Digital Twins in Mining

Digital Transformation Driving Next Generation Mining Operations

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Market Challenges

MARKET ENVIRONMENT
- Commodity Prices, Fluctuating Demand
- Competition and Consolidation
- Equipment, Quality, Safety Regulations
- Geopolitical Uncertainties
- Generation Shift
- Pace of Change

BUSINESS IMPERATIVES
- Compressed Construction, Engineering & Design Cycles
- Operational Efficiency to Drive Profitability
- Asset Reliability and Availability
- Performance Management and Decision Support
- Workforce Evolution and Capability

TECHNOLOGY TRENDS
- Cloud
- Industrial IoT
- Mobility
- Big Data & Analytics
- Cyber Security
Key Objectives

Deliver the Maximum Sustainable Economic Return

- Provide real-time decision support to the business for centralised team members, sites & management
- Enablement of field operators providing through digitisation with classic mobility & AR.
- Enable Self-Service analytics & predictive modelling
- Eliminate wasted work
- Deliver tangible business returns through action and accountable loop closure
- Supporting agile enterprises, operations into the future whilst driving sustainable innovation
- Support both incremental and innovative improvement
- Leverage rather than replace existing systems and assets

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72% of the companies will increase their digital transformation spending in the next three years.

60% of the companies are already involved in digital transformation initiatives.

26% success rate (74% failure)

Sources:

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Partnership with Proven Capabilities & Technology

Together we collaborate to deliver bottom line results
Digital Twin: One Core Philosophy

For every Physical Asset …

there must exist a Digital Asset …

as operated & easily accessible
With Closed Loop Decision Support

Merging the Operations and Asset Lifecycle

People
Ownership, Leadership

Process
Yield, Utilization, Efficiency

Asset
Reliability, Availability

CONNECT
COLLECT
ANALYZE
ACT

Current State of Operations
Non-conformity Event
Causal Analysis with Decision Support
Action

Associated State of Operations

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People & Business Objective Centric Solutions

People
Understand behavior and culture. Create a clear path, a vision, purpose and values. Ensure trust.

Process
New business model, information and workflows are introduced to take advantage of opportunities and remove wasted work.

Objectives
What are the desired outcomes long and short term for the business and its customers.

Information Architecture
What data do we need and how do we want to share the information. Good choices create the best user experience.

Technology
Choose technology and infrastructure that enables People, Process and Things relevant to the journey.

Execution
Assign accountabilities, tie metrics against outcomes and encourage collaboration across projects.
A Complete Journey Built on Your Existing Systems

**Systems of Engagement**
- Touch Devices
- Multi-player Gaming Platform
- Mobile Devices
- Human Machine Devices

**System of Context**
- Quality & Progress Reporting
- Project/Asset Information Search Engine
- Tag Center: Information Retrieval
- Tag-to-Doc: Cross Referencing
- Multi-Project/Asset access and Visibility
- Visualization

**Systems of Record**
- Create/Modify the Digital Twin

**System of Reference**
- Asset Hierarchies
- Class Library/Taxonomies
- Data Requirements Specification
- Numbering Systems
- Business Validation Rules
- Data Governance Model

**Manage the Digital Twin**

**Exploit the Digital Twin**

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Delivering the Living Twin

**Living Product:** The ability to understand what makes the product, its history, status and quality, progress.

**“Living” Digital Twin:**
- **“Living” Product:**
  - Digital Asset: design, engineering structural data/models. The ability to evolve, and maintain assets at the productivity levels required.
- **“Living” Digital Asset:**
- **“Digital” Operations:** All the real-time data, events and associated context of operations. To enable operational, and process improvement, and operational consistency.
- **“Smart” Worker:**
  - Smart Worker: proving all the knowledge, learning models, information, visual models to allow workers to become increasingly effective.

Provide the capabilities to enrich the **digital representation** that will ultimately become the Digital Twin, encompassing all aspects of the physical item.

Providing the critical knowledge/information for workers and systems to enable Operational Effectiveness of process/plant etc.
Digital Operations – A Cockpit to Run Your Operations & Business

Access External Applications
▲ Native Browser Controls
▲ Custom Content
▲ Single Sign On / Pass-thru Authentication

Leverage More Information
▲ Playback & Replay
▲ Cross Panel interactivity scaling to your device
▲ Zero engineering to leverage

Develop Custom Apps
▲ Interactive Mapping from any Tile Server
▲ Bringing Together BI & Process Graphics
▲ Build with HTML5 technology
Living Product - Digital and Live Across the Supply Chain

Unifying production and operations across the supply chain

- Single, unified, enterprise application across all supply chain activities
- Enable new workflows that cross traditional tool boundaries
- Built-in collaboration providing broad user accessibility to a unified decision-making tool
- Enable better decision making through transparency, interactivity and analytics
Smart Worker – Empowering the Workforce

Support Handover, Decision Making & Work Execution

Real-time Information, Asset Data, Planning, Tasks & Simulation

AR and MR Information Visualisation

Machine live data
Alarm manager
Performance history and KPI
Documentation
Teleservice
Cooperation between devices/personnel
Connection to cognitive services
Digital Asset – Managing the Physical & Digital

Hyperconvergence of all Asset Information
Consolidated Visualisation
Bringing Together Many Views in One
Seamless Drill-Down to Plant, Process & Asset

Geospatial, CAD and Plant models all seamlessly brought together
An Interactive & Living Digital Twin

Integrating Engineering, Product, Operations and Maintenance
With Access to Contextual Documents & Drawings

Linkage to documents and engineering data across all data sources
Closing the Loop with Field Operations

Supporting current and future field DSS technology
Questions & Discussion

• How is Digital Transformation affecting your operations and what do you see as the biggest potential benefits?
• What challenges have you faced or can foresee in digital transformation?
• Looking at your experience in digital transformation would you do differently?
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