



EXTRACTING VALUE AND BUILDING RESILIENCE WITH **DATA-LED MINING** IN SOUTH AFRICA



INTRODUCTION

Accenture's research, developed in collaboration with the World Economic Forum (WEF) in 2017, reveals that a combination of seven digital initiatives can help South Africa's mining industry create ZAR213 billion (\$14 billion) in value through 2026.¹

Of this, ZAR153 billion (US\$10.2 billion) can be unlocked by businesses in the form of cumulative top and bottom-line gains. Meanwhile, society can gain ZAR60 billion (US\$4 billion) by way of cost and time savings for customers, productivity gains, jobs created and reduced carbon emissions.

In order to investigate how South African mining companies are navigating digital transformation and the impact of their investments in digital, we conducted a separate survey of 30 local mining executives in 2019. Our survey revealed that South African mining companies are pouring millions of rands into new technologies—augmented and virtual reality (AR/VR), drones, robots, self-driving vehicles and artificial intelligence (AI). All this, to meet two key imperatives:

- To unlock incremental value-creation opportunities by productively and safely extracting the country's mineral resources at the least possible cost; and

- To build more resilient businesses capable of quickly recouping losses arising due to economic distresses or business disruption.

But when we looked at their choices of technology vis-à-vis the value creation opportunity, some striking findings emerged. Our survey reveals that South African mining companies are likely to miss out on more than a third of the value-creation opportunity.

Why?

South African mining companies' have skipped a key step in their digital transformation journeys. Enamoured with the promise of technologies such as AI, autonomous vehicles and AR/VR, they have overlooked investments in key foundational technologies such as advanced analytics and integrated platforms. By doing so, they are missing out on nearly ZAR51 billion—or a third of the ZAR 153 billion value creation opportunity—arising from the deployment of advanced analytics and integrated platforms. Additionally, they also risk not being able to completely tap the gains available from the digital technologies already deployed.

Making the most of their digital investments is particularly important for the sector, considering that a series of economic slowdowns and business disruptions have repeatedly erased significant value from their books. According to Accenture estimates based on Oxford Economics data,² business disruptions brought about by COVID-19 are expected to shrink the sector's value-add output by 3 percent in 2020 alone. (See Appendix for methodology.)

So, what should they do? We examined the best practices adopted by leading mining companies globally and two key insights emerged. First, they align their workforce skills to their technologies of choice and wisely choose the right channels to fulfil the skill gap in their organisation. And second, they leverage the entire ecosystem and forge unique collaborations to create value with foundational technologies.

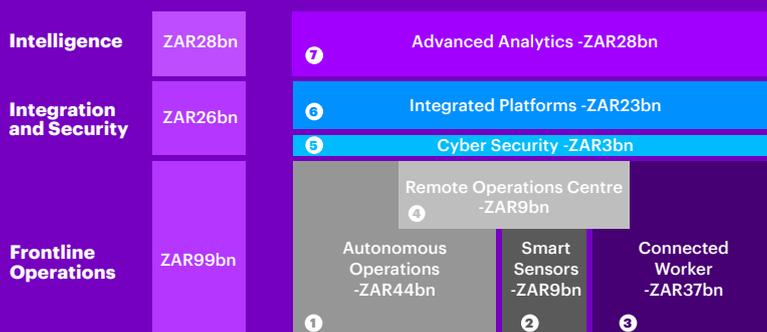


CLOSING THE DIGITAL VALUE GAP: 7 INITIATIVES

Our analysis, based on a value-at-stake framework developed in collaboration with the World Economic Forum (WEF) in 2017, reveals that deploying a combination of seven digital initiatives could help the South African mining sector unlock ZAR213 billion in value by 2026—contributing to an additional 2% increase in South Africa’s 2026 GDP to ZAR4,446 billion. Of this, more than two-thirds (or ZAR153 billion/US\$10.2 billion) could accrue to businesses in the form of gains impacting the top and the bottom line (see Figure 1). Such gains include increased output, reduced personnel cost, improved asset utilisation, reduced downtime and fewer health and safety incidents. The remaining 30 percent (or ZAR60 billion/US\$4 billion) benefits society through gains such as jobs created, reduced carbon emissions and wastage, increased transparency and improved security.³

