THURSDAY, OCTOBER 26, 2023

Rio Tinto and Accenture Project Success Story

AVEVA™ Production Management (Ampla) and AVEVA™ PI System™: better together

Ross Finnie and Cedric Brown

accenture | RioTinto

Industry x

Rio Tinto and Accenture Project Success Story

October 2023

AVEVA Production Management (Ampla) and AVEVA PI System: better together

Agenda

Rio Tinto Gudai-Darri Mine

- Introduction
- Overview

Accenture in the mining industry and our capabilities, including MES

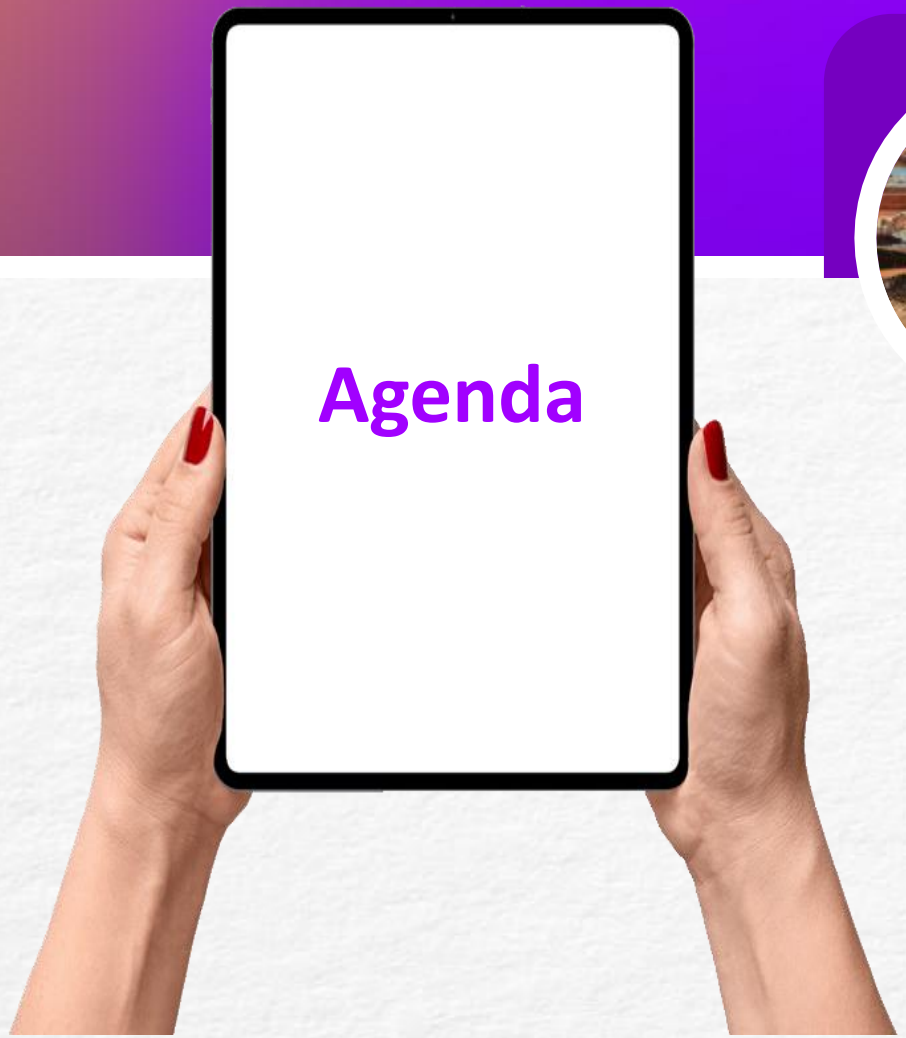
Project Success

- Translation of the business requirements
- Design solution to deliver the desired outcome
- The team worked together to achieve the outcome

Technical Solution

- The power of PI and AVEVA Production Management working together
- Solution Highlights
- Fixed Plant Circuit Based Monitoring, Equipment Time Usage and Delay Event Auto-Coding
- Laboratory Equipment Monitoring

