Digital Mine: Pit to Port Transformation Journey

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Minds + Machines

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South32 – Who we are

We are a global resources company, producing products that are used in nearly every aspect of our daily lives.

Purpose & Strategy

We want to make a difference to the world by developing natural resources in a safe and sustainable way, bringing long-term benefits to the communities we work with.

By investing in high-quality assets and maintaining financial discipline, we are unlocking value for our shareholders and global partners.

Locations

| Africa          | Singapore       |
|                | London          |

| Australia      |                |
| South America  |                |

Commodities

| Alumina        | Lead           |
| Alumimum       | Nickel         |
| Bauxite        | Manganese      |
| Energy coal    | Silver         |
| Metallurgical  | Zinc           |
| coal           |                |

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# Mining Industry Challenges

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<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>1</td>
<td>The <strong>safety</strong> of people</td>
</tr>
<tr>
<td>2</td>
<td><strong>Productivity</strong>: operations not running at their full potential</td>
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<tr>
<td>3</td>
<td>Ongoing <strong>cost challenges</strong> through commodity cycles</td>
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<tr>
<td>4</td>
<td><strong>Degradation ore quality</strong>: more impurities, more complex to blend and process</td>
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<tr>
<td>5</td>
<td><strong>Data</strong>: multiple sources and disparate data</td>
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<tr>
<td>6</td>
<td>Increasing <strong>social, environmental and regulatory pressures</strong> impacting licence to operate</td>
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<tr>
<td>7</td>
<td><strong>Siloed value chains</strong>: end to end integration and optimisation</td>
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Areas of Strategic Focus

Our investment in technology and innovation will be guided by three areas of strategic focus to drive value.
**Digital Core Platform**

**REAL-TIME DATA**
Short interval control and operational improvement from real-time data and analytics

**HISTORICAL**
Improved visualisation, reporting and analysis of historical data

**DIGITAL CORE**
Data-driven planning and decision-making

**DATA PLATFORMS**
Integrated data platforms

**DIGITAL TWIN**
Digitised engineering and asset information

**FUTURE**
Analytics for future modelling, prediction and simulation
Automated Support Processes and Enabling Platforms

- **SUPPLY**
  - Robotic process automation (RPA)

- **FINANCE**
  - “Re-imagined” cloud-based ERP

- **HUMAN RESOURCES**
  - Network connectivity and bandwidth

- **SUSTAINABILITY**
  - IT OT Convergence

- **LEGAL**
  - Cyber security

- **SHARED SERVICES**

- **MARKETING**

Digital Mining

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We know how to enable successful delivery

Design led, Agile Enabled

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We know how to enable successful delivery

Value Focused

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We know how to deliver value “pit to port”

Differentiated productivity leader

fullstream industry domain
+ software and analytics
+ fullstream service excellence

= Minds + Machines
Get Smart

• Access the wide number of specialized operational technology systems
• Data is available to all users
• Understand the source of the truth for data
• Making faster decisions since everyone has common insights
• See what’s happening now

Get Guidance

• Leverage asset centric machine learning to look at fleet health and prioritise effort
• Be alerted to changing operational conditions
• Capture human expertise to enable knowledge management
• Perform what-if analysis to determine actions that have highest impact to business goals

Get Optimized

• Utilise the digital thread to understand the value chain impacts of events
• Balance assets to optimize for lowest operating cost, longest services intervals or life of mine
• Resource optimization and waste reduction

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GE Solution Roadmap for Mining Transformation

Outcome Value

Cyber Security + Predix Platform

Equipment

Processes

Operations

Business

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- Digital Twin
- APM
- Field Agent
- APC
- in-vehicle unit
- PID Loop optimization
- expert on-demand
- Digital Twin
- Brilliant Blend
- weather
- OEE
- Collision avoidance
- in-vehicle unit
- decision support
- new business models
- compliance to plan
Digital Vision | Digitised Assets and Operations

Digitised Assets & Operations

**Ore Body**
- Digitised Geological Data

**Real Time Data**
- Equipment Automation and Remote Operation
- IoT sensors for real time data capture

**Emerging Technologies**
- Drones for inspection, stock and safety monitoring
- ‘Digital Twin’ – Digitised engineering and asset information
- Wearables for field maintenance and operator safety

**Mobility**
- Diverse mobile connected workforce

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**SUPPLIERS** > **EXPLORATION & DEVELOPMENT** > **MINING** > **PROCESSING** > **MAINTENANCE & LOGISTICS** > **TRANSPORT** > **CUSTOMERS**

**Integrated Planning and Scheduling**
**Maintenance Optimisation**
**Operations Visualisation and Optimisation**

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Digital Vision | Automated Operations and Digitised Assets

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Digital Vision | Asset Performance Management

Maintenance Optimisation

(Documented benefits achieved in the first two years of over 125 APM sample implementations)
Digital Vision | Expected Outcomes

Examples of where we are testing technology to drive outcomes

<table>
<thead>
<tr>
<th>Maintenance Optimisation</th>
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<tbody>
<tr>
<td>• Asset Performance Management for predictive maintenance</td>
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<table>
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<th>Operations Visualisation and Optimisation</th>
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<tbody>
<tr>
<td>• Operations Optimisation with Advanced Process Control</td>
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<tr>
<td>• Operations data visualisation</td>
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<tr>
<td>• Automated drone inspections</td>
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<table>
<thead>
<tr>
<th>Ore Body Knowledge</th>
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<tr>
<td>• Ore body knowledge tracking</td>
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<th>Integrated Planning and Scheduling</th>
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<td>• Real time asset tracking and compliance to plan</td>
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Outcomes

- Safer workplace
- Improved Productivity
- Increased Margins
- Smarter decisions
- Improved employee experience and collaboration
- More sustainable energy and water usage
Thank You

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