The ZAR213 billion value creation opportunity translates into roughly 51 percent of the current size of the South African mining industry.⁴

Figure 1: Seven digital initiatives can help South African mining businesses unlock ZAR153 billion in value by 2026



Source: Accenture Value Lab analysis

VALUE-AT-STAKE FRAMEWORK: OVERVIEW

The value-at-stake framework is designed to assess the impact of digital transformation initiatives on industry, customers, society and the environment. It provides a differentiated and evidence-based understanding of the extent of the impact that digital transformation will have on an industry, and where potential value-creation opportunities exist. It provides likely value estimates of the industry operating profits that are at stake between 2017 and 2026, and the contribution that digital transformation can make to customers, society and the environment in that timeframe.

Industry Value

Value at stake for the industry comprises two elements. First, the potential impact on the industry’s operating profits that will be generated because of the digital initiatives (value addition). Second, operating profits that will shift between different industry players (value migration).

Value to Society

The value at stake for society includes three elements: customers, society and the environment. Each element is measured as follows:

1. Value impact for customers: the potential gain to customers—both business to business (B2B) and business to consumer (B2C)—in the form of cost and time savings, discounts and ability to earn additional profits (for B2B only).
2. Value impact for society: the financial and non-financial impact of digital initiatives on productivity gains and jobs.
3. Value impact on the environment: the estimated impact of the digital initiatives on increasing or reducing CO2 emissions.

Frontline Operations

Frontline operations in mining are complex and hazardous. They require several processes, such as production, equipment maintenance, geology, surveys, safety and hazard management, to be well coordinated for improved operational performance and safety. With a selection of four digital initiatives, South African mining companies stand a chance to unlock cumulative value creation opportunities worth ZAR99 billion (US\$6.6 billion) through increased output, reduced personnel cost, and improved efficiency and safety of their frontline operations.

- **Autonomous operations**, entailing deployment of autonomous trucks, trains, diggers and drills, allow mining companies to perform a large number of tasks with a great degree of autonomy for extended periods and without human intervention. Autonomous trucks, for instance, can carry out hauling operations round the clock using a pre-defined GPS course to automatically navigate roads. Autonomous drills, which are often remotely controlled, can carry out more precise and accurate drilling. By implementing such initiatives, mining companies can realise ZAR44 billion (US\$2.9 billion) in value in the form of increased throughput, safer operations and improved productivity levels.
- **Smart sensors** can help mining companies collect critical data from their vehicles or equipment across multiple processes and provide insights into potential failures. Other traditional sensors, such as gas detection sensors, can help mining companies monitor the levels of toxic gas in an environment and alert workers or supervisors to adjust airflow to optimal levels. Wearables can help monitor driver or operator fatigue levels and provide an early warning to avoid a potential accident. Through improved equipment utilisation, better predictive maintenance and safer operations, smart sensors are expected to reduce cost to the tune of ZAR9 billion (US\$600 million) for South African mining companies.
- **The connected worker** initiative, where field workers are equipped with AR/VR or mobile devices, helps mining companies introduce digitally-enabled ways of working. AR/VR devices, fed with real-time data, can enable field workers to carry out more targeted and efficient extraction and exploration. Workers can use AR/VR devices to repair faulty equipment through real-time assistance or access to on-demand digitised instructions. These devices also facilitate carrying out and documentation of procedural workflows directly from the field. With an expected cost reduction of ZAR37 billion (US\$2.5 billion), the connected worker initiative could represent the second largest driver of value for South African mining after autonomous operations.
- **Remote operation centres (ROCs)** allow mining companies to remotely monitor and control multiple operations simultaneously. These centres facilitate round-the-clock operation at mining sites and with fewer accidents. They also integrate diverse data sources to support real-time decision-making. By doing so, ROCs can deliver ZAR9 billion (US\$600 million) in cost savings and improved productivity.