Agenda



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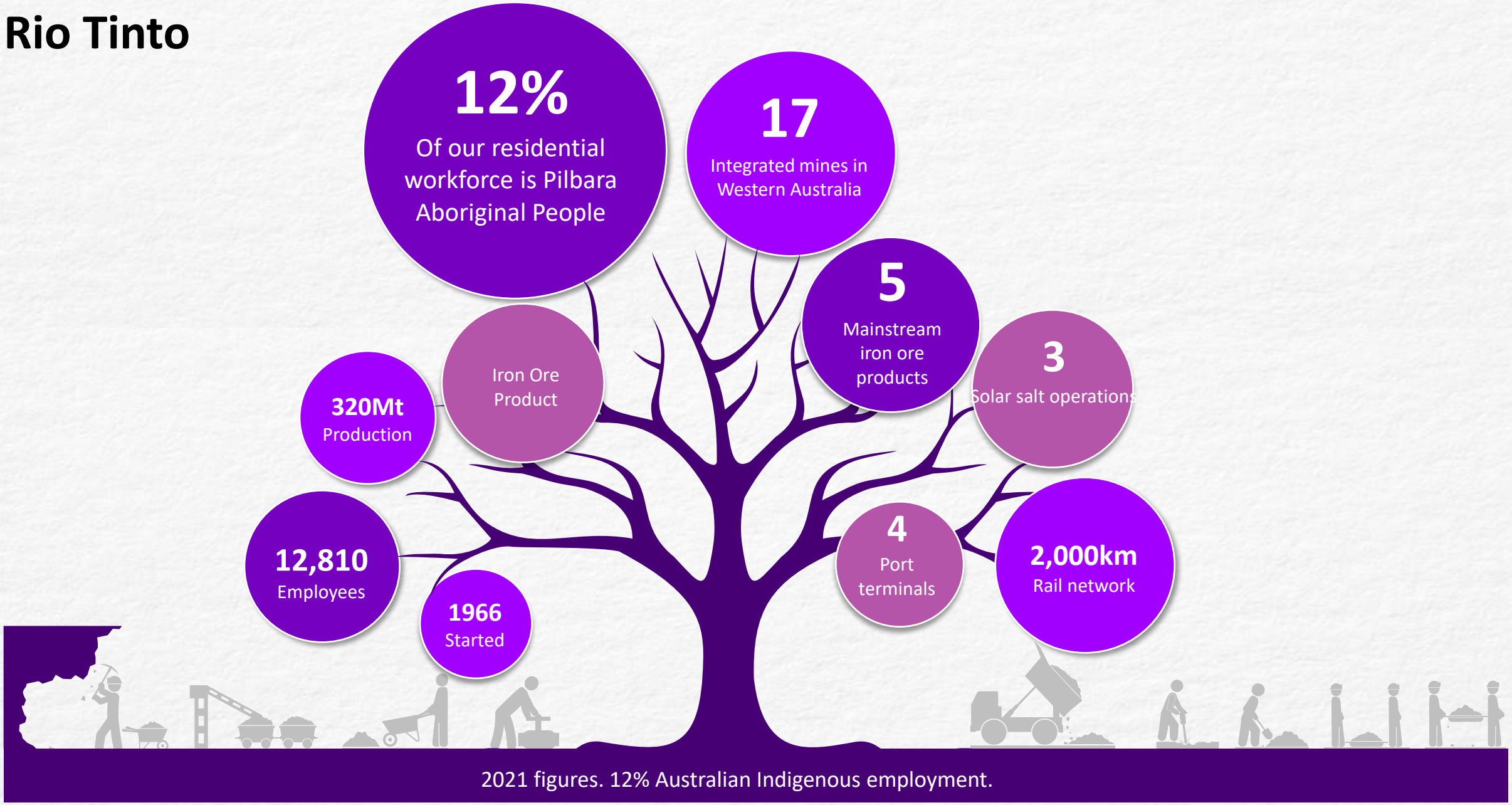
INDUSTRY X

