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Insights

Tracking the trends 2021

Closing the trust deficit

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INTRODUCTION

Closing the trust deficit

ALTHOUGH BUSINESS RARELY unfolds along a linear path, 2020 will likely be particularly remembered for its twists and turns. COVID-19 cut a swathe through most companies' best laid plans, forcing leaders across the mining sector to refine their strategic objectives, recommit to their stakeholders, and reset their priorities. COVID-19 has preoccupied the headspace of executives and boards in the mining industry during the past year and no doubt will continue to dominate into the early part of 2021.

As we set out to identify the top trends of 2021, we purposely avoided focusing on the immediate response to COVID-19. Instead, we tried to look beyond the pandemic and see how longer-term trends in the industry were being impacted and what new trends might be emerging.

Stepping back from the 2021 trends, a central narrative emerged, namely the issue of trust between the mining industry and its wider set of stakeholders. In July 2020, the World Economic Forum[1] released a report identifying the "trust deficit" as being the key risk facing the mining industry.

The industry is, in many ways, at an important juncture. Mining could hold the key to a lower carbon future through many of the minerals it mines, yet the industry is capital starved. It has the potential to create widespread meaningful employment in urban and rural areas, yet it's often not the first choice for talent. And while mining companies have played a significant role though the COVID-19 crisis by flying in personal protective equipment (PPE), leveraging their health care infrastructure, and keeping workers safe, many governments continue to look toward the industry for additional taxes and royalty payments.

In many ways, these dichotomies still exist because of a deficit in trust. So, this year, we share our perspective on what mining companies should consider to increase or rebuild trust among their extended ecosystem of stakeholders, from their investors and employees to the communities and societies in which they operate.

As miners navigate the new normal, resiliency is imperative, so it's not surprising that we kick off this year's trends with four divergent scenarios of how things might play out over the next three to five years. COVID-19 has accelerated many trends, but the world remains uncertain, and these scenarios could be helpful as firms navigate different stakeholder needs to close the trust deficit.

From an investor perspective, this means winning back confidence by finding new ways to deliver consistent shareholder returns (particularly as transactional activity picks up), and closing the supply chain gaps that the pandemic brought to the fore. Many miners are also taking this opportunity to recalibrate for the future by shifting toward integrated operations to drive more predictable returns.

To rebuild trust across their talent network, many companies are redefining leadership, adapting the workplace culture, and recommitting to the goal of zero harm.

They are also revisiting their commitments to local communities, and to society at large, by enhancing their environmental, social, and governance (ESG) performance. This has seen them working to get serious about decarbonization and turn their corporate governance frameworks into a competitive advantage—initiatives that can drive value for their broader stakeholder groups as well. Most mining companies are also working to link their social investments to sustainable outcomes and playing an active role in the world's transition to a clean energy future.

Amid prevailing uncertainty, it's impossible to predict the results these efforts will yield. However, success in the future will likely be judged on factors far beyond financial performance. COVID-19 has taught us about the things people value most—safety, community, social impact, the environment. Mining companies struggling to overcome a deficit in trust should take these lessons to heart.

