standards/
Participation has grown to 68 organizations across multiple industry sectors, with 370+ Individual members.

Current CFIHOS Membership (as of March 2022)

IOGP Owner Operators
1. Woodside
2. Total
3. Suncor Energy Inc
4. Shell
5. Petronas
6. Petrobras
7. ExxonMobil
8. Equinor
9. ENI
10. ConocoPhillips
11. Chevron
12. BP
13. Saudi Aramco

Non IOGP Members Owner Operators
1. Sellafied
2. Evonik Operations GmbH
3. Eastman
4. Dow
5. Covestro
6. Technip Energies
7. SBM Offshore
8. Saipem
9. Mitsubishi Heavy Industry
10. McDermott
11. Fluor
12. Akker Solutions
13. Petrofac
14. Baker Hughes
15. Chiyoda Corporation
16. Wood
17. Worley
18. Bechtel
19. Technip FMC

Software Vendors & Consultants
1. Aucotec
2. Sharecat
3. Rathlinc System
4. Plant Resource Technology
5. Kraken
6. Hexagon
7. Digital Construction Works
8. Aveva
9. Accenture
10. Talent Swarm
11. Idox
12. Sirfull
13. ReVision Inc
14. DMS Corporation
15. Dassault Systèmes
16. Autodesk
17. Assai
18. Wipro
19. Phusion IM
20. Prospects
21. Datum 360
22. Covizmo
23. L&T Technology Services (LTTS)
24. Austin Fernandez Consulting Limited
25. RZON ™ TECHNOLOGY
26. Aspentech
27. AIFlux Limited
28. Semmtech
29. FutureOn

EPC Contractors
1. Technip energies
2. SBM Offshore
3. Saipem
4. Mitsubishi Heavy Industry
5. McDermott
6. Linde
7. KBR
8. JGC
9. Fluor
10. Akker Solutions
11. Petrofac
12. Baker Hughes
13. Chiyoda Corporation
14. Wood
15. Worley
16. Bechtel
17. Technip FMC

Equipment Suppliers & other Institutions
1. Yokogawa
2. KNU
3. Myongji University
4. Aucotec
5. Sharecat
6. Rathlinc System
7. Plant Resource Technology
8. Aveva
9. Accenture
10. Talent Swarm
11. Idox
12. Sirfull
13. ReVision Inc
14. DMS Corporation
15. Dassault Systèmes
16. Autodesk
17. Assai
18. Wipro
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28. Semmtech
29. FutureOn

IOGP Owner Operators
13
Non IOGP Members Owner Operators
6
Software Vendors & Consultants
29
EPC Contractors
17
Equipment Suppliers and Others
3

Total Organisations
68
## CFIHOS Working Groups

Open to the entire membership

<table>
<thead>
<tr>
<th>WG Name</th>
<th>Lead</th>
<th>Deputy</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference Data Library</td>
<td></td>
<td></td>
<td>Develop and maintain the content of the Reference Data Library (Classes and Properties) and implement any new feature requests that affect it as the result of Change Requests.</td>
</tr>
<tr>
<td>Documents</td>
<td></td>
<td></td>
<td>Enhance the portion of the data model and RDL describing documentation requirements, and how it relates to equipment and tag classes.</td>
</tr>
<tr>
<td>Data Model</td>
<td></td>
<td></td>
<td>Team meetings re-established</td>
</tr>
<tr>
<td>Implementation</td>
<td></td>
<td></td>
<td>Develop and evolve a logical data model, depicting the concepts of interest to CFIHOS, how they are defined, and what business rules they must obey.</td>
</tr>
<tr>
<td>Software</td>
<td>Steve Parvin</td>
<td></td>
<td>Team scope in transition from narrative documents maintenance to a focus on training and implementation support.</td>
</tr>
<tr>
<td>Marketing</td>
<td></td>
<td></td>
<td>Develop and define a broad and flexible framework that enables software organisations to demonstrate compliance with the CFIHOS standard – for all the elements of the standard and across the supply chain.</td>
</tr>
<tr>
<td>Digitalisation</td>
<td></td>
<td></td>
<td>Communicate to prospective (and current) CFIHOS members to educate them about the standard, encourage its adoption and foster participation in development. Ensure widespread knowledge about and support for CFIHOS within stakeholder organisations – not just members but ALL organisations in the supply chain where the standards apply.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Keep up to date on what is going on within digitalization happening in oil and gas and other industries. Coordinate with Industry Digitalization Roadmap task force within ISSC and CFIHOS. Develop a digitalization roadmap for CFIHOS, in years to come</td>
</tr>
</tbody>
</table>
CFIHOS V1.5 Deliverables (Open Source)