Rio Tinto



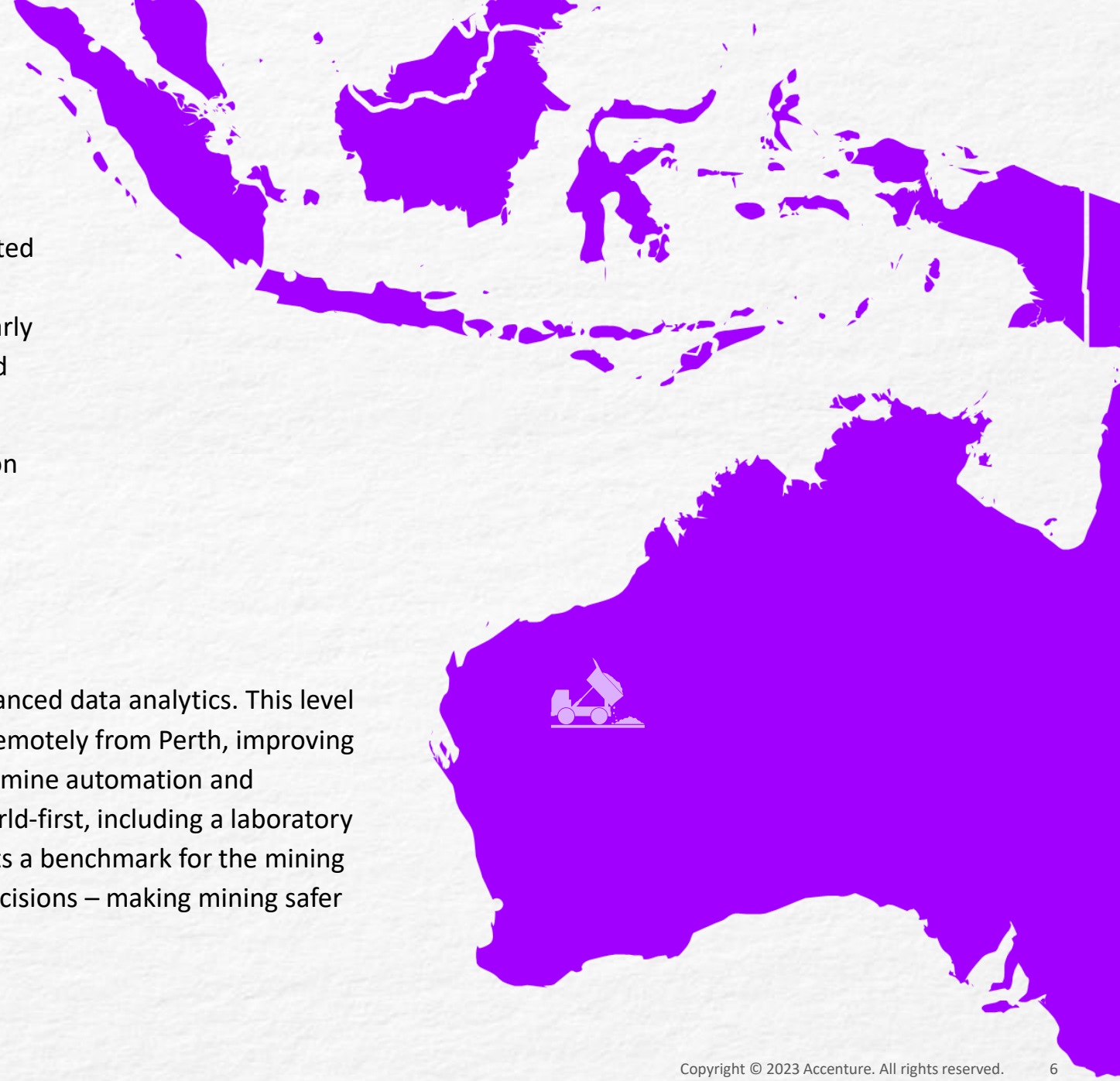
2021 figures. 12% Australian Indigenous employment.

Rio Tinto

Iron Ore: Pilbara region of Western Australia

In the Pilbara region of Western Australia, Rio Tinto owns an integrated portfolio of iron ore assets: a world-class, integrated network of 17 mines, four independent port terminals, a rail network spanning nearly 2,000 kilometres and related infrastructure – all designed to respond rapidly to changes in demand.

Rio Tinto is one of the world's leading producers and exporters of iron ore



Gudai-Darri: Rio Tinto most technologically advanced mine

Gudai-Darri's design is more automated and digitised, including advanced data analytics. This level of automation allows Rio Tinto to operate equipment and vehicles remotely from Perth, improving safety and efficiency. Significant innovations include fully integrated mine automation and simulation systems. Several of Gudai-Darri's innovations are also world-first, including a laboratory that's fully automated and integrated with the mine. Gudai-Darri sets a benchmark for the mining industry in terms of automation and using real-time data to drive decisions – making mining safer and more productive

Gudai-Darri Automated Delay Accounting System

The aim was to improve the business process and reduce the amount of manual data entry into the Delay Accounting System.

43Mtpa Dry Crushing and Screening Plant

Fed from the **Kara Pit**

First Mining mid-July 2021

First Ore on Train late November 2021

Robotic Laboratory – late 2021 / early 2022

A key part of the solution was to

- Implement AVEVA PI System and develop a framework for PI Asset Framework
- Implement the AVEVA Production Management (Ampla) System for delay accounting and production management.