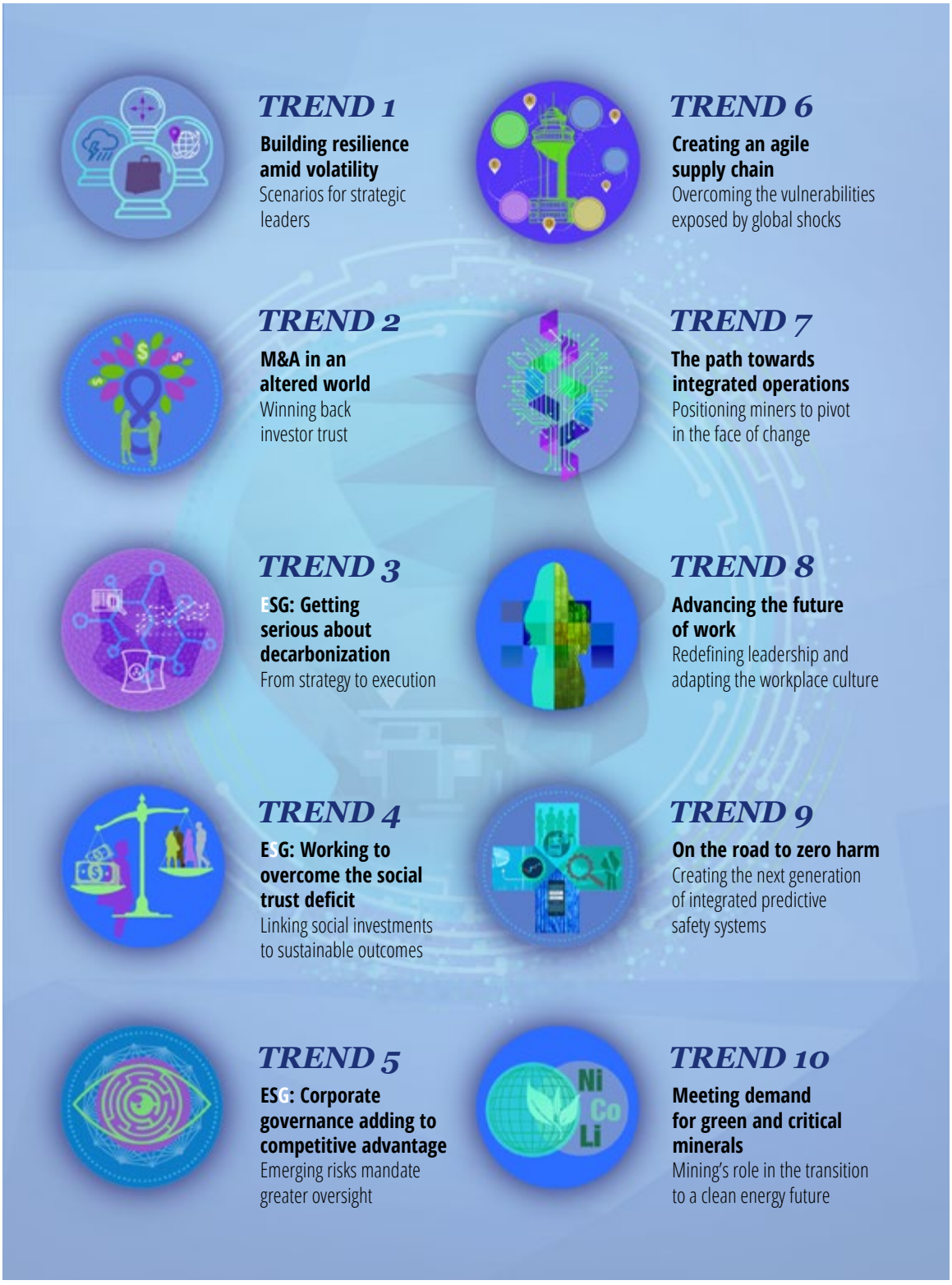
Now in its 13th year, *Tracking the trends 2021* takes a hard look at the mining sector and considerations for improvement as we lay a foundation for tomorrow. As in previous years, this edition features insights from Deloitte's global mining professionals who share real-world case studies and examples that mining companies can leverage in building a path forward. Thank you again for your ongoing support, and we invite you to share your input and feedback with us.

ENDNOTE

1. Hélène De Villiers-Piaget, "How data can help mining companies tackle their trust deficit," World Economic Forum, July 20, 2020.

Tracking the trends 2021

Closing the trust deficit



TREND 1

Building resilience amid volatility

SCENARIOS FOR STRATEGIC LEADERS

Andrew Swart, Global sector leader, Mining & Metals, Deloitte Touche Tohmatsu Limited
Andrew Lane, Energy, Resources & Industrials leader, Deloitte Africa

WHILE COVID-19 HAS had a range of impacts on mining companies, varying by commodity and geography, the one thing the past year has taught leaders is the value of building resilient organizations to navigate uncertain futures. To build a resilient organization, mining companies should embrace scenario planning as part of their strategic planning processes. Doing this effectively can position miners to better anticipate a range of global disruptors that could affect their organizations. To help companies on this path, we outline four divergent scenarios based on current trends and uncertainties and consider how they might play out in the mining sector.

Setting strategy and mitigating risk have always required an element of prediction. The further into the future a company needs to peer, the harder it is to develop accurate forecasts. Mining companies that work on decades-long time horizons are all too familiar with this challenge.

When a wrench is thrown into this process, companies often scramble to recalibrate. This has certainly been the case with COVID-19. As the pandemic began taking a toll on the global economy, mining companies found themselves reacting to emergency measures, regional regulations, and supply chain disruptions.

Moving past the initial shock

To protect worker health and safety, many companies quickly canceled nonessential travel and moved to remote work, where possible. In addition to imposing stricter hygiene and social distancing measures, some also scaled down production on specific sites in response to cases of COVID-19 and/or supply chain disruptions.

To mitigate risk, numerous companies created specialized internal task forces to develop site-specific pandemic plans, began screening onsite workers for symptoms, and took steps to solidify their finances through cash-flow planning. Several miners in remote regions also found themselves stepping up donations to help local health authorities meet their urgent needs for personal protective equipment (PPE).

"Now that the initial shock has passed, companies are facing challenging environments, alternating between restriction and relaxation," says Andrew Swart, Global sector leader, Mining & Metals, Deloitte Touche Tohmatsu Limited. "The differential impact of COVID-19 on different commodities and geographies has heightened both volatility and uncertainty. Despite being in uncharted waters, leaders should take decisive action to ensure their organizations are resilient."