https://www.jip36-cfihos.org/cfihos-standards/

- CFIHOS v1.5 Release Notes

Narrative Documents:
- Scope and Procedure (C-TP-001) (V1.5)
- Specification Document (C-SP-001) (V1.5)
- Implementation Guide for Principal (C-GD-001) (V1.5)
- Implementation Guide for Contractor (C-GD-002) (V1.5)

Reference Data Library (RDL):
- Reference Data Library (C-ST-001) - Excel version
- Reference Data Library (C-ST-001) – CSV zip file

Data Model:
- Using the Data Model (C-DM-001)
- Data Dictionary (C-DM-002) - Full Version (V1.5)
- Data Dictionary (C-DM-002) – Light Version (V1.5)

Supporting Templates:
- V1.5 CFIHOS Contract Scenario Templates

CFIHOS V1.5 is available in AVEVA Information Standards Manager (ISM)
CFIHOS

Project Execution
- **Interoperability**: Drive consistency through a common specification and dictionary from day 1 to reduce cost of consolidation of information at each step in the supply chain across the project.
- **Debottlenecking**: Raise productivity by applying the “theory of constraints” e.g. find bottlenecks in design review & approval process using status reporting on information delivery & review.
- **Accelerated handovers**: Continuously stage and validate asset data to assure data quality and accelerate population of operational systems to speed up the first oil date.

Operations
- **Speed up searches for information**: Reduce “search-time” by linking documents to tags (often quoted as 25% of operational staff time). Improve management of change for brownfield modifications.
- **Reduce operational risk**: Demonstrate control over “As Built” asset information. Use as a “minimum standard” for asset information. Use as a specification for integrated service contractors & data cleaning.
CFIHOS

International Association of Oil and Gas Producers (IOGP)

- CFIHOS / Joint Industry Programme 36 (JIP 36) – Making information handover quicker, easier and safer for operators, contractors, equipment manufacturers and suppliers by using standardized specifications

https://www.jip36-cfihos.org/

- AVEVA recommends that our customers consider joining CFIHOS

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    Tel : +44 20 3763 9700

https://www.iogp.org/about-us/contact-us/
Standardizing Procurement Specifications
International Association of Oil and Gas Producers (IOGP)

• Joint Industry Programme 33 (JIP 33) – Standardizing Procurement Specifications
  • https://www.iogp-jip33.org/
  • Making a step-change improvement in the specification, procurement and delivery of equipment for the capital facilities industry, through the use of standardized industry procurement specifications.

https://www.iogp.org/about-us/contact-us/
Questions
Information Governance

Managing Information Standards as an Asset
Managing Asset Information Management – Information Standards
As an Asset
Information Standards Management

Key Capabilities

- Contract, Specifications, Standards
- Excel Spreadsheets
- Configuration Management
- Information Governance
- Information Modeling
  - Classes, Attributes and UoM
  - Taxonomy
  - Industry Standards
  - Naming / Numbering Rules
  - Lifecycle Phase Definitions
  - Mapping to Data Sources
  - Maturity Model
  - Validation Rules
Information Standards Management

Mapping Systems of Record / Systems of Reference

Reference Data Library

AVEVA Information Standards Management (SaaS)

Reference Data Library - Deliverables Matrix

Reference Data Library
Data Model Seed File

Systems of Record (Data Sources)
Measure Information Standards Compliance

Information Governance

Digital Twin solution (Trust and Verify)
## Capital Facilities Information HandOver Specification v1.5

