

AXORA

*Discover innovation.
Unlock transformation.*

INNOVATION FORECAST 2021: METALS & MINING



How can mining be fit for the future?



Historically, metals and mining has adopted digital technology at a slower pace than many other industries. The highly variable nature of mining is partially responsible for this reticence, as are the remote and heavy environments in which companies operate. Additionally, the industry is still at a nascent stage when it comes to bringing digital skills to mine sites.

But although digital deployment has historically moved at a measured pace, there's now a growing need for companies to unlock its benefits through a more coordinated and strategic approach. As the industry emerges from the COVID-19 pandemic, digital transformation is necessary to boost production efficiency and reduce costs across operations. And as the next great super cycle approaches – likely to be driven by the energy transition – companies need to deploy the right technologies, in the right places, at the right time. So how do you do this in a way that leverages scale and cost-efficiency while minimising risk?

This report will help. The Axora Innovation Forecast: Metals and Mining is based on a survey of 150 decision makers from around the world. From safer working environments to greater productivity – and from remote operations centres to digital mines – these insights will help you make more informed decisions on ways to:

- › **Achieve more production** with lower costs
- › **Improve safety** and move towards zero harm
- › **Operate more sustainably** as industries strive for net zero

As one survey respondent said: “In an era of rapid development and uncertainty, problems of complexity and unpredictability are increasing. Therefore, it's important to accelerate digital transformation.”

This Axora Innovation Forecast will help you do just that as you develop your organisation's short-term strategy and long-term approach.



Ritz Steytler
Chief Executive
Officer



AXORA

Who we surveyed



Senior decision makers
from 150 metals and
mining companies

Company size:

50 →
60,000

employees



* Survey conducted March-April 2021



Departments:
IT, Operations,
Engineering and
Technical Services,
Senior Site Management

Locations*:



*These territories are
where respondents are
based, not necessarily
where the company's
mines are located

Digital transformation is mission critical as the industry enters the next super cycle

It's easy to pay lip service to digital transformation. But are metals and mining companies truly prioritising it? And how are they making decisions on where to invest?

"The industry is risk-averse and skeptical about digital transformation's benefits. By proving functionality and investment benefits, new technologies such as digital twins have demonstrated that system-wide digital transformation is essential for modern metals and mining companies."

Michelle Ash,
CEO, Geovia

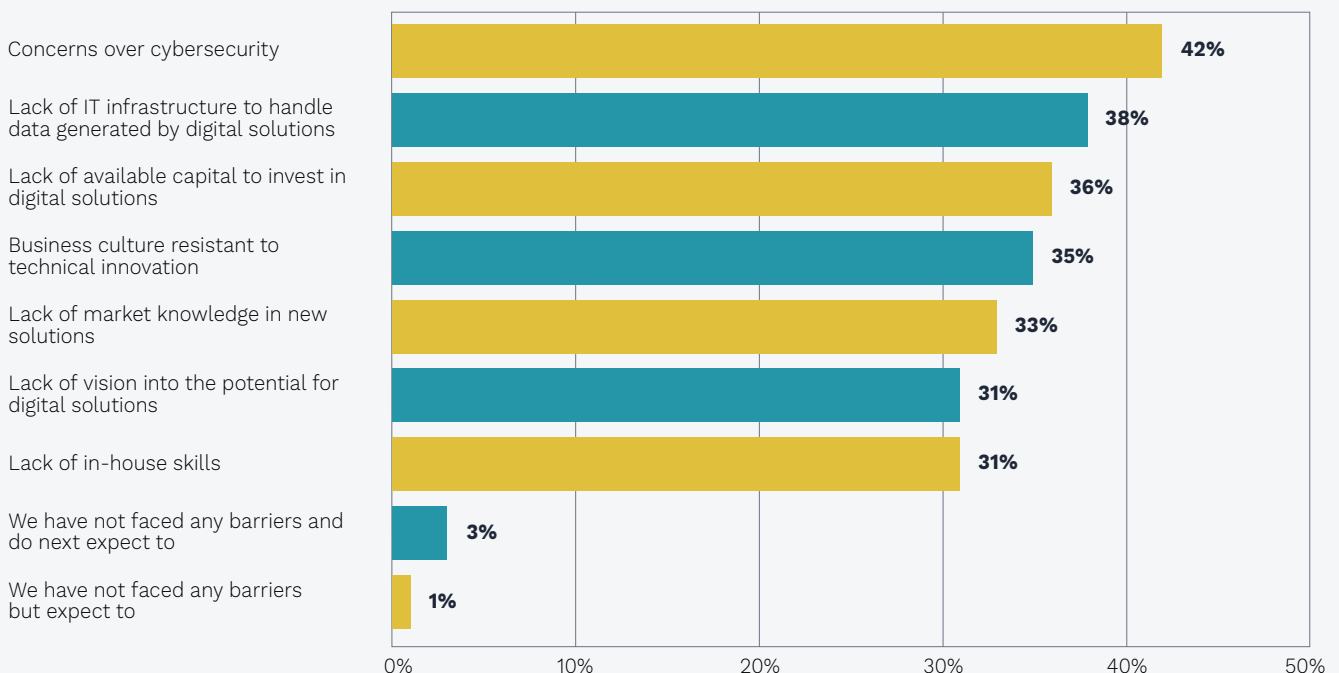
Digital transformation and innovation are seen as crucial to meeting the rising demand from the energy transition