Four future scenarios

To help mining companies set their strategy and mitigate risk in the coming three to five years, Deloitte considered how the future might be affected by two uncertainties: (1) the severity of the pandemic, and (2) the level of collaboration within and between countries.

A set of scenarios developed by Deloitte and Salesforce[1] was used as the basis for the development of four distinct scenarios related to the mining sector (figure 1).

FIGURE 1

Four scenarios based on current trends and uncertainties

Source: Deloitte and Salesforce, *The world remade by COVID-19: Scenarios for resilient leaders*, April 6, 2020.

While scenarios are merely stories of what the future may be like rather than predictions of what will happen, these hypotheses can help leaders open their eyes to new opportunities and hidden risks:

- **The passing storm** presumes that, after a slow start, the COVID-19 pandemic is met with an increasingly effective health system and a strong political response. The virus is eradicated earlier than expected due to coordinated measures by global players to spread awareness and share best practices. Public institutions' competence in the crisis renews trust in them. The pandemic has long-term economic impacts. Fiscal and monetary stimulus blunt the shocks but cannot reverse the losses that small businesses and lower and middle-income individuals have begun to experience. Tensions sharpen between socioeconomic classes.

- **Good company** presumes the COVID-19 pandemic persists past initial projections, placing a growing burden on governments around the world, which struggle to handle the crisis. A surge of public-private partnerships emerges as companies step up to be part of the global solution. New "pop-up ecosystems" arise as companies across industries—including mining—partner to respond to critical needs and drive much-needed innovation. Social media companies, platform companies, and tech giants gain new prestige. Ultimately, companies shift further toward "stakeholder capitalism," with a

more empathetic stance on how they can best serve their customers, shareholders, and employees to rebuild after the crisis.

- **Sunrise in the east** postulates that the COVID-19 pandemic is severe and unfolds inconsistently across the world. China and other East Asian countries manage the disease more effectively, whereas Western nations struggle with deep and lasting impacts—human, social, and economic—driven by slower and inconsistent responses. The global center of power shifts decisively east as China and other East Asian nations take the reins as primary powers on the world stage and lead global coordination of the health system and other multilateral institutions. The ability of China, Taiwan, and South Korea to contain the outbreak through a strong, centralized government response becomes the "gold standard."

- **Lone wolves** posits that the COVID-19 pandemic becomes a prolonged crisis as waves of disease afflict the world for longer than expected, resulting in a growing death toll, social unrest, and economic freefall. Paranoia grows. Nations put strict controls on foreigners and make supply chains domestic in the name of local security. Countries become isolationist. Government surveillance is commonplace, with technology monitoring people and their movements.

In assessing how these scenarios may play out, trust figures prominently. In many ways, an effective recovery hinges not only on citizens' ability to trust in government, communities' ability to trust in companies, and employees' ability to trust in their employers' leadership, but also on the trust of investors to deploy capital.

Layering in industry megatrends

To determine how these scenarios might play out in the mining sector, we considered their impact on five industry megatrends, which have been illuminated because of the COVID-19 pandemic. Depending on which scenario plays out over the next three to five years, some of these trends can be accelerated, while others may slow down:

- **Supply chains.** Geopolitics, the rise of nationalism, and cross-border supply chain risks are expected to reshape global supply chains. This could result in mining companies strengthening the resilience and agility of their supply chains and, in some cases, regionalizing the supply chains of critical inputs, to mitigate risk and drive more local employment.

- **Government power.** Governments may be less able to provide public services (e.g., health care, education) due to increased indebtedness, resulting in greater reliance on mining companies to fill the gap. This would present companies with an opportunity to create value beyond compliance by partnering more deliberately with governments and host communities.

- **Future of work.** As the crisis highlights the importance of operating safely, the already ongoing shift to remote and virtual working environments could accelerate. This may see miners focus more on the automation of work, deployment of different talent models, and a transition to remote operations.

- **Automation and digital.** In the more severe pandemic scenarios, mining companies could accelerate investment in automation and digital technologies to allow for remote operations and people and equipment tracking. Individuals would likely be more open to new technologies, from wearables to AI, as long as they provide benefits to personal security and health.

- **Decarbonization.** As the crisis highlights the trade-off between short-term economic recovery and long-term environmental impact, companies can seek a balance between prioritizing the economic recovery and increasing support for environmental issues,

particularly decarbonization. Underlying drivers could include a less attractive business case in a low oil price environment, the imposition of carbon taxes, and investor/community pressure around environmental, social, and governance (ESG) commitments.

