Digital Mining Transformation

Mining, Metals and Minerals Industries

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Introduction

Today, we see an increase in global consumption for commodities due to upward trends in urbanization and industrialization.[1]

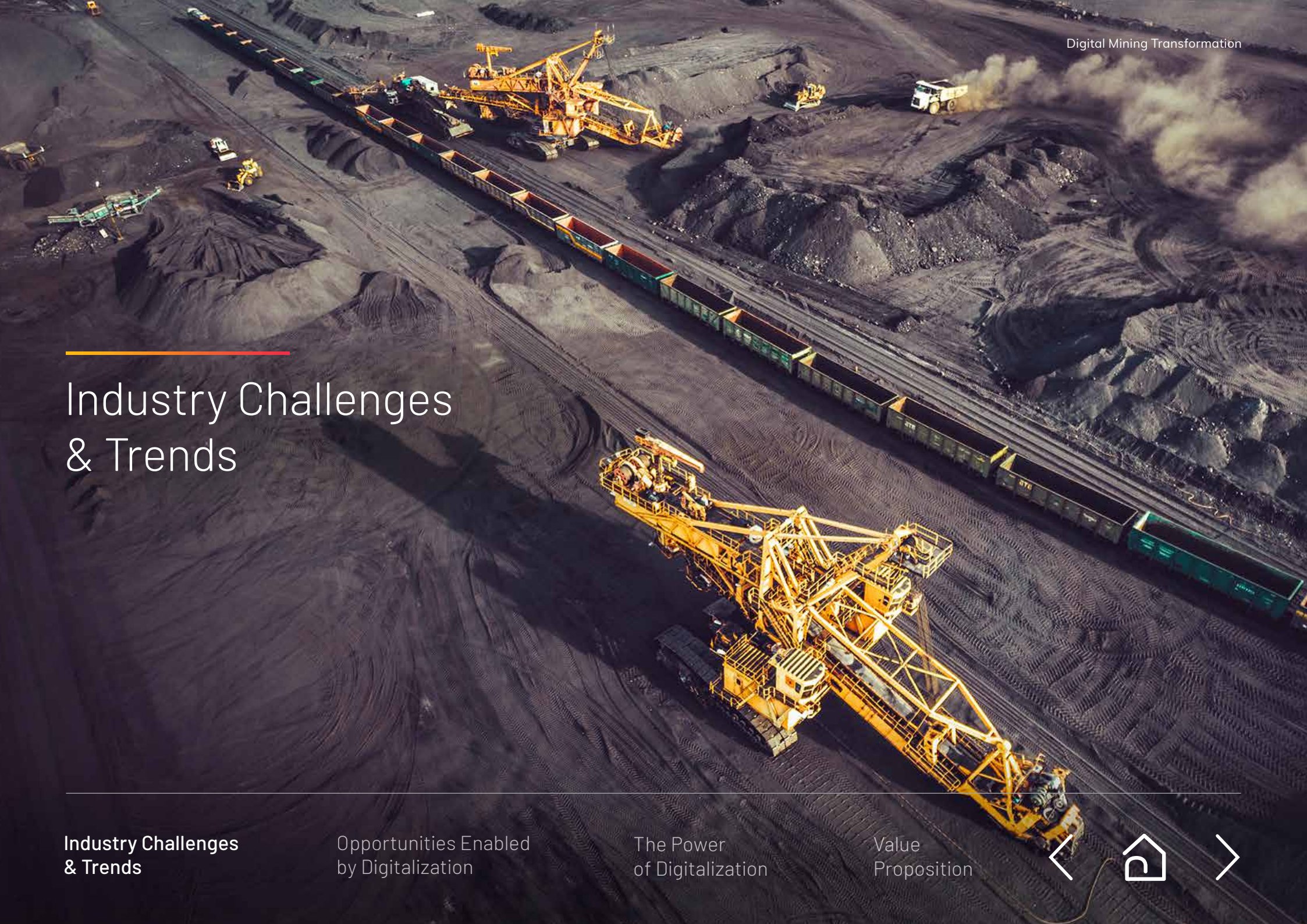
The mining, mineral processing, and metals (MMM) industries play a critical role in our lives. In fact, it is estimated that each person uses more than 25,000 pounds of new non-fuel minerals on a daily basis found in everyday products like medicines, buildings, homes, electronic gadgets, etc.[2] These growing demands will continue to drive the industries for many years.