There's been a dramatic shift in how metals and mining companies perceive transformation. Ninety-nine percent of decision makers now believe technology and innovation are critical to their organisation's survival.

This perception is reflected in companies' digital transformation strategy deployment. Ninety-four percent of respondents said their deployments were advanced or intermediate. Just six percent described their progress as moderate, and no one said they were at the starter stage. Those in North America, the UK and South America saw themselves as most advanced, whereas South Africa saw itself as least advanced.

The biggest barriers to executing digital transformation were cybersecurity concerns (42 percent of respondents) and lack of IT infrastructure to handle data from digital solutions (38 percent). Interestingly, 31 percent of respondents cited lack of in-house skills as a barrier, a trend that was particularly marked among mid-sized companies and those in Australia, India and South Africa.

Barriers to developing and deploying digital solutions





99%

of all respondents said
technology and innovation
were **critical to their
organisation's survival**

Is metals and mining doing enough?

Given how critical digital transformation is to survival, it's unsurprising that 85 percent of metals and mining companies said the percentage of annual global revenue dedicated to it increased in the past year. Investing in digital technology was a key business priority: 57 percent of respondents cited it as their prime concern for the next three years, and 51 percent ranked it first for the next five years. Large and mid-size companies were most likely to see it as a top priority, with small companies giving it less emphasis.

However, despite this strategic imperative, companies are hesitant to invest. Most decision makers (45 percent) said their business currently spends just six to 10 percent of annual global revenues on transformation. Companies in North and South America spend the most, with those in Russia and Kazakhstan spending the least.

In the short term, this is set to increase. Within two years, most respondents anticipate their business will spend 11 to 15 percent of annual global revenue on transformation. Within five years, most believe this will increase to 16 percent or more. Spending is predicted to remain highest in North America, but Russia and Kazakhstan anticipate making major headway.



57%

of respondents said investing
in digital technology was their
organisation's **highest business
priority for the next three years**

Food for thought

- › Every respondent said their company has some degree of digital transformation strategy in place – no one is at the starter stage
- › Organisations see investing in digital technology as the highest business priority over the short and medium term
- › Although 85 percent of respondents said the percentage of annual global revenue dedicated to digital transformation increased in the past year, most are only spending six to 10 percent at present. North and South America predict major increases in the next two years, whereas India and Russia predict a big boost in the next five years
- › The biggest barriers to executing digital transformation are cybersecurity concerns and lack of IT infrastructure to handle data generated by digital solutions. Lack of in-house skills is a substantial barrier as well, particularly in mid-sized companies

Companies recognise technology's potential to boost productivity while reducing costs

Productivity isn't just about working faster – it's also about working smarter and more safely. Metals and mining companies are using digital technologies to achieve all these goals while also identifying potential cost savings.