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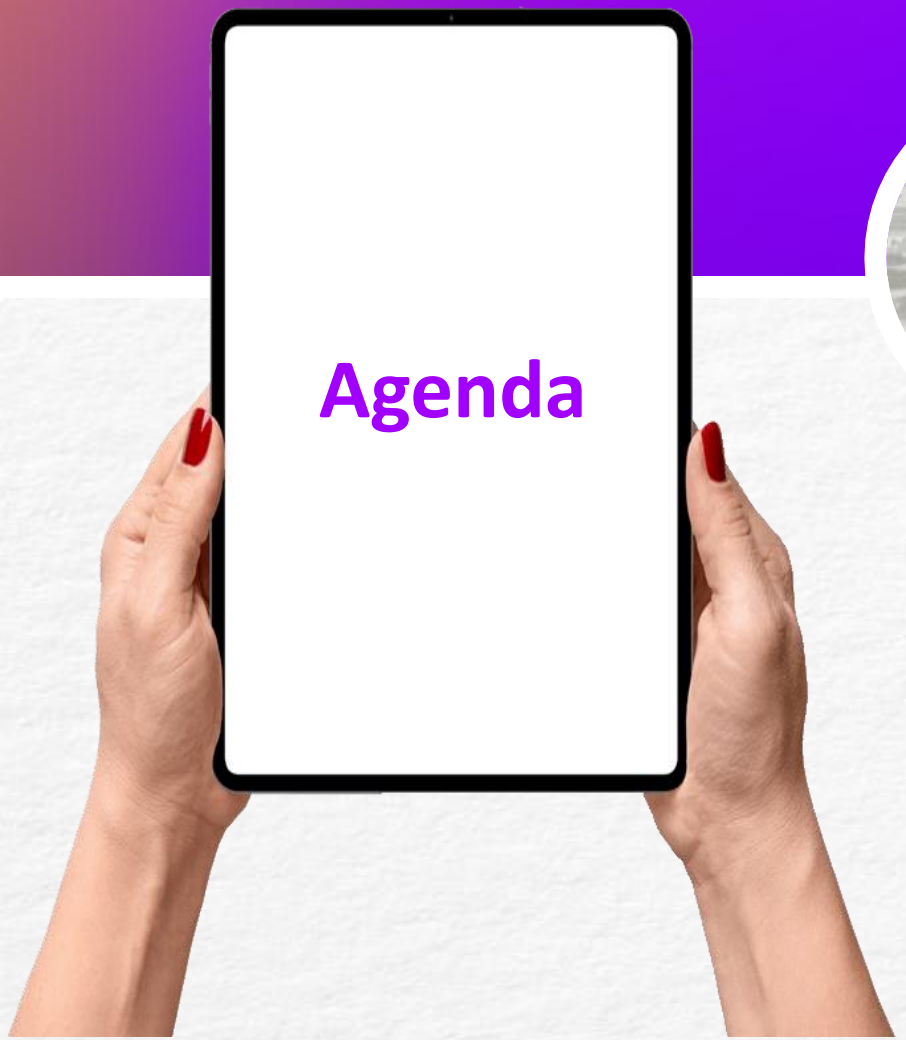

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Accenture and AVEVA Strategic Alliance

A strategic partnerships spanning more than 10 years of collaboration and investment

We are proud to be 2022 AVEVA global partner awards winner!

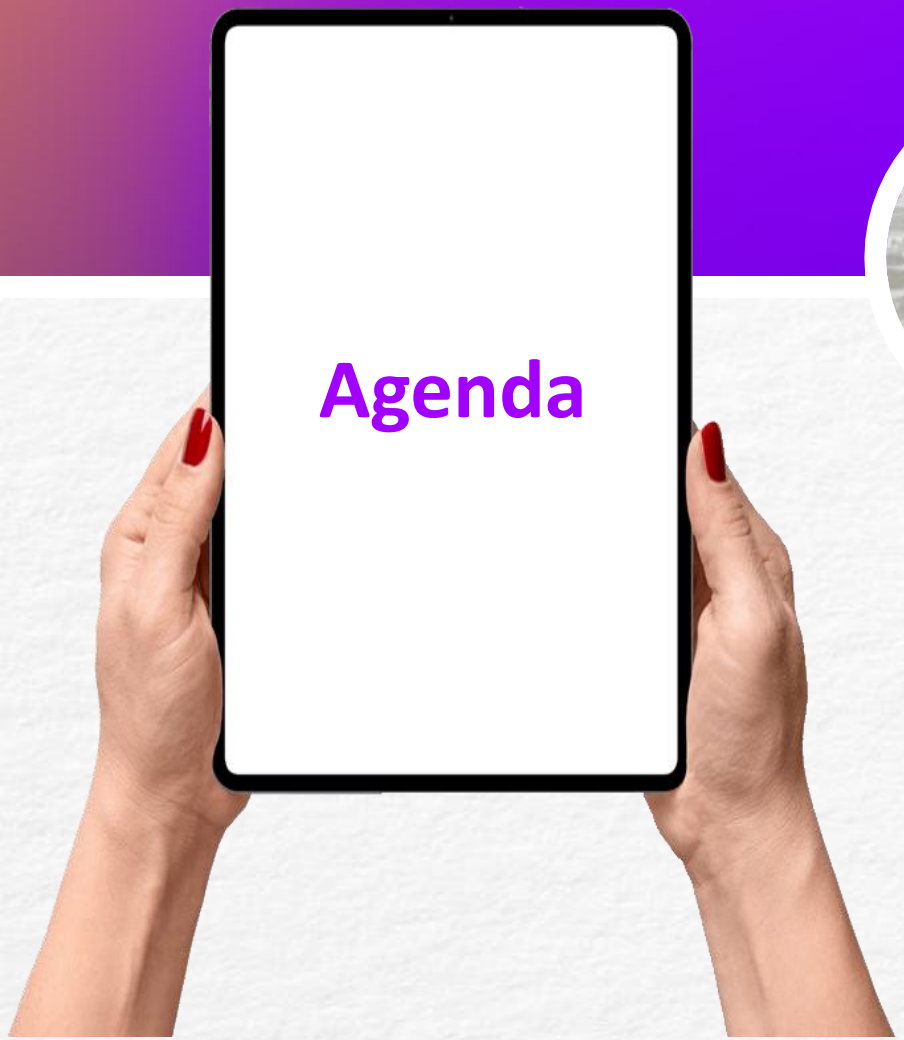
We invest in building our capabilities and dedicated CoEs including