This ebook will show how mining companies can optimize business performance by embracing digitalization.

Source:

[1] Mining & Metals Scenarios to 2030, World Economic Forum (2009)

[2] Do We Take Minerals for Granted?, U.S. Department of the Interior - U.S. Geological Survey (2017)



Industry Challenges & Trends

Industry Challenges & Trends

In the current environment, the top three concerns echoed by mining executives are[1]:

1 Cash Optimization

2 Capital Access

3 Productivity

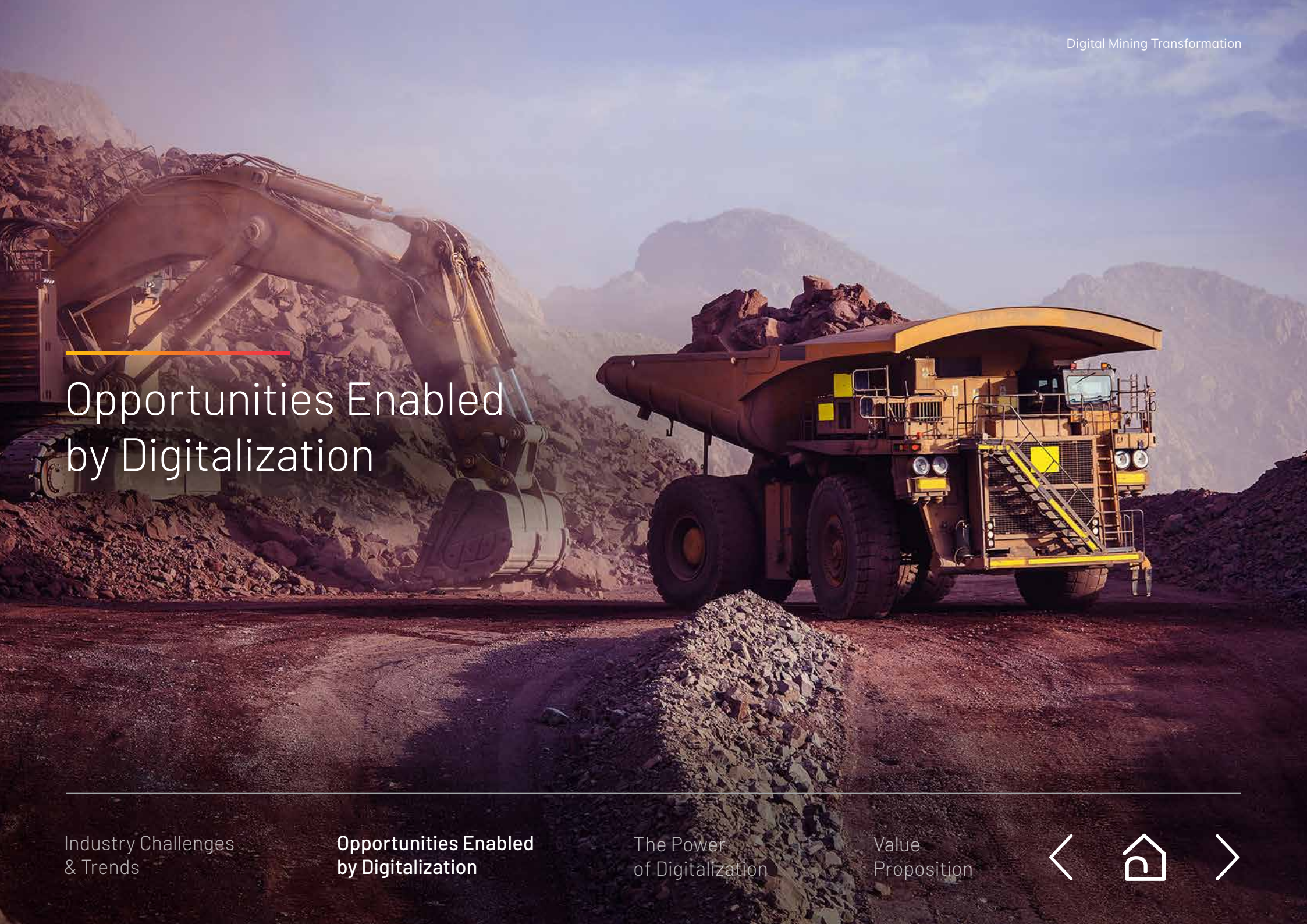
Mining capex has been declining since 2012, and this trend is expected to continue.[2]