Integration and Security

Technology initiatives in this category could potentially deliver ZAR26 billion (US\$1.7 billion) in value creation for South Africa mining.

- **Integrated platforms** provide visibility and monitoring capabilities by linking operations, disparate devices or technologies across the value chain. They leverage advanced analytics and machine learning to forecast, track, learn, predict, report and manage company resources and business processes. This drives collaboration across functions or even key partners, such as suppliers, and could help South African mining companies unlock ZAR23 billion (US\$1.5 billion) in value.
- **Cybersecurity** is critical to ensure that sensitive information generated by connected systems, operational technologies and other digital assets are safeguarded. This is particularly crucial as mining companies increasingly deploy connected assets, such as computing devices, equipment infrastructure and sensors for intelligence gathering. By eliminating the risk of these assets being hacked or information being stolen, cybersecurity initiatives are expected to help South African mining companies reduce costs to the tune of ZAR3 billion (US\$200 million).

Intelligence

For mining companies to truly benefit from the vast amount of geoscientific, asset condition and operational data generated by sensors or autonomous machinery, they need the intelligence necessary to uncover insights from data and drive decision-making.

- **Advanced analytics** leverages algorithms and artificial intelligence to spot opportunities that humans miss. It processes data, identifies trends and patterns from structured or unstructured data, as well as uncovers relationships between events. Mining companies can leverage such insights to identify operational bottlenecks or waste patterns, and make plant operations more efficient. These insights are also helpful in predicting potential disruptions, learning useful lessons from the past and informing future actions. Mining companies are also increasingly deploying advanced analytics to quickly and effectively identify ore value during exploration. Advanced analytics could therefore help South African mining companies unlock ZAR28 billion (US\$1.9 billion) through improved productivity and more streamlined operations.

Digital implementations by a number of mining leaders show how these technologies can be combined to unlock significant value.

Take global mining giant BHP. In Western Australia, its deployment of autonomous drills at the Yandi and Mining Area C mines has increased productivity. At Jimblebar, the use of self-driving trucks has improved site safety, increased truck utilisation and reduced haulage costs by approximately 20 percent. BHP's use of AI-based advanced analytics for scheduling and dispatching trains carrying iron ore between its mines and Port Hedland has reduced cancellations due to congestion. This has enabled more trains to run on the tracks. The company has also improved worker safety with smart caps that analyse brain waves to measure driver fatigue.⁵

Digital Scaling in South African Mining

The value and importance of scaling digital initiatives to achieve these benefits is not lost on South African miners.

On average, South African Mining companies are looking to scale 64 percent of their digital PoCs.

In a separate 2019 survey of 30 South African mining executives, they echoed the same optimism when asked about scaling digital innovations. On average, they indicated that they aim to scale roughly 64 percent of their digital proofs of concept (PoCs). This is in line with their global counterparts (see Figure 2).

Our survey indicates that South African miners are most interested in scaling digital PoCs in production and operations, digital and physical security, and supply chain and logistics functions.

Figure 2: Scaling digital proofs of concept across the mining value chain



Source: Accenture South Africa Mining Survey, 2019
Percentages represent the proportion of PoCs scaled out of the total number of PoCs piloted in each business function.

However, the sector risks losing out on nearly a third of the value creation opportunity along with not optimising their gains from digital initiatives already deployed.

Why? Our survey shows that South African mining companies are not prioritising digital initiatives in the areas of integration and intelligence which form the foundation to unlocking value with frontline operations. Instead, they are focusing their investments on frontline initiatives, particularly in the areas of autonomous operations, the connected worker and remote operations centres (see Figure 3).