Applying the scenarios to the mining sector

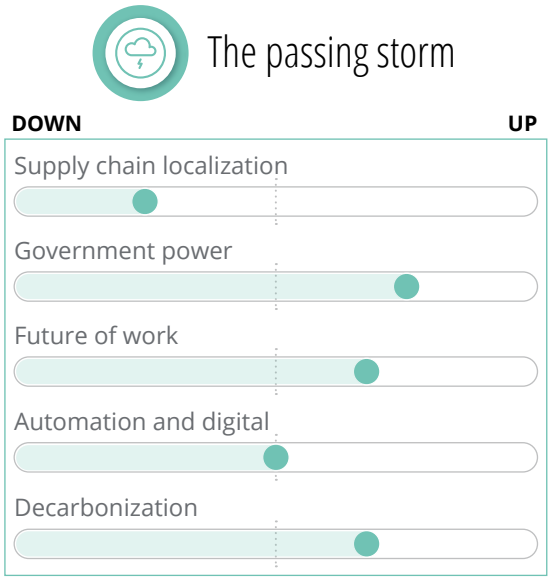
By lining these megatrends up to our four scenarios, we get a sense of how the global landscape might unfold in the next three to five years (figure 2).

SCENARIO 1: THE PASSING STORM

In response to the crisis, mining companies would likely keep automating and digitizing their operations and assets to mitigate risks. Governmental stimulus, including an accelerated infrastructure agenda, could help drive the demand for and prices of commodities. Less affected by the economic impacts, large companies would likely be better positioned to move forward by investing in new exploration and operations, technology innovations, and acquisitions of smaller players.

FIGURE 2

Scenario 1: The passing storm



Source: Deloitte, *Thriving post COVID-19: Scenarios for resilient leaders in Mining & Metals and Construction & Base Materials*, April 6, 2020.

Efforts to decarbonize the supply chain could also allow companies to respond to mounting ESG pressures and maintain social licenses.

Signposts that may indicate progression toward this scenario include:

- The virus sees a single peak with no indications of further waves.
- Governments decide to reopen large swathes of society and the economy, with little to no impact on infection rates.
- Highly effective mechanisms to combat the virus are created and deployed (e.g., vaccines).
- Governments collaborate and share best practices, resulting in a worldwide decline in infections.

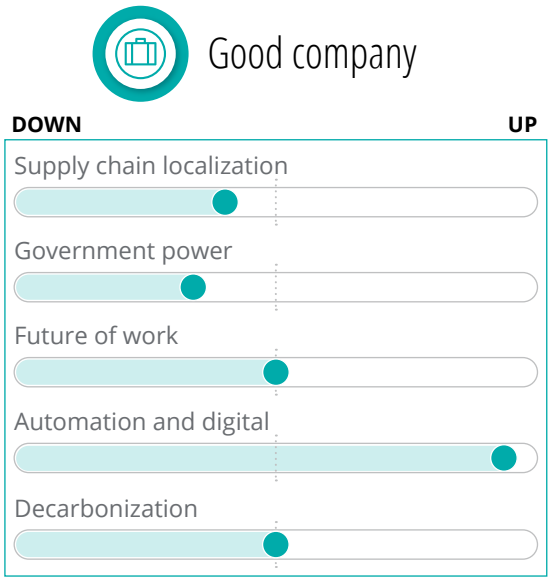
Should this scenario come to pass, larger mining companies would likely have better access to resources and investment to combat COVID-19 in the short term and would rebound quicker. For their part, smaller mining companies may take longer to return to normal, given their lack of resources and reduced ability to change operations in the short term.

SCENARIO 2: GOOD COMPANY

Mining companies could be forced to step up to the plate (figure 3). Companies can volunteer their resources to support and supplement containment, treatment, and recovery efforts. They would also be increasingly expected or required to make direct financial investments into their local communities to maintain their social license to operate and avoid a backlash from communities, governments, and the media. At the same time, mining companies would need to adapt to new realities by investing more heavily in areas such as wearables, virtual reality, AI, and 3D printing to combat significant supply chain shifts and workforce social distancing requirements.

FIGURE 3

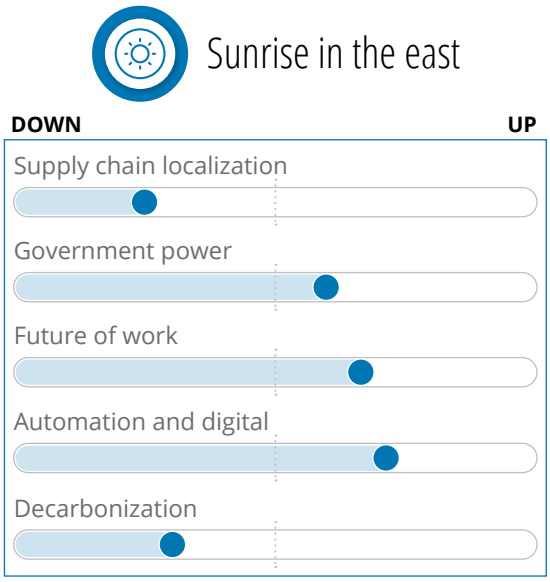
Scenario 2: Good company



Source: Deloitte, *Thriving post COVID-19: Scenarios for resilient leaders in Mining & Metals and Construction & Base Materials*, April 6, 2020.