### Statistics

<table>
<thead>
<tr>
<th>Category</th>
<th>Count</th>
</tr>
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<tr>
<td>Functional Classes</td>
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<tr>
<td>UoM Classes</td>
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<tr>
<td>UoM Units</td>
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<tr>
<td>Lifecycle Types &amp; Maturity Levels</td>
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<tr>
<td>General Classes</td>
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<tr>
<td>Attributes</td>
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<tr>
<td>Physical Classes</td>
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<td>Enumeration Lists</td>
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</tr>
<tr>
<td>Naming &amp; Numbering</td>
<td>0</td>
</tr>
</tbody>
</table>

CFIHOS v1.5 is available in AVEVA ISM

[https://www.jip36-cfihos.org](https://www.jip36-cfihos.org)
Capital Facilities Information HandOver Specification v1.5

Overview of CFIHOS v1.5 Updates

- **Function Class of a Class**: 12, there has been no change since the previous release of CFIHOS v1.4
- **Functional Classes**: 876, this represents an addition of 307 Functional Classes since the previous release of CFIHOS V1.4
- **Attributes**: 960, this represents an addition of 103 attributes since the previous release of CFIHOS v1.4
- **Physical Class of a Class**: 12, this represents an addition of 1 Physical Class of a Class since the previous release of CFIHOS V1.4
- **UoM Classes**: 35, there has been no change since the previous release of CFIHOS v1.4
- **General Classes**: 119, this represents an addition of 23 General Classes since the previous release of CFIHOS V1.4
- **Enumeration Lists**: 164, this represents an addition of 28 Enumeration Lists since the previous release of CFIHOS V1.4
- **UoM Units**: 92, this represents an addition of 9 UoM Units since the previous release of CFIHOS V1.4
- **Lifecycle Types & Maturity Levels**: 1 Lifecycle Type and 25 Maturity Levels, these are new elements to the latest release of CFIHOS v1.5
- **Document Classes**: 291, this represents an addition of 7 Document Classes (and 29 new Document Sub-Classes) since the previous release of CFIHOS V1.4 as well as the addition of 169 Document Sub-Classes
- **Naming & Numbering**: 0, there has been no change since the previous release of CFIHOS v1.4
Asset Information Management Strategy based on CFIHOS

AVEVA ISM, AVEVA Asset Information Management & AVEVA Change Manager
Asset Information Management

Facility Lifecycle

- Decommission
- Destruction

OPERATE & MAINTAIN

- Commissioning
- Start-Up

EXECUTE Phase

- Fabrication & Construction
- Detail Design & Procurement

DEFINE Phase

- Select Phase

SELECT Phase

GOVERNANCE

- CAPEX
- OPEX

- CAPEX: > 25 Years
- OPEX: 3 to 5 Years
- CAPEX: 8 Months
- OPEX: 1 Year
- CAPEX: 2 Years
Asset Information Management

Digital Asset Strategy
Defining an Engineering Information Management Strategy by means of a Maturity Model – A Roadmap Tool for Owner Operators

Level 1: Siloed
Level 2: Recognition & Planning
Level 3: Foundational
Level 4: Integrated
Level 5: Optimized / Best in Class

Add link to whitepaper
“Information Governance” is essential for higher Digital Maturity

Information Governance

Information Handover Specification

Digital Twin solution
(Trust and Verify)
✓ Compliance
✓ Consistency
✓ Completeness
“Management of Change” is Essential for Sustaining Digital Twins
What are the benefits?

• Digital Twin to aggregate project deliverables
• Supports the project by providing:
  • Easy access to data and documents
  • Ability to identify data/document compliance, consistency and completeness
  • Early identification of gaps or issues with deliverables to allow for action
  • Measure of data readiness for key project activities
  • Mapping of data input sources and data destinations, supporting the Digital Thread
  • Management of change of data requirements through ISM
• Aggregated and aligned data to support a Digital Twin in operations
Steve Parvin

Engineering Information Management Portfolio Strategy

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Andy Davidson

AVEVA ISM and AVEVA Point Cloud Manager Product Manager

• AVEVA
• Andy.Davidson@aveva.com
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.
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