This lopsided prioritisation means that while South African mining companies are generating data across different processes and functions, they lack the capability to convert data into meaningful insights for intelligent decision-making across the company. What is at stake? By not prioritising integrated platforms and advanced analytics, they are missing out on nearly ZAR51 billion (US\$3.4 billion) or a third of the ZAR 153 billion value creation opportunity arising from these two digital initiatives. Furthermore, they also run the risk of not being able to optimally book the gains from the digital initiatives they have already deployed.⁶

South African miners risk losing out on over a third of value-creation opportunities because they are not prioritising advanced analytics and integrated platforms in their digital initiatives.⁷

Figure 3: How South African mining companies prioritise technologies across digital initiatives

	DIGITAL INITIATIVES	DIGITAL TECHNOLOGIES				
INTELLIGENCE	Advanced Analytics (ZAR28 billion)	Machine Learning/ Deep Learning	Big Data Analytics	Cloud	Digital Twin	
INTEGRATION AND SECURITY	Integrated Platforms (ZAR23 billion)	Machine Learning/ Deep Learning	Big Data Analytics	Cloud	Digital Twin	Blockchain
	Cyber Security (ZAR3 billion)	Cyber Security Protocols	Cloud			
FRONTLINE OPERATIONS	Remote Operations Centre (ZAR9 billion)	Autonomous Vehicles	Machine Learning/ Deep Learning	AI/AI-powered Automation	Big Data Analytics	
	Autonomous Operations (ZAR44 billion)	Autonomous Vehicles	Industrial Robotics	AI/AI-powered Automation		
	Smart Sensors (ZAR9 billion)	IIOT Sensors & Transmitters				
	Connected Worker (ZAR37 billion)	Immersive Experience	AI Assistants	Mobility		

High Deployment	Medium Deployment	Low Deployment
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Source: Accenture South Africa Mining Survey, 2019 and Accenture Value Lab analysis
 Note: 3D printing and quantum computing were also included in survey but not classified under any of the seven initiatives.

The experiences of a multinational mining giant underscore the importance of foundational technology. The company deployed self-driving trucks and automated drills for mineral extraction. It also used autonomous trains and an autonomous loading process to transport minerals. However, by not leveraging data insights at the mineral processing stage, the company was unable to adjust its processing settings to help maximise the recovery of minerals extracted from ores. So, although the company was able to save on costs, it failed to drive its topline from its digital investments.



EXTRACTING DIGITAL GAINS: THREE KEY IMPLICATIONS OF NOT FOCUSING ON FOUNDATIONAL TECHNOLOGIES

In order to understand the gains made from digital initiatives, we asked South African mining companies participating in our survey how their digital investments have helped improve their company's performance across the key business areas/functions. Most executives admitted that their gains from these investments have been muted. In fact, we discovered that their gains remain a far cry from the gains booked by their global counterparts in three key areas:

1 Non-transparent and non-resilient value chain:

By their own admission, South African mining companies participating in our survey reveal that despite their digital efforts, they fail to eradicate inefficiencies in their value chain and make it flexible. Their limited focus on foundational technologies restricts them from sharing information and monitoring operations across the value chain from pit to port. Meanwhile, workers are hamstrung by the absence of analytics-driven insights that can help make evidence-based, real-time decisions. As a result, they fail to identify and prevent problems in one area, such as delayed trains or ships waiting for products to arrive, from propagating through the chain.

For a large number of South African mining companies, the lack of this critical capability impacts service levels. Executives in our survey admit that despite their digital efforts, they have had limited success in improving the timeliness of deliveries. South African mining companies witnessed a marginal 1 percent improvement in their ability to deliver on-time outcomes between 2016 and 2018, compared with their global counterparts who improved on-time outcomes by 10 percent during the same period.

South African mining companies' limited focus on analytics and integrated platforms prevents them from accurately forecasting demand and adjusting their supply chains accordingly.