300 + experts in AVEVA solutions and **150 +** experts in OSIsoft solutions

We invest in building assets, accelerators and demonstrators across a portfolio of Industry-X Innovation Centres around the world

- **PI-in-the-Sky** (cloud-based analytics PaaS for transformation)
- We are **OSIsoft partner** since 2007 and are the largest integrator of PI systems
- **MES integrators** for accelerated deployment
- Milan, Essen, Dublin, Houston, Tokyo, Shanghai and more …

Agenda



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5 Ingredients to Project Success

(just like the popular cookbook)

Clear Vision and Business Strategy for New Mine

(most automated mine)

Translate the business requirements into a solution to deliver the required outcomes successfully

Holistic Project Model

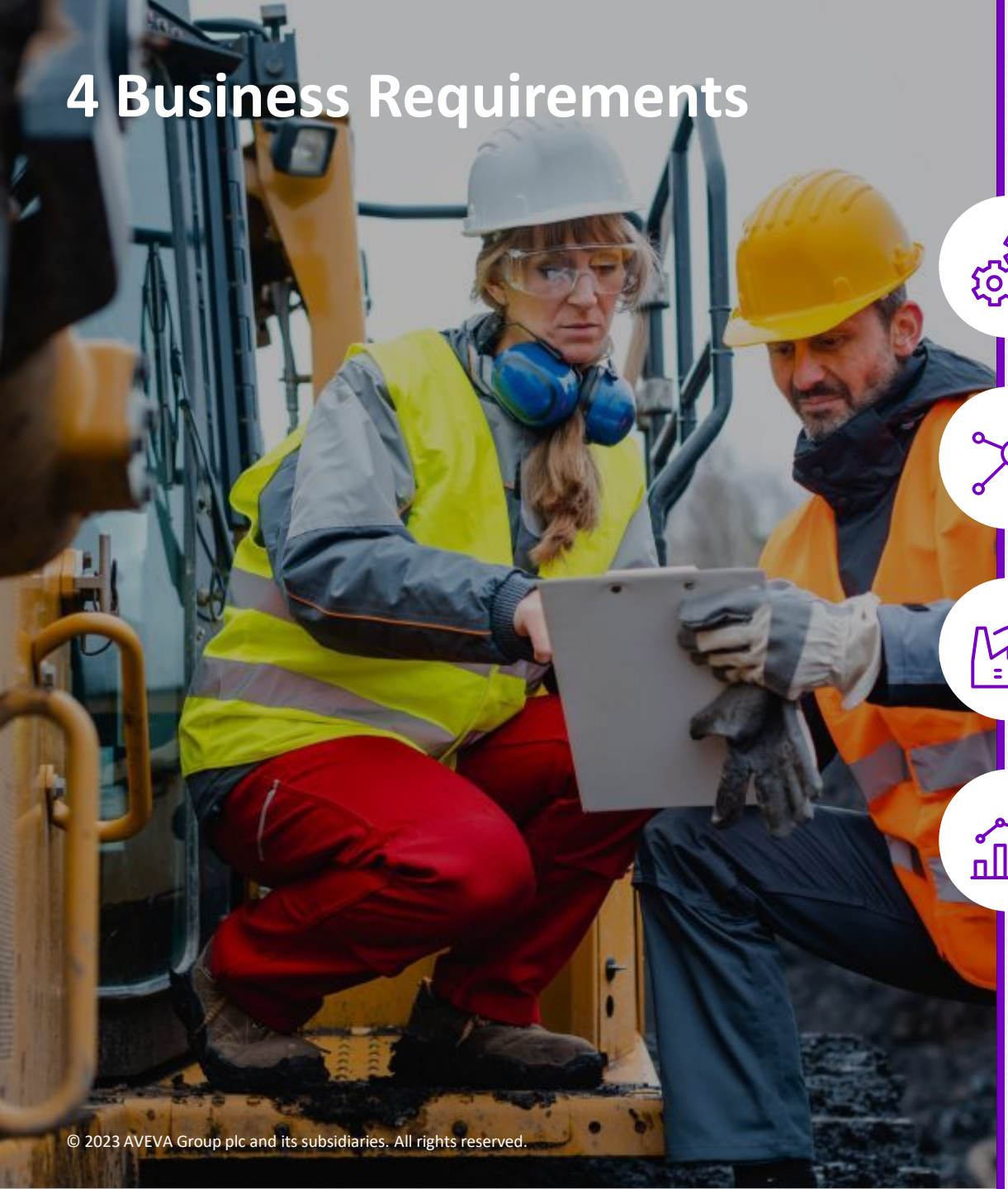
(Integrated team approach with focused collaboration and communication)