Therefore, miners will have to shift their focus towards operational efficiency to stay ahead of the curve.

Source:

[1] Top 10 Business Risks Facing Mining and Metals 2016–2017, EY (2016)

[2] CHART: Mining capex decline set to continue, mining.com (2016)



Opportunities Enabled by Digitalization

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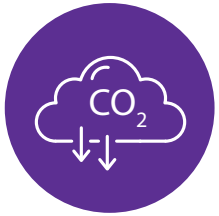
Digitalization could generate:[1]

More than $425 billion of value for the industry, customers, society and environment over the next 10 years (to 2025). This is the equivalent of 3-4% of industry revenue during the same period.

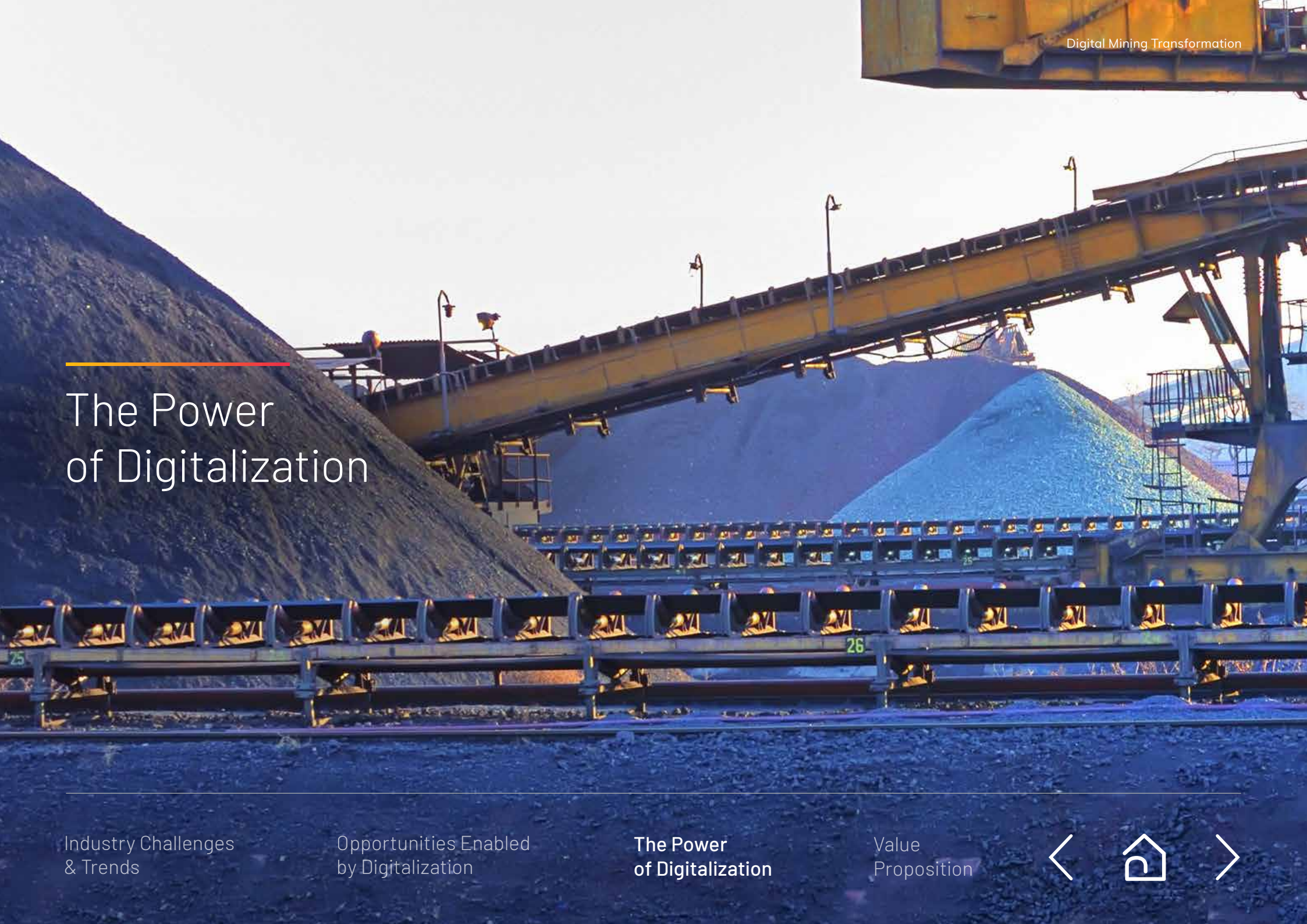
More than $320 billion of industry value over the next decade, with a potential benefit of approximately $190 billion for the mining sector and $130 billion for the metals sector. The total for mining and metals is equivalent to 2.7% of industry revenue and 9% of industry profit.