They therefore tend to restrict themselves from venturing into flexible supply chain arrangements, such as on-demand warehousing solutions. South African executives in our survey reported a sub 1 percentage point increase in the ratio of warehousing capacity on variable load basis, while global mining companies increased this ratio by almost 8 percentage points between 2016 and 2018.

2 Suboptimal value realisation:

The absence of foundational technologies prevents South African mining companies from optimally leveraging the technologies deployed for frontline operations. For instance, while a fleet of autonomous vehicles may help improve productivity by operating around the clock, the lack of predictive analytics to monitor wear and tear prevents companies from anticipating breakdowns and avoiding unplanned downtime. This restricts optimal resource utilisation and associated value creation.

Similarly, initiatives to equip field workers with AR/VR devices, mobiles or smart wearables may not completely avert accidents unless they are paired with analytical insights or data platforms.

So, in addition to equipping workers with these devices, it is critical that site managers have access to dashboards with root cause analysis of past accidents and predictive insights on potential accidents. Only 27 percent of the South African mining executives in our survey reported that they were able to fully achieve physical site security between 2016 and 2018. That's less than the 38 percent of global executives who reported the same.

3 Inefficient new opportunity identification:

For mining companies looking to generate additional revenue from tailored products and services, foundational technologies are critical. Not only do they optimise material sourcing, they enable intelligent process adjustments that help deliver products and services in line with customers' requirements. Without foundational technologies, identifying such business opportunities may end up being a trial-and-error exercise that does not yield the desired returns. Indeed, our 2019 survey reveals that South African mining companies achieved only 2 percent growth in their service revenue, compared with the 8 percent of growth achieved by their global peers.

HOW CAN MINING COMPANIES UNLOCK GAINS WITH FOUNDATIONAL TECHNOLOGIES: A GLOBAL PERSPECTIVE

Based on Accenture's experience working with mining companies around the world—and by analysing our survey results—we uncovered best practices that mining majors globally deploy to unlock gains with foundational technologies. Two insights emerged:

1. Workforce skills need to align to the technologies of choice.

Global mining companies recognise that succeeding with digital initiatives hinges significantly on having a workforce with the right skillsets. And global mining majors excel at aligning the skill set of their workforce with their preferred technologies.

Our survey reveals that the deployment of big data analytics, machine learning/deep learning and cloud capabilities ranked high in priorities for global mining companies over the past three years. And when we asked them about the top five skills that they believe will be critical in successfully building and scaling digital PoCs and some interesting insights emerged. In line with their focus on analytics and AI, global mining companies revealed data analysis and visualisation as well as artificial intelligence and machine learning (AI/ML) training among the top five skills. (see Figure 4).

CASE STUDY: EXXARO

Working with a Clear Strategy

In 2017, Exxaro conducted a digital assessment to identify business use cases and infrastructure requirements to support its digitalisation efforts. The company developed a roadmap and launched the Digital@Exxaro vision in 2018. The vision focuses on intelligently integrating the entire value chain and leveraging data analytics to optimise work in real time, better manage operational variability and enhance productivity.¹

Exxaro adopted a value-centric approach to guide its digital agenda, rigorously evaluating each project against a set of criteria that evaluates readiness to unlock value. The process stress tests the digital portfolio and identifies key requirements.

Exxaro has digitised its mining value chain and created a virtual, integrated intelligence centre called The Middle Eye which provides real-time insights into the performance of each business unit across the value chain. Such centres can anticipate bottlenecks and notify the relevant functions and departments when interventions are required.² Exxaro reports productivity improvements of 5 percent to date (measured in terms of average ex-pit tonnes per shift).³ Intelligence centres also promote collaboration along the value chain from planning, mine and beneficiation to transportation, ports and logistics.