Achieving more with less and improving working environments were popular reasons for deploying digital solutions

There's widespread recognition that transformation can help organisations achieve more with less and improve safety. When we asked about people-related drivers for deploying digital solutions, there were clear frontrunners: increasing productivity (65 percent of respondents), improving labour effectiveness (59 percent) and providing a better working environment (53 percent).

When we asked about deployment drivers related to machinery and operations drivers, the most popular responses were increased productivity (51 percent) and improved ROI (48 percent).





53%

of organisations are **deploying digital solutions** to provide a better working environment for staff

Respondents don't anticipate major cost savings from digital technology in the short term, but see great potential in the medium term

The metals and mining industry is traditionally risk averse, which is one reason many companies have previously hesitated to dedicate large percentages of annual revenue to transformation. However, the perception of value is evolving, with organisations seeing an increasing potential for cost savings over the medium term.

In the next two years, most companies anticipate achieving between six and 10 percent cost savings from digital technology. Only seven percent of respondents expect to save 16 to 20 percent. However, within five years, this skyrockets to 28 percent of respondents expecting 16 to 20 percent savings.

As companies invest more revenue in digital deployments, they're also prioritising the benefits these technologies bring rather than the expenses they incur. More than three-quarters (76 percent) of respondents stated that the value of digital technology was more important than the cost. Interestingly, small companies (50 – 249 employees) were most likely to prioritise value (86 percent), while respondents from organisations with 1,000 – 2,999 employees were least likely to provide the same answer (57 percent).



28%

of respondents **anticipate saving 16 to 20 percent** from digital technology in the next five years

Food for thought

- › There's more focus on using technology to boost direct productivity, foster a better working environment and improve ROI than to prevent downtime
- › Companies are taking a longer-term view when it comes to cost savings from digital transformation. In the next two years, 24 percent of respondents anticipate saving one to five percent from digital technology. Within five years, just three percent of respondents anticipate that level of savings, with most predicting between 11 and 15 percent
- › More than three-quarters (76 percent) of respondents prioritised the value of digital technology over its cost

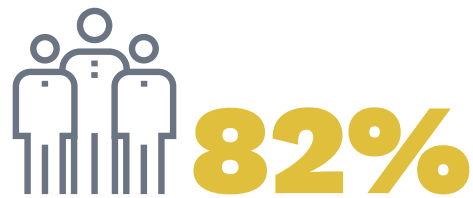
Companies need support to succeed with digital transformation

Metals and mining decision makers recognise they can't drive digital transformation alone – they need specialists to guide them along the journey. As a result, a major digitalisation success factor is involving partners, internal consultancies and government bodies in the process. But companies need to go a step further, learning about the highs and lows of their peers' experiences.

Technology and innovation partners are having a big influence on digital transformation strategies

Eighty-two percent of respondents said a partner had the biggest influence on their organisation's digital technology adoption. The preference was for generic partners (55 percent of respondents) over industry-specific ones (27 percent).

Internal consultancies were most popular among small businesses and with people working in operations. Working with government bodies was most popular among larger companies and people in IT roles.



of respondents said a partner had the biggest influence on their organisation's digital technology adoption



People want ways of learning from peers' experiences to reduce implementation risks

There's definite appetite for more practical guidance to inform digital transformation in metals and mining. Sixty percent of decision makers said that more information would be useful even though there's so much available in the market. And 99 percent said they'd benefit from a digital transformation community where they could learn from peers' experiences with different technologies and applications.

Interestingly, 23 percent of people said they were overwhelmed by the amount of available information, hence the desire for more help homing in on relevant insight. This information overload was most pronounced among mid-sized businesses, those in North America and among senior site managers.



60%

of respondents said more information on digital transformation would be useful

"Industry partnerships are critical for the mining industry to find the right skills to drive new innovation whilst they focus on the core business. Without these partnerships, miners risk getting left behind."