FIGURE 4

Scenario 3: Sunrise in the east



Source: Deloitte, *Thriving post COVID-19: Scenarios for resilient leaders in Mining & Metals and Construction & Base Materials*, April 6, 2020.

Signposts that may indicate progression toward this scenario include:

- Companies are increasingly looked at as partners in solving this crisis; solutions start arriving from the private sector.
- Government measures face limitations, which have to be addressed by private sector innovation.
- Governments run out of resources (e.g., human capital, money) to effectively combat the virus and must look elsewhere to fill the gap.

Should this scenario come to pass, miners with good community and government relations could build on their license to operate. Conversely, those with poor reputations might not be seen as strategic partners and could be left behind.

SCENARIO 3: SUNRISE IN THE EAST

The severe and long-lasting impacts of the crisis would see mining companies prioritize and accelerate the implementation of digital technologies (see figure 4). Particularly in remote areas and developing countries, companies could develop programs in and around their operations to provide public services that highly indebted governments cannot afford. East Asian countries could take a central role in acquisitions and consolidating some sectors. Some governments may turn to nationalization to help their finances. Mining companies could shift away from decarbonization efforts and toward business models lighter in assets.

Signposts that may indicate progression toward this scenario include:

- East Asian countries see their peaks end soon, while Western countries struggle to contain their outbreaks or see repeated waves.
- China and other East Asian nations lift restrictions and their economies return to normal at a quicker pace than in Western nations.
- Western governments strike partnerships with East Asian nations to share best practices around reducing infections.

Should this scenario come to pass, mining companies based in East Asian countries will likely rebound quickly, and those with demand based in Asia could see stronger results than others. All other jurisdictions could be at a productivity disadvantage given local restrictions and social distancing measures, and would see softer demand as a result.

SCENARIO 4: LONE WOLVES

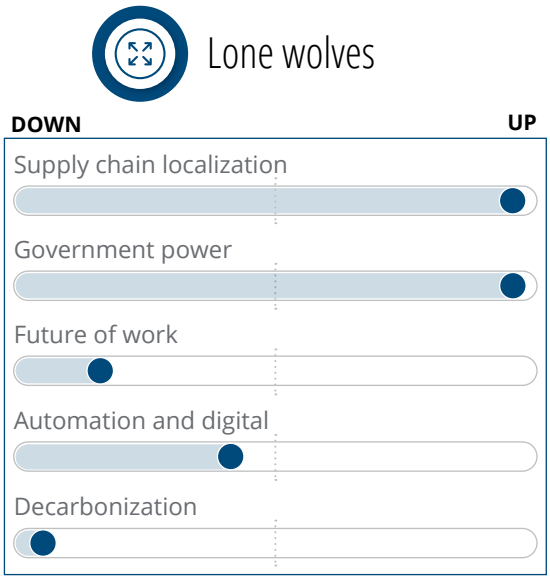
In response to the impacts of the crisis, mining companies could see drastic disruptions to their production and supply chains. With strict social distancing and tracking measures, companies could be forced to halt production or to suffer large productivity declines. If countries adopt isolationist policies and global supply chains are cut, companies would likely seek local suppliers and customers (figure 5). The strength of local supply chains could determine who will survive. In regions with strong local demand, companies could thrive; in regions where metals are heavily exported, companies could struggle.

Signposts that may indicate progression toward this scenario include:

- Vaccines or other medical developments face setbacks.
- Multiple waves of infection occur.
- Countries deploy intrusive monitoring programs to track individuals in the name of safety.
- Countries begin investment programs to build local industries to supply important resources.

FIGURE 5

Scenario 4: Lone wolves



Source: Deloitte, *Thriving post COVID-19: Scenarios for resilient leaders in Mining & Metals and Construction & Base Materials*, April 6, 2020.

- Countries deemphasize working together and enter into trade wars.

Should this scenario come to pass, mining companies with their own integrated processing operations could be better positioned to weather the storm. Those with largely global supply chains could have to navigate a complicated international landscape in order to continue operating.

In order for companies to navigate the next few years, they will likely require dynamic strategies, resilient leadership, and a constant reevaluation of the environment around them. Scenario planning could be an invaluable tool for leaders as they embark on the next few years.