Figure 4: Global mining leaders align the right talent for successful implementation of digital technologies

RANK	TOP 5 SKILL CHOICES FOR GLOBAL MINING COMPANIES	TOP ACTIONS TAKEN TO FULFIL THE SKILL REQUIREMENT
1.	Data Analysis/ Visualisation	Upskill existing in-house talent
2.	Digital Production Management	Source Full Time Employees (FTEs) from tech partners
3.	Automation Expertise	Source Full Time Employees (FTEs) from tech partners
4.	Quality Analysis	Upskill existing in-house talent
5.	AI/ML Training	Recruit new talent from the market

Source: Accenture South Africa Mining survey, 2019

Equally interesting is the fact that global mining companies portray a deep understanding of the skills gap in their organisations and choose appropriate channels to fulfil the skill requirements. Consider their need for data analysis and visualisation skills. Having equipped their workforce with analytics-powered dashboards for real-time access to insight, global mining companies recognise that the end users of such systems—which include field operators and supervisors—should be adept at leveraging the data insights to solve complex problems. They therefore work towards upskilling their existing in-house talent in the areas of data analysis and visualisation.

However, when it comes to AI/ML training, global mining majors understand that building complex data models and programming languages are skills that may not be easy to develop in-house. They therefore focus on recruiting experts who are proficient at handling such complex and advanced data systems on a regular basis.

Additionally, most mining companies around the world are working toward creating a culture where the workers and advanced systems interact seamlessly, collaborating with one another to drive optimum value. Our survey reveals that close to 53 percent of global mining companies have advanced plans to improve human-machine collaboration over the next three years, compared with 40 percent of mining companies in South Africa.

Building the Workforce of Tomorrow

To help employees reskill to drive its rapidly digitalising business, Exxaro implemented a smart workforce initiative. Training rolled out in 2018 included Microsoft 365, design thinking, data science and data mining.^{iv}

Its Belfast Implementation Project (BIP) is looking to build a completely digital and connected mine at its Mpumalanga coal deposit site, allowing operators to connect to, and manage the site from anywhere in the world. This will, for example, enable maintenance teams to monitor connected machinery to analyse, identify and address potential problems early on, resulting in increased safety and reduced downtime.^v

Exxaro is also working on digital initiatives to facilitate increased human + machine collaboration. Some repetitive processes that used to be performed by employees are now being handled by Digital C (Colleague) bots. This has increased the volume of transactions, reduced processing errors and improved the quality of data while freeing up the workforce to focus on other, higher-level work.

Forging Unconventional Collaborations

In 2018, Exxaro acquired a leading start-up in the industrial energy analytics industry. The platform continuously collects and analyses energy consumption data together with production indicators from sensors on the production floor. This results in deeper insights for improved energy management and efficiency. This is one of several partnerships Exxaro is driving together with other ecosystem players to scale innovation and impact.

2. Unique collaborations open up new opportunities.

Owing to their limited understanding and experience of deploying integrated data platforms, global mining leaders recognise that they will need a range of partnerships to create value with foundational technologies. Global executives participating in our survey therefore highlighted the fact that in addition to partnering with tech partners and suppliers, they are keen on collaborating with the developer community and research clusters (see Figure 5).

Figure 5: Global mining leaders try to leverage the entire ecosystem and look for unique collaborations

RANK	TOP 5 ECOSYSTEM CHOICES FOR GLOBAL MINING
1.	Developer Community
2.	Tech Partners
3.	Suppliers
4.	Competitors and other industry players
5.	Research Clusters

Source: Accenture South Africa Mining Survey, 2019

Mining companies globally value the technical expertise of developers, particularly in niche areas such as applied mathematics, machine learning or computer graphics. Partnering with the developer community ushers in an agile and disruptive mindset which is key for aging mining companies that seek to overhaul their processes. Not only that, most mining majors also engage with the developer community to enable them to quickly develop and deploy customised solutions that address their specific challenges.

Similarly, global mining leaders are convinced of the benefits of partnering with research clusters. Such partnerships provide them with the latest academic thinking, the ability to carry out research and to develop a pool of mining talent with expertise in digital.

CASE STUDY REFERENCES

ⁱ Exxaro website: [Exxaro Resources Limited integrated report 2018](#)

ⁱⁱ Exxaro website: [Exxaro at the Leading Edge of Mining Innovation in South Africa](#)

ⁱⁱⁱ Exxaro website: [South African Coal Leaders Summit, Dr Nombasa Tsengwa](#)

^{iv} Exxaro website: [Exarro Resources Limited Supplementary report 2018](#)

^v Mining Review, August 2019: [Exxaro Resources - The rise of the 'digital' coal mine.](#)



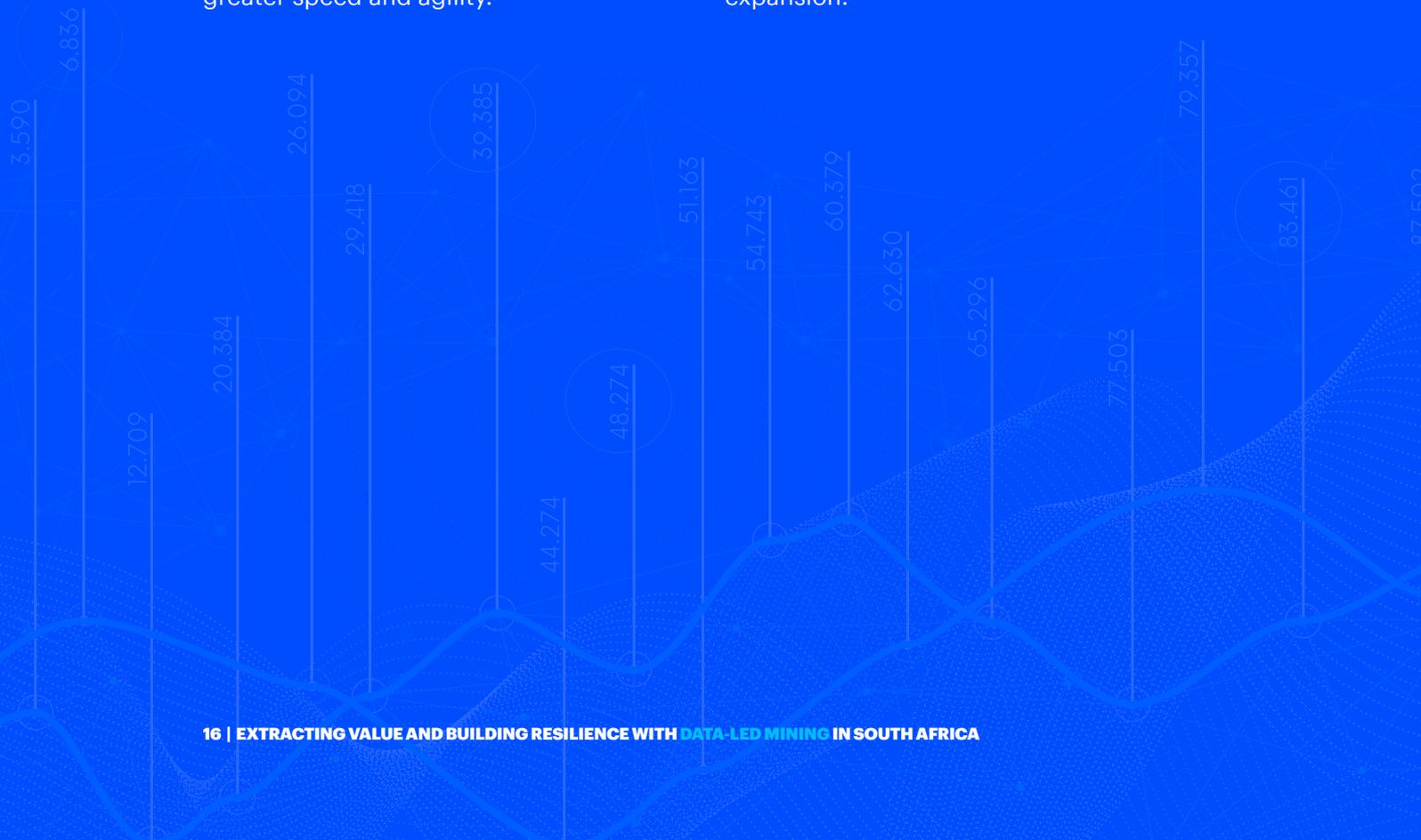
BECOMING A DIGITAL LEADER WITH FOUNDATIONAL TECHNOLOGIES

The upsides of South Africa's mining industry becoming a leader in digital technologies are manifold.

Investing in digital initiatives opens the possibility for South African mining companies to unlock significant value through improved operational performance, better visibility across their value chains—from pit to port—and real-time, evidence-based decisions. Timely and predictive decisions will not only help minimise hazards and unplanned mine shutdowns, they will position mines to respond to potential disruptions with greater speed and agility.

But, like all initiatives, the success of digital initiatives hinge on where resources are allocated and how they are used. In this case, the South African mining industry must rejig its investment focus.

To its prioritised digital investments in frontline operations technology, it must actively deploy foundational technologies to unlock the full value of digital investments and see better outcomes today and in years to come. These foundational technologies not only underpin strategic, data-driven decision-making, they support future digital expansion.



REFERENCES

- ¹ Accenture: [Unlocking digital value for business and society in South Africa](#)
- ² Accenture estimates based on data from Oxford Economics, Global Industry Databank, Accessed on March 2020
- ³ Accenture: [Unlocking digital value for business and society in South Africa](#)
- ⁴ Ibid
- ⁵ BHP website: [Which technologies will boost mining safety and productivity?](#) November 1, 2017
- ⁶ Accenture analysis
- ⁷ Accenture analysis

APPENDIX: METHODOLOGY

VALUE-AT-STAKE FRAMEWORK

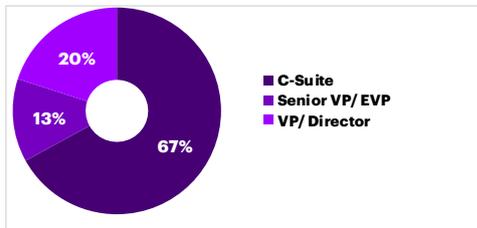
Value at stake has been calculated using a top-down approach involving three key steps:

1. Identification of the total addressable market and the adoption / penetration rates over the next 10 years for each digital initiative based on secondary research, industry reports, existing use cases and interviews with subject and industry experts.
2. Creation of a value tree to represent the different industry and society value categories mentioned above.
3. Testing, revision and validation of assumptions and results with Accenture experts, DTI working group members and select Industry Partners of the World Economic Forum.

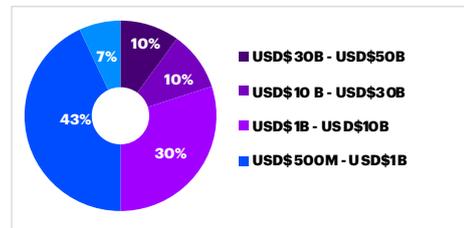
ACCENTURE SOUTH AFRICA MINING SURVEY, 2019

We surveyed 30 South African executives from mining companies with annual sales exceeding \$250 million.

EXEC PROFILE



ANNUAL REVENUE



SECTOR VALUE-ADD OUTPUT

The following approach was used to estimate the impact of COVID-19 on the South African mining sector:

1. Post-COVID value added output forecasts (in real US\$ terms) for bottom-level sectors were extracted from Oxford Economics' Global Industry Databank
2. Forecasts were reclassified and mapped as per Accenture's industry classification
3. Year-on-year percentage change was calculated between 2019 and 2020 to arrive at the impact of COVID-19 on the sector

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