Joe Carr,

Mining Innovation Director, Axora

Food for thought

- › 82 percent of respondents said a partner had the biggest influence on their digital technology adoption, with the preference being for generic rather than industry-specific ones
- › Mid-sized companies, those in North America and senior site managers were most likely to be suffering from digitalisation information overload
- › 99 percent of people said they'd benefit from a digital transformation community

Digital transformation is at a relatively early stage, but organisations are still reaping benefits

Our survey covered a range of technologies and applications, and there was appetite to explore all of them as companies look for ways to boost efficiency, safety and sustainability. Deployments are generally in their infancy, with most technologies implemented across less than 50 percent of each organisation.



73%

of organisations have deployed advanced analytics and semi-autonomous equipment to some extent

Tech-wise, companies have focused on analytics and semi-autonomous equipment

We asked respondents about 10 technologies: artificial intelligence (AI), machine learning, advanced analytics and sensors, robotics, Industrial Internet of Things (IIoT), cloud-based platforms, modern data architecture, autonomous haulage technology, digital twins and semi-autonomous equipment.

Companies were most likely to be using advanced analytics and sensors and semi-autonomous equipment, with 73 percent of respondents saying these had been deployed to some extent. Semi-autonomous equipment was most likely to be 100 percent deployed across the organisation (19 percent of respondents). On average, small companies are experiencing the most benefits from both of these technologies.

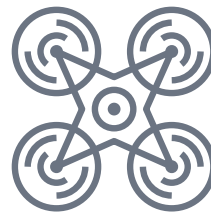
In terms of digital solutions companies intend to trial, the most popular were IIoT (13 percent of respondents), cloud-based platforms (12 percent) and modern data architectures (12 percent). Small companies are currently getting the greatest benefits from cloud technology; they see it as the greatest growth opportunity over the short and medium term.



Application-wise, there's been emphasis on remote operations and automation

We also asked respondents about nine applications for digital technology: vehicle telemetry monitoring, predictive maintenance from AI or machine learning, automation systems, virtual reality and augmented visuals, safety monitoring and tracking, driver fatigue monitoring, remote operations technology, plant optimisation technologies and greenhouse gas reduction technologies. The most popular application was remote operations technology (73 percent of respondents), followed by automation systems and predictive maintenance (both 72 percent).

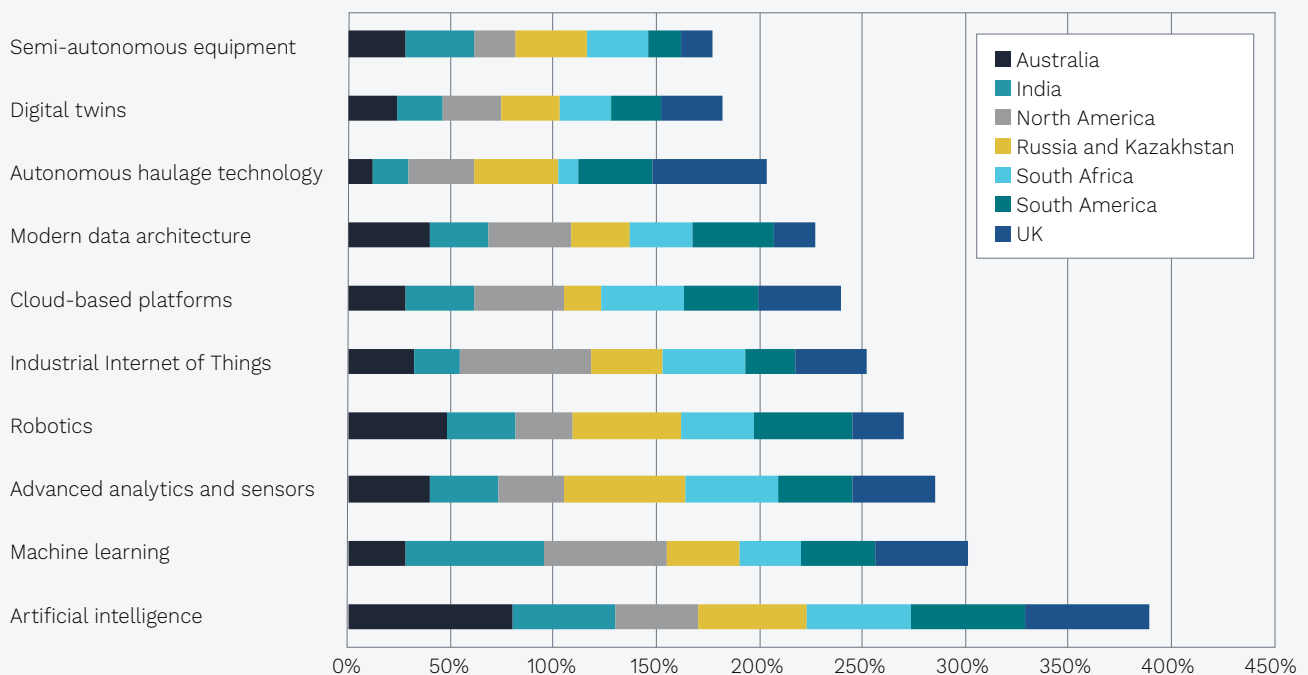
The emphasis on safety is reflected in how companies are using digital technologies. Driver fatigue monitoring was most likely to have been deployed across 100 percent of the organisation (21 percent of respondents). Safety monitoring is seen as delivering the greatest benefit, on average (41 percent of respondents), followed by automation systems (39 percent) and remote operations technology (38 percent).



73%

of organisations have deployed **remote operations technology**

Which of the following digital technologies do you believe will provide the biggest growth opportunities for your organisation in the next three to five years?



Remote operations centres are improving sustainability and safety

The use of remote operations centres (ROC) also demonstrates how companies are using digital technology to improve safety and move towards zero harm. Seventy-two percent of respondents said their company had implemented a ROC, with a further 15 percent saying they're planning to do so in the next year. Everyone surveyed said ROCs were planned at some stage.

One hundred percent of respondents said their organisation had benefited from ROCs. The biggest overall benefits were seen to be improved sustainability (44 percent of respondents) and safer operations (42 percent). Small companies reported an overwhelming benefit in terms of productivity increases, whereas mid-size companies saw great benefits from data-driven decision-making and large ones from improved transparency.

Food for thought

- › There are clear regional trends for different technologies. In the next year, Russia and Kazakhstan are expected to focus extensively on robotics, Australia on AI, the UK on cloud-based platforms and North America on machine learning. In the next five years, Russia gains a major focus on robotics as well as advanced analytics and sensors, North America on IIoT and the UK on autonomous haulage technology
- › Small and mid-size companies are experiencing more benefits from safety monitoring, remote operations technology and predictive maintenance, whereas larger companies are experiencing more benefit from automation systems
- › At present, senior site managers and operations are seeing the greatest benefits from digital solutions, with IT seeing the least benefit



Digital transformation offers opportunities to streamline and improve safety processes – but are they being overlooked?

There are many ways in which digitalisation can help the metals and mining industry move towards zero harm. The challenge? Helping stakeholders understand how and why technology can improve the established safety culture and augment existing processes.

Since safety is often embedded in business as usual, it's often not seen as a top driver for digital transformation

People safety was cited as the third highest business priority over the next five years. The top two highest priorities for both periods were investing in digital technology and improving business sustainability. Over the next three years, mid-size companies are prioritising it the most; in the next five years, it's small ones.

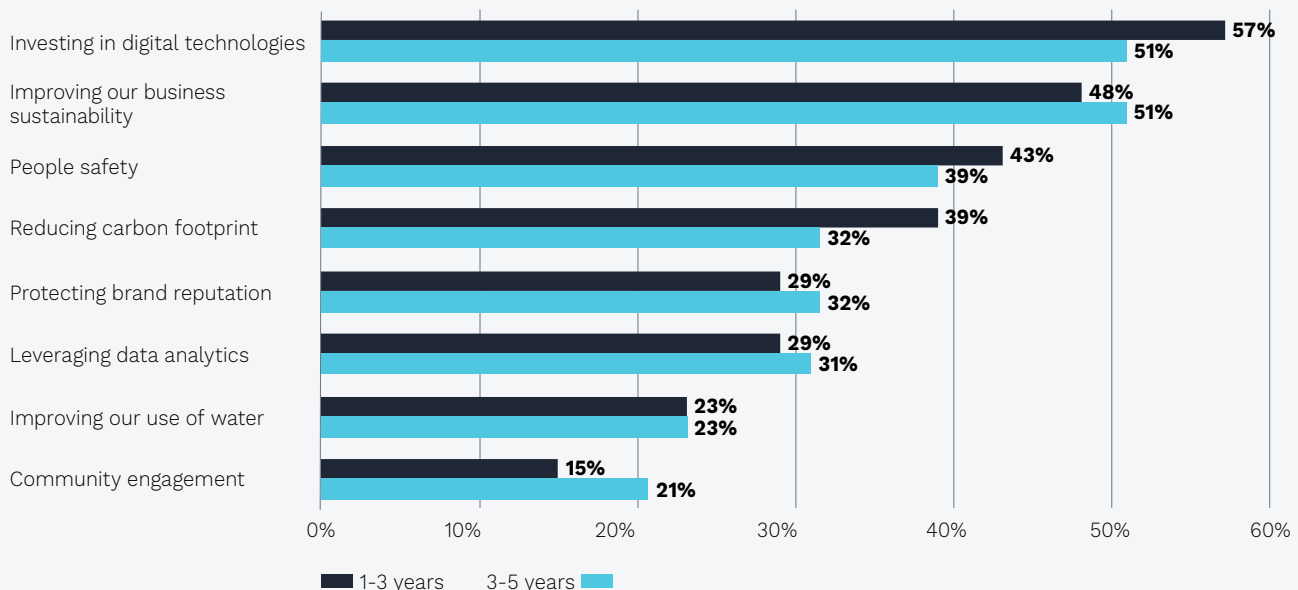
However, organisations deploying safety-related technologies are reaping benefits. Solutions for monitoring driver fatigue are most likely to have been deployed across 100 percent of an organisation. And safety monitoring is seen as having the greatest benefit to companies on average.

21%

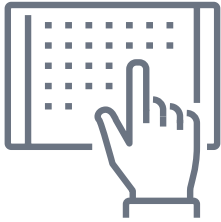


of respondents said they've deployed driver fatigue monitoring solutions across the entire organisation

Which of the following are among the highest priorities for your organisation to achieve in the next one-to-three and three-to-five?



* Combination of responses ranked first, second and third



On-the-job training platforms are the most popular safety technology

Small and mid-size companies are leading with safety-related deployments

We asked respondents about seven health and safety technologies: fatigue monitoring, automated PPE monitoring, predictive real-time safety management platforms for the Safe Connected Worker, non-invasive medical screening, on-the-job training platforms, telemedicine and remote workforce collaboration.

On-the-job training platforms were the most popular, with 73 percent of respondents saying their organisation is investing or planning to invest. This was followed by fatigue monitoring (69 percent) and remote workforce collaboration (69 percent). On-the-job training platforms and PPE monitoring were most likely to have been deployed across 100 percent of the organisation.

Companies are seeing different benefits based on their size. Small ones are reaping the most benefits from on-the-job training platforms and mid-size ones from automated PPE monitoring. Large companies generally lag in experiencing benefits from health and safety technologies.

"The benefit of safety monitoring is ensuring companies align solutions where they're needed. If you don't know what the trends are in concern areas, how can you make important decisions and invest in the right areas?"

Karl Simons OBE,

Executive Director of Health, Safety and Wellbeing, FYLD

Food for thought

- › In the next two years, mid-sized companies are most likely to see people safety as a key business priority. In the next five years, small companies have the greatest focus on it
- › Small and mid-size companies are experiencing more benefits from health and safety-related technologies – there are opportunities for large companies to catch up by enhancing their approach
- › Training and collaboration technologies are the most popular, along with fatigue monitoring

The digital mine is on the horizon

So-called digital mines have the potential to boost sustainability, mitigate risk and optimise operations by harnessing data more effectively. Achieving this digitalisation requires the ability to collect and analyse data from equipment – using sensors and IIoT devices to measure everything from vibrations and humidity to airflow. And that requires technology like AI.

59% 

of respondents see AI as having the greatest growth potential in the next 12 months

AI is seen as a major growth driver

Fifty-seven percent of decision makers said their organisation had deployed AI to some extent. And although it's a high number, it was the least popular of the technologies we mentioned. AI was also third from the bottom in terms of technologies seen to be delivering benefits.

However, AI is also the technology seen to offer the greatest growth opportunities. Fifty-nine percent of respondents ranked it first for growth potential in the next year, followed by robotics (45 percent). It also topped the rankings for growth drivers in the next five years (cited by 56 percent of respondents), with machine learning in second place (42 percent).

The focus on AI is particularly marked in Australia and the UK. Although Russia and Kazakhstan are least likely to see it as a growth driver in the next 12 months, they predict a major push in the next three to five years.

At present, small and mid-size companies are receiving the most benefit from AI. However, larger companies see it as a greater growth driver over the next five years.





Food for thought

- › Small and mid-size companies are currently experiencing the most benefits from AI, but larger companies are prioritising it over the next five years
- › Australia sees major opportunities for AI over the short and medium term – much more so than other regions
- › Companies see combined growth opportunities from AI, robotics and machine learning

So how can you drive forward meaningful digital transformation?

With 99 percent of senior decision makers saying technology and innovation are critical to their organisation's survival, digital transformation is a question of how and what, not if or when. If metals and mining companies want to harness opportunities in the looming super cycle, they need ways to achieve more with less while operating more sustainably and safely.

Although productivity has been a key digitalisation driver to date, companies need to look more closely at the safety side. After all, just because the industry has drastically improved its record in recent years doesn't mean there aren't opportunities to revolutionise standard ways of working and accelerate the move towards zero harm.

Training will be key to this – and to driving a more strategic approach to digital transformation more widely. By prioritising upskilling and change management, companies can gain even greater benefits and economies of scale from their technology adoption.

"Part of the issue with training is adopting a start-up mindset: fail fast and fail cheap. Mining doesn't have a culture of failure, but you have to acknowledge that when you deploy digital technology, there will be failures."

Agustin Costa,

Managing Director and Partner, Boston Consulting Group

So what immediate steps can you take?

Here are five questions to help you refine your approach and access insight that will drive value



Will you lose market share if you don't implement digital technology? Because other metals and mining companies are already investing in digital.



Do you have the capability to develop these technologies yourself? Or will you be better served by a proven solutions provider or partner?



Where do you want to deploy these technologies? Determine which parts of your operation would benefit the most from digital technology.



Do you have the skills needed to deploy these technologies yourself? If not, you need to partner with companies that can deploy them on your behalf.



How will you measure success? What do these technologies need to achieve in order to justify their deployment?



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About this study

Axora partnered with market research company Vanson Bourne to survey 150 metals and mining decision makers across North America, the UK, Russia and Kazakhstan, India, Australia, South Africa and South America.

Job roles included Chief Executive Officer, Chief Technology Officer, Chief Operations Officer, Chief Information Officer, Chief Information Security Officer, Head of Operations, Head of Strategy, Head of Engineering, Head of Innovation, Mining Manager, General Manager and Site Manager. The research was conducted in March and April 2021.

We also conducted qualitative interviews with industry stakeholders, some of whom are featured in this report.

About Axora

Axora is the marketplace for industrial innovators. We make it simple for industrial companies to discover, buy and sell digital innovation, driving safety, sustainability and efficiency across their entire operations.

Beyond our marketplace, we empower our community of industrials, technology companies, industry experts, universities and professional services with the latest digital innovation reports, insights and curated events.

Coming soon: An exclusive digital transformation community for metals and mining professionals

Email sasha.suzdaleva@axora.com
to learn more and join the waitlist.