A reduction of 610 million tonnes of CO_2 emissions, with an estimated value to society and environment of $30 billion.

An improvement in safety, with around 1,000 lives saved and 44,000 injuries avoided. This equates approximately to a 10% decrease in lives lost and a 20% decrease in injuries in the industry.

Source: [1] Digital Transformation Initiative Mining and Metals Industry, World Economic Forum (2017)



The Power of Digitalization

The Power of Digitalization

Mobility

Cloud

Sensing

Analytics

Security

Digital solutions can help mining companies reduce complexity and optimize business and operational performance.

Digitalization Across the Mining Value Chain

Embrace digital transformation across these four innovation pillars to achieve a connected mine.

Production Optimization

Ability to turn data into insights for downtime analysis, delay accounting and process optimization

Value Chain Optimization

Provides visibility across the entire value chain in a unified environment from planning to scheduling to inventory

Asset Performance Management

Provides predictive equipment failure warnings and digitalization of maintenance procedures and activities

Workforce Transformation

Addresses the mobile workforce, enhances collaboration and provides state of the art training option

Production Optimization

Production Stabilization

Make continuous efficiency improvements by analyzing production downtime causes and prioritizing maintenance, new equipment, and new operating procedures. Report on scheduled and unscheduled downtime events, as well as, underperforming equipment, to stabilize production at or near maximum sustainable rates.

Integrated Process Optimization

Once production rates are stabilized, the next step is to apply process optimization to the entire operations system based on its constraints, including energy and financial inputs.

74% of mining executives say digitalization has the biggest impact in improving productivity.[1]

Production Optimization | Value Chain Optimization | Asset Performance Management | Workforce Transformation

Source: [1] Accenture Global Mining Survey, Accenture (2014)

Value Chain Optimization

Unified Supply Chain Management

Employ supply chain management tools to efficiently generate schedules and plans, increasing production performance and providing insights to better understand deviations between operations and planning functions.

Integrated Operations

Improved visibility into the entire value chain, enabling resource-to-market strategies through visibility into entire value chain from movement of raw materials to production to market.