Stress testing your strategy against the scenarios

The four scenarios set out here suggest a range of possible impacts as the COVID-19 crisis evolves. To build resilience, leaders should take several key steps:

- **Understand the implicit assumption in your current strategy.** Spend time as an executive team exploring each of the four divergent scenarios and determine which future best describes your current plan. In many cases, different members of the team will have different futures in mind. That insight alone is valuable in surfacing areas of alignment and misalignment.
- **Understand what you might do differently should a different scenario come to pass.** There may be scenarios to which your organization has not given thought. Consider what it would take to succeed should they come to pass. This will oblige you to think about new capabilities, partnerships, or strategic shifts that may be needed. Equally, some of the biggest threats to the business under this scenario will become clear, such as exposure to certain geographies or commodities, or vulnerability to competitive moves.
- **Monitor the news for clues about how the world might be shifting or unfolding.** In any uncertain environment, the key to success is agility and the ability to shift your strategy accordingly. To this end, monitoring the geopolitical and economic environment for early warning signs could be essential. Understanding what your future moves might be and what you might need to do differently in each scenario should be built into your strategic planning process.

ENDNOTE

1. Deloitte and Salesforce, *The world remade by COVID-19: Scenarios for resilient leaders*, April 6, 2020.

TREND 2

M&A in an altered world

WINNING BACK INVESTOR TRUST

Ian Sanders, Mining & Metals leader, Deloitte Australia
Robert Noronha, partner, M&A Advisory, Deloitte Canada

AS MINING COMPANIES seek to strengthen their portfolios and develop the commodities that can help power the energy transition, merger and acquisition (M&A) activity is picking up. To finance M&A deals however, miners should work to win back the trust they lost during the peak of the last cycle when numerous deals destroyed value rather than creating it. To win back investor confidence, companies may need to find new ways to deliver consistent shareholder returns; enhance their environmental, social, and governance (ESG) performance; and improve their capital and operational discipline.

While the rapid onset and spread of COVID-19 resulted in a slowdown initially in M&A activity across numerous sectors, volumes have picked up from these lows; historical evidence suggests that M&A markets quickly recover once uncertainty subsides.[1] This is true in the mining sector as well, where companies remain on a relentless search to build robust portfolios, a quest that is expected to be fueled, at least in part, by M&A transactions and consolidation.

Companies without deep coffers, however, may find themselves the victims of simmering investor displeasure. Much of this can be traced back to the historical track record of shareholder returns in the mining sector.

"Significant wealth was destroyed subsequent to the peak of the last mining cycle, and a good amount of that was due to richly priced M&A transactions that failed to deliver," says Robert Noronha, partner, M&A Advisory, Deloitte Canada.

Stung by poorly performing transactions, many investors have lost confidence in the mining sector over the past decade. As a result, small and mid-sized miners on the hunt for capital have often struggled. This is doing more than obstructing market activity; it's also leading to a limited pipeline of new projects being developed and put into production.

Addressing this could be key to unlocking the next set of minerals that can help power the energy transition and drive a new wave of economic growth. Miners should focus on winning back investor trust by addressing a range of fundamental issues.

Addressing the table stake issues

In seeking M&A financing, mining companies should be aware of the criteria investors are looking at in making their capital allocation decisions. First, many investors want comfort around a company's ability to deliver stable dividends over time. This means maintaining dividends even if commodity prices dip.

Beyond returning excess cash flow to shareholders, mining companies are also expected to have cohesive and compelling growth stories. With many miners issuing relatively flat future production guidance, investors often feel there is limited upside potential or opportunity for capital appreciation in the sector. This, combined with lower yields and the relatively high risk of mining operations, has resulted in fewer generalist investors targeting the industry.

But shareholder returns are just one area of focus for most global investment firms. Another area is mining's ESG performance. With each passing year, investors are pressing harder for detailed information about companies' ESG targets and how they are tracking against them.

ESG investing continues to be a major trend. According to a study released in January 2020 by the HEC Paris Business School, the Toulouse School of Economics, and MIT Sloan, investors are willing to pay US$0.70 more for a share in a company that donates at least one dollar per share to charity.[2] That trend has strengthened following the outbreak of COVID-19, as sustainable funds began to attract record levels of investment, with inflows rising to US$45.7 billion globally in the first quarter of 2020 alone.[3]

In the mining sector, the ESG movement is translating into vocal calls for companies to reduce the carbon intensity of their asset portfolios, eliminate exposure to geographies where human rights violations and corrupt practices are common, and follow through on their commitments to link social investments to sustainable community outcomes.

Given the limited universe of sector-focused investors, mining companies are acutely aware that they are competing with their peers for these pools of capital. To capture investor attention, new strategies may be required.

Some companies are attempting to attract financing by widening their potential investor base. Australia's Newcrest, for instance, recently listed on the Toronto Stock Exchange[4]—and it is by no means the only company to have sought a secondary listing outside its home jurisdiction. Two Canadian companies—Wheaton Precious Metals[5] and Yamana Gold[6]—were recently approved to trade on the London Stock Exchange, and others are poised to follow.