Working together to bring technology applications and site knowledge together

Solid Technology Platform

(AVEVA PI System and AVEVA PI Server asset framework, and AVEVA Production Management)

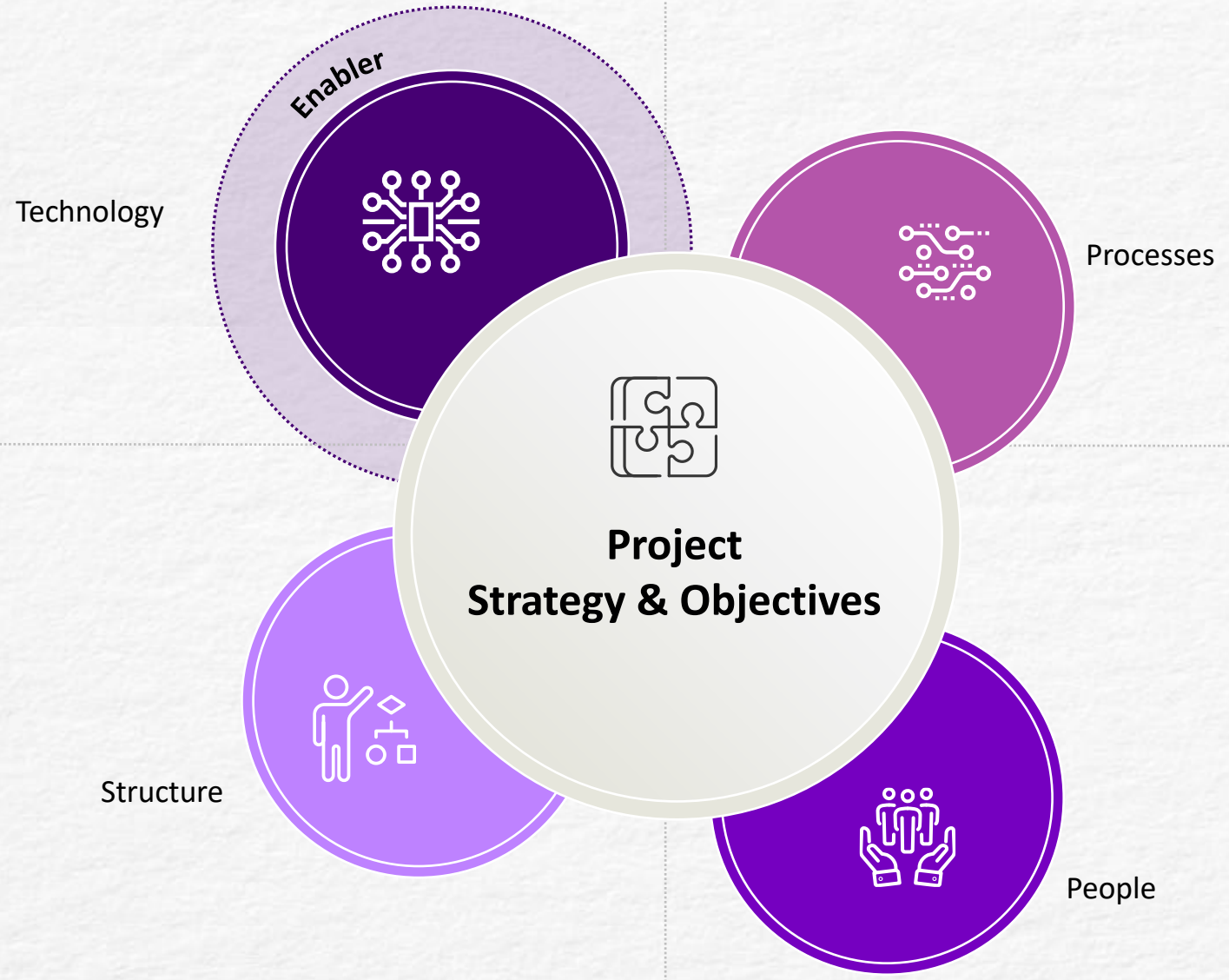
4 Business Requirements



- Automation – Optimize Controller productivity and reporting accuracy (Focus on “Equipment Metrics”)
- Integration – Metrics and Dashboard, reporting (Effective KPI Visualization)
- Sustainability – Equipment reliability data and data integrity. (Maintainable)
- Performance – Increase Asset utilization , reduce delays...

Holistic Project Model

Global Context



Methodology ... Approach to the Project

1

Design

- Workshops
- Research and Development
- Prototype
- Functional specification documentation
- Review
- Acceptance of design by stakeholders
- Governance body sign-off

2

Integration and Configuration

- SME input from AVEVA
- Implementation Standards
- Coding Standards
- Supportability verification
- Testing of the system
- System integration testing
- Performance Testing
- Technical Approval

3

Deploy

- Source system critical dependencies
- User Acceptance Testing
- Change Approval
- Change Management
- Training and coaching
- Go live
- Commissioning Support

Successful Project Approach

The **Project objectives** need to be captured and validated , supported by a business case.

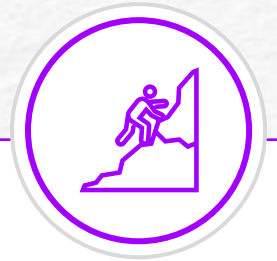
The Project success is dependent on **People, Process, Org structure and technology** components all working together at the correct level of maturity.

The **level of maturity** of the organization in the 4 domains needs to be assessed and evaluated via a Matrix considering the project objectives.

The project may need to be implemented in phases to ensure the building blocks such as **standards, processes, definitions and Change management** are in place.

Only once the above is established can the technology component be considered.

Challenges of a Multi Year project



Challenges faced

- Many source (downstream) system critical dependencies
- Many consuming (upstream) system critical dependencies
- Resource changes within Client Team
- New Control System standards (presented earlier in the week)

No problem

- Schedule linked to critical dependencies to enable visibility on impact when dependency dates change
- Communication and Early Warning
- Good documentation
- Additional workshops
- High Quality Software Packages

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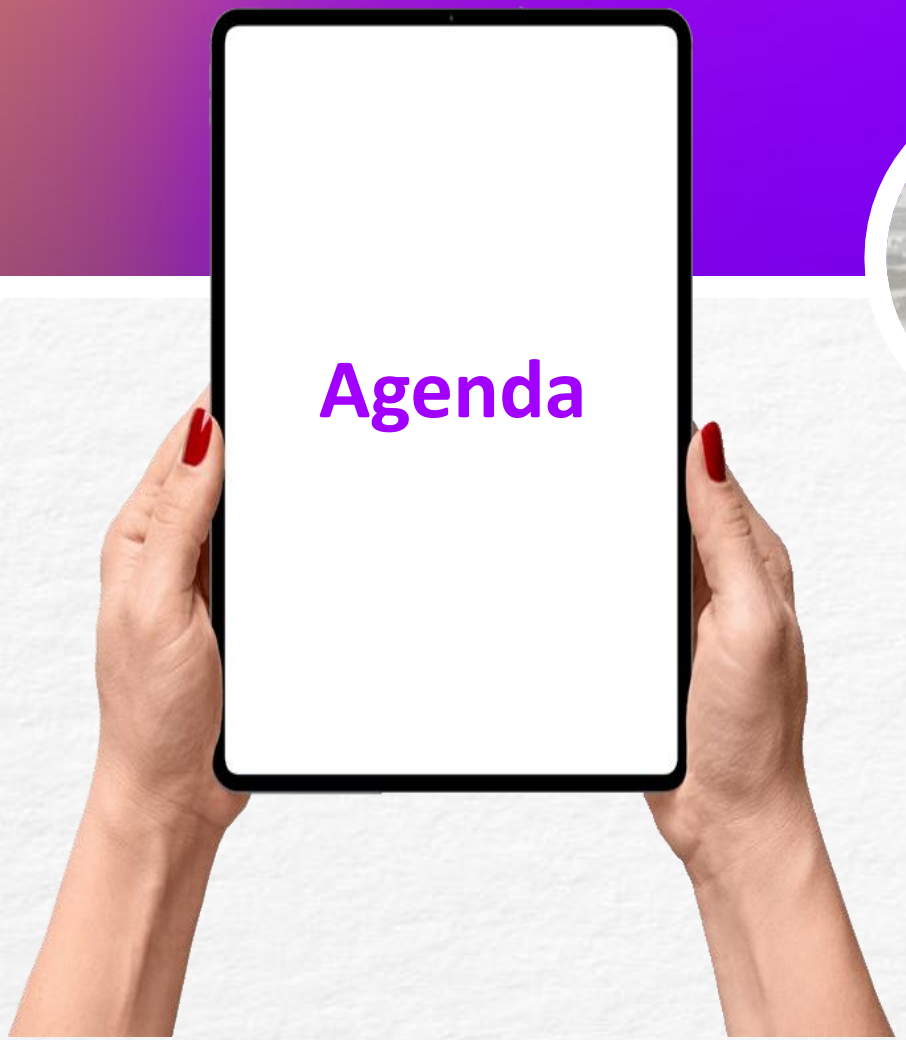

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AVEVA PI System Highlights

1 PI Interface Nodes

Redundant Failover of AVEVA Plant SCADA Data Configured for Hot Failover

- Fixed Plant
- Laboratory
- Utilities

AVEVA PI Connector for UFL Nodes Configured for Cold Failover

- HV Electrical
- ANFO
- Belt Scan and Smart Idlers
- Weather Station

2 PI Data Archive Server

- Historical Point Count of 100000 points
- Weighted average AVEVA PI Interface Scan Rate of 14s
- 10 years of online storage and then data will be archived
- Latest cyber security features utilized to protect data

3 PI AF Servers

AVEVA PI Server asset framework Models for

- Delay Auto Classification Automation
- Production Calculations
- Advanced Data Analytics Integration
- PDS Integration
- Reporting of Laboratory and Fixed Plant Equipment Time Usage

4 PI Data Access Server

- AVEVA PI OLEDB and PI OLEDB Enterprise
- AVEVA PI Web API
- AVEVA PI OPC HDA Server
- AVEVA PI OPC DA Server

AVEVA Production Management Highlights

1 Fixed Plant Circuits

6 Downtime Points

2 Metrics Points

5 Production Points

2 Fixed Plant Equipment Usage

29 Downtime Points

29 Metrics Points

3 Laboratory

81 Downtime Points

4 Minimal custom code to support

Fixed Plant Circuit Based Monitoring

Overview of the Scope

- Standard equipment hierarchy design
- Governance requirements
- Uses current Relationship Matrices (classification/cause/effect combinations for each equipment type)
- Rio Tinto Time Usage Model
- Data will be available in existing AVEVA Production Management

Standard DAS implementation for a RTIO mine, including the following circuits:

- Primary Crushing (Primary Crusher to the COS)
- Fixed Plant (COS Apron Feeders to Screening, Secondary Crushing and Stacking)
- Train Loading (Reclaimer to the Train Loadout)
- Fines and Lump Sample Stations
- Incremental Tons Build Own Operate Plant

DAS = Delay Accounting System

Fixed Plant Automatic Delay Reason Classification

Overview of the Scope

The time usage reason codes will be automatically filled in, where possible, instead of being manually entered:

- Cause Location – Which asset caused the delay
- Classification – Time Usage Model
- Cause – Root cause of the stoppage
- Effect – What happened as a result of the root cause

Scenarios for potential automation were identified as follows:

- Reviewed what has and hasn't worked in the past
- Reviewed Process Flow Diagrams, P&IDs, Functional Specifications (approach, interlocks, alarming), Alarm Lists, and SCADA
- Reviewed historical delay accounting and alarm logs from other mine sites
- Reviewed the equipment relationship matrices and allocated time usage model
- Workshop with Site (over 200 scenarios)
- Reviews and discussions are ongoing to identify new scenarios

INDUSTRY X

Fixed Plant Delays Automation: Benefits

1

Accurate, reliable and consistent reporting

2

Less data entry burden for the Controllers

3

Capture of shorter duration downtime events

4

High quality delay accounting for improvement opportunities

Fixed Plant Equipment Time Usage

Parallel streams

- Can Hide Inefficiencies
- Selection Bias
- Mask Reoccurring Faults
- Over And/Or Under Utilization
- Low Availability
- Unused Capacity
- Conceal Bottlenecks

Fixed Plant Equipment Time Usage

Streams, Equipment, and Modules included:

- Secondary Crushers
- Screening Modules
- COS Apron Feeders
- Bores
- Dust Extraction

Purpose

To uncover and provide extra understanding of the functioning and performance of key equipment and modules. In particular where there are multiple running in parallel (e.g. seven screening modules).

Calculation of a subset of the standard Rio Tinto Time Usage Metrics

Delays generated enable automatic calculation of the following metrics:

- Equipment/Module Availability
- Equipment/Module Utilisation
- Equipment/Module Operating Time

Delays generated for each equipment and module and then rules are used to automatically identify the type of classification of the stoppage

No input is required from the Plant Controllers or Operations

Laboratory Delay Accounting

Gudai-Darri has a Robotic Laboratory for the processing of Pit and Production Iron Ore Samples

Laboratory Delay Accounting

Overview

- Automated Laboratory Delay Accounting is performed to complement the fully automated Robotic Laboratory
- AVEVA PI System used to capture data from the Automated Laboratory SCADA for Gudai-Darri
- Project designed and implemented a solution to automatically generate delay events using AVEVA PI Server asset framework in combination with AVEVA Production Management

Configuration

- Implementation of delay accounting for the robotic laboratory
- Time Usage Model consistent with Fixed Plant
- Laboratory specific Relationship Matrices (different equipment types)
- Classification and Cause will be automatically populated using AVEVA PI Server asset framework, where possible (Cause only – no requirement for Effect)
- Data will be available in Production Reporting Databases via the current interfaces
- Laboratory specific reports (PowerBI)

Project Highlights

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AVEVA

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

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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

AVEVA

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IDC MarketScape
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- Austmine
- Global Mining Council (Accenture)
- Global Mining Guidelines Group (GMG)
- MIT Environmental Solutions Initiative

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