40% of mining executives say integrated mine planning has the most potential for ROI.[1]

Production Optimization | **Value Chain Optimization** | Asset Performance Management | Workforce Transformation

Source: [1] Accenture Global Mining Survey, Accenture (2014)

Asset Performance Management

Asset Efficiency

Deliver improved asset health, better O EE and less downtime through data collection, aggregation, and analytics.

Predictive Analytics

Apply advanced predictive algorithms to identify subtle changes in system behavior which are often the early warning signs of equipment health and performance problems.

Decision Management

Leverage a knowledge-based platform to provide linkages between performance events, and their root causes, generating a list of potential actions to drive accountability and collaboration. Supporting faster and more informed decision making.

77% of mining executives are focused on cost and performance management.[1]

Production Optimization → Value Chain Optimization → **Asset Performance Management** → Workforce Transformation

Source: [1] Proactive Asset Management with IIoT and Analytics, ARC (2015)

Workforce Transformation

Mobile Applications

Enable users to view data and KPIs on mobile devices/tablets for real-time decision making. Deliver consistent execution of best practices for data collection during safety, maintenance and environmental inspections.

Digital Collaboration

Digitize your SOPs/ workflows, including mobility & procedural enforcement; collaborate on multi-user planning or schedule scenarios.

Augmented Reality

Use innovative augmented reality software on mobile devices to augment physical equipment and process areas with real-time data and relevant information.

Operator Training Simulator

Provide real experience to field and DCS operators through a high fidelity process simulation platform that mimics the actual operations. Now they can be trained in any scenarios safely in a controlled environment.

"Digital natives" will comprise 50% of the workforce by 2020 and 75% by 2025.[1]

Production Optimization → Value Chain Optimization → Asset Performance Management → Workforce Transformation

Source: [1] Workforce of the future in mining, Accenture (2017)

Improve Mine Operational Performance Central Control Room

Digitalization integrates IT and OT, creating the opportunity to centralize the monitoring and control functions of all mining processes and operations to a single physical location.

The Central Control Room increases the opportunities to enhance efficiency, responsiveness and profitability across the mining value chain.

Schneider Electric Powers Roy Hill's Remote Operations to Drive Digital Strategy

69% of mining companies are looking at remote operation and monitoring centres.[1]

Source: [1] The Digital Revolution- Mining starts to reinvent the future, Deloitte (2017)

Benefits of Digital Mining Transformation

Here are several findings on the real value that miners expect to gain from digital technology[1]:

64% of executives are satisfied with their **digital investments**

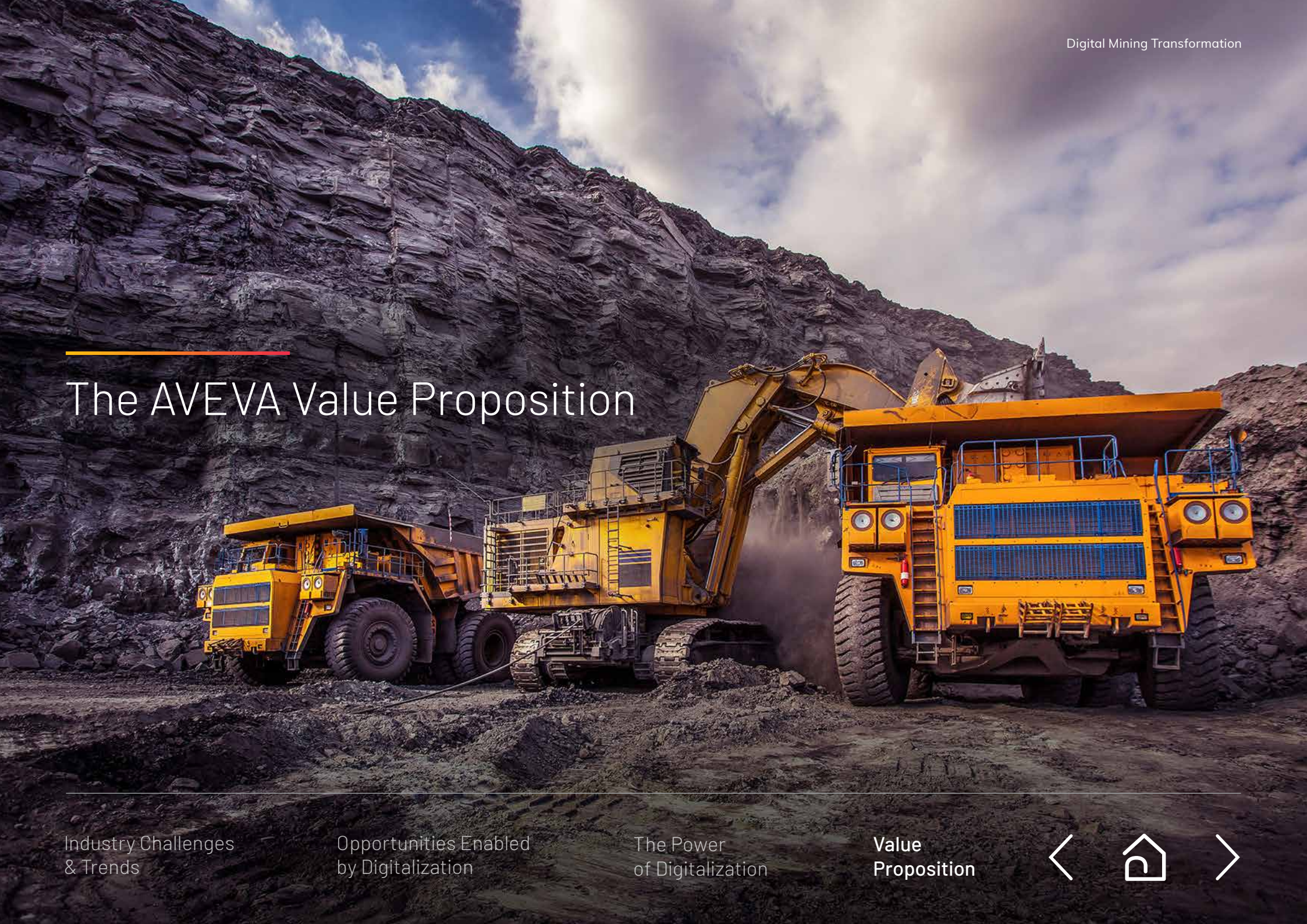
47% of executives cited better **operational performance**

42% executives reported on operational and administrative **cost savings**

40% of executives saw better **decision making** process

Within the mining, minerals processing and metals industries, **digitalization transforms** key aspects at every step of the value chain.

Source: [1] Digital in Mining: Progress And Opportunity, Accenture (2017)



The AVEVA Value Proposition

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At AVEVA, we understand the power of digital technology.

Digital Mining Transformation connects your key assets—people, technology and processes to achieve strategic transformation in your organization, and stay ahead of the curve.

For more information about Digital Mining Transformation, please visit: sw.aveva.com/mining

Global Mining Customers

Backed by long-term mining expertise and experience, AVEVA empowers top mining companies with leading-edge solutions to stay ahead of the curve.

We'll Take You There

Backed by a World-Class Solution Portfolio to bring Digital Transformation to the Mining, Mineral Processing, and Metals Industries: aveva.com

aveva.com

linkedin.com/company/aveva

@avevagroup

About AVEVA

AVEVA is a global leader in engineering and industrial software driving digital transformation across the entire asset and operational life cycle of capital-intensive industries. The company's engineering, planning and operations, asset performance, and monitoring and control solutions deliver proven results to over 16,000 customers across the globe. Its customers are supported by the largest industrial software ecosystem, including 4,200 partners and 5,700 certified developers. AVEVA is headquartered in Cambridge, UK, with over 4,400 employees at 80 locations in over 40 countries.