Dual listings however, are not the remedy to solve a mining company's capital needs. To truly win back investor confidence, mining companies should strengthen their capital and operational discipline. Additionally, mining companies should undertake M&A transactions at no or low premiums, as opposed to the typical 30% to 50% ranges of the past.[7]

To truly win back investor confidence, mining companies should strengthen their capital and operational discipline.

"With investors increasingly reacting negatively to high-premium deals that fail to deliver sustainable value, low-premium to no-premium transactions are becoming more common," says Ian Sanders, Mining & Metals leader, Deloitte Australia. "Success under such a structure requires a relentless focus on capital discipline."

Mining companies may also succeed in attracting investors with longer time horizons by building a pipeline of projects to achieve growth. Before this can happen, however, exploration and development budgets must rise. Globally, the mining sector's exploration budget fell by US$958 million between 2019 and 2020, a mere 19% increase since the lows of 2016.[8] Only gold exploration stayed steady, rising 1% year over year.[9]

"Companies with excess cash flows often choose between M&A and exploration, which is why exploration budgets often fall subsequent to a transaction," explains Dan Schweller, Global Energy, Resources & Industrials Financial Advisory leader, Deloitte US. "Yet, it doesn't have to be this way. Instead, larger miners can partner with junior explorers to help them build out their assets. It all comes down to intent."

Putting a strategic lens on M&A

Beyond just addressing the table stakes issues for investors, it is important that mining companies think about the strategic possibilities through M&A. The post–COVID-19 world will unleash structural and systemic changes that could have a direct impact on end markets for commodities. Mining companies should think about using M&A as a strategic tool to embrace scenario planning and build this into their strategic thinking as they navigate these uncharted waters. This can help companies decide the direction of their strategy, identify the new capabilities required, and prioritize the markets in which they need to operate to drive growth and profitability. Redefining M&A in terms of these scenarios and choices can bring much needed clarity of purpose while confronting these uncertainties.

A combination of defensive and offensive M&A strategies should emerge as a result, as companies try to safeguard existing markets, accelerate recovery, and position for future success. Figure 1 shows some of the key strategic choices that are facing mining companies as they seek to win back investor trust.

Within these quadrants, there are a range of potential strategic moves that mining companies can undertake, and we are already seeing many firms exploring these options.

1. **Salvage value.** Mining companies will likely face a range of investor pressures here. This can span the gamut of shedding nonperforming assets, selling off assets that don't meet the ESG expectations of investors, or divesting noncore assets to free up cash.

FIGURE 1

The M&A strategic framework

Source: Deloitte, "M&A and COVID-19: Charting new horizons," 2020.

BHP, for instance, has continued on its course to divest thermal coal assets to meet its decarbonization agenda.[10] Anglo American also laid out a plan to divest its thermal coal assets in South Africa within the next three years.[11] Although many miners are struggling to find a balance between a focus on economic recovery and the need to meet their sustainability objectives, investor demands for improved environmental performance will likely see many more miners restructuring their portfolios in the years to come.

2. **Safeguard markets to maintain competitive parity.** Companies can also use M&A defensively to safeguard markets and maintain competitive parity. These defensive plays can emerge in several ways. The next tier of gold miners emerged in a set of mid-market consolidations in the past year. Many of these firms need to double down on extracting the synergies that they promised, not least to defend themselves from future predators.

   Over the year, we have seen a range of announcements that have included the strategic alliance between Kirkland Lake Gold and Newmont Canada with respect to exploration and development opportunities around the company's Holt Complex and Newmont's properties in Timmins, Ontario.[12] With predictions that gold prices could hit US$2,300 per ounce within the next year, and ongoing concerns about the length and magnitude of the second wave of the pandemic, more deals could emerge.

   Likewise, in a sector where investor confidence is low, mining companies should again explore alliances and partnerships to bring promising projects online and share the risk between parties.

3. **Transform the business to safeguard the future.** On the offensive side, there are significant opportunities for mining companies to transform their portfolios through acquisitions or alliances. For many, this is about looking at their portfolios and doubling down on minerals or businesses, particularly those that are key to a lower carbon future.

   Exxaro Resources, an African mining company with interests in various minerals and a large-scale coal producer, is putting down key positions in renewable energy.[13]

4. **Change the game.** There is also an opportunity for the sector to explore more transformative moves by exploring adjacent markets, scaling "edge" businesses, or creating alliances. Given the importance of battery minerals to a long-term energy transition, it is likely that we will see more nontraditional mining companies enter the space by either taking positions in critical minerals or even disrupting the traditional mining models.

   For example, the US government recently acquired a stake in TechMet, a Dublin-based mining company, to create supply around key battery minerals.[14] There are likely to be more of these kinds of deals emerging over time, with technology companies and motor manufacturers also expected to enter this market.

   The companies that emerged strongest from the 2008 global financial crisis were those that took decisive measures to rebuild their balance sheets through a combination of rigorous cost optimization programs and divestment of non-core assets. The current situation, partly brought about by COVID-19, provides an opportunity for mining companies to use strategic M&A to position themselves to become the clear winners 10 years from now.

Rebuilding investor trust

- **Protect value.** Miners should remain focused on preserving value, delivering consistent returns, and extracting synergies for investors. Acknowledging financial distress can be daunting, ignoring it can be devastating. To protect value in a disrupted market, it's important to understand the signals of stress and investigate the root causes. Red flags can include deteriorating performance, a rising debt burden, significant management turnover, difficulty refinancing, stakeholder unrest, and erosion of working capital. If your operating assumptions have fundamentally changed, it can be critical to anchor your business forecasts in reality and run scenarios to determine whether you have the resources to weather the storm.
- **Leverage scenarios in the M&A planning process.** In laying a foundation for growth, mining companies typically develop various scenarios for the future that they stress test on a regular basis. Today's altered landscape, however, is a good moment in which to reimagine the future scenarios on which your planning currently depends. This may involve engaging a broader set of stakeholders to foresee alternative pathways that can inform your portfolio strategy and transactional focus in the years to come.
- **Use M&A strategically.** The mining sector seems ripe for a range of disruptive moves, and as mining companies develop their strategies for the next three to five years, there is a real opportunity to consider a range of defensive and offensive moves. The sector is continuing to garner interest from adjacent and downstream industries and companies as the world realizes the critical role that minerals could play in the energy transition. The name of the game is no longer just scale and synergies, but also exploring more disruptive business models.

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TREND 3

ESG: Getting serious about decarbonization

FROM STRATEGY TO EXECUTION

John O'Brien, partner, Financial Advisory, Deloitte Australia
Henry Stoch, partner, Risk Advisory, Deloitte Canada

AMID GROWING DEMANDS to reduce their climate impacts, mining companies have begun to explore how to move beyond risk identification and mitigation to execute on their decarbonization agendas. This is a critical area as companies work to meet the environmental mandates associated with their environmental, social, and governance (ESG) commitments as well as win back the trust of investors. Here we outline several practices miners can use to think through the context in which decarbonization might make sense for their organizations so that they can clearly visualize their risks, optimize their strategies, and realize their opportunities.

Driven by external pressure to reduce greenhouse gas emissions and a strengthening business case for diesel replacement and electrification, many mining companies have been making strides toward decarbonization. In Chile, for instance, BHP, Anglo American, and Antofagasta Minerals have all announced plans to power local operations from entirely renewable resources.[1] For its part, Vale has committed to achieving 100% self-production from renewable sources by 2025 in Brazil, and by 2030 globally.[2]

With renewable energy approaching price parity (at least for some renewables), the cost of taking action is also decreasing. While the costs of transitioning must also be taken into account, operationally it is now much cheaper to replace fossil fuels with renewables and, in many cases, attain significant economic benefits.

However, eliminating outputs, or even transitioning to a lower carbon footprint, is easier said than done. With each passing year, pension funds, institutional investors, and the ESG investment community demand more specifics about how companies plan to move from strategy to execution.

Demands for action mount

Providing these specifics has become paramount amid a mounting demand for action. Beyond conducting climate-related stress testing, some banks are divesting holdings or refusing to invest further in companies that fail to meet their ESG commitments.[3]

Asset manager BlackRock announced its divestment of certain thermal coal securities from its discretionary active investment portfolios in early 2020, stating in a letter to its clients: "With the acceleration of the global energy transition, we do not believe that the long-term economic or investment rationale justifies continued investment in this sector."[4] Members of the Net-Zero Asset Owner Alliance, representing US$4 trillion in assets under management, have committed to transitioning their investment portfolios to net-zero emissions by 2050.[5] Already, we have seen several pension funds advising their portfolio companies to adopt net-zero plans as a condition of remaining on the share registry.

"Mining companies should recognize that there is a correlation between stakeholder sentiment and company valuation," says Henry Stoch, partner, Risk Advisory and National Sustainability and Climate Change leader, Deloitte Canada. "Companies that fail to commit to a decarbonization agenda could find their share prices affected, which strengthens the case for decarbonization."

Governments are getting into the act as well. In Canada, for instance, companies that could not demonstrate adherence to their obligations under the Taskforce on Climate-related Financial Disclosures (TCFD) were not eligible to receive COVID-19 relief funds.[6]

In light of these realities, many companies are adopting a range of leading practices as they move from decarbonization commitments to action, balancing short-term economic factors with long-term environmental impact. While some of the approaches explored here are still nascent, they represent a set of practices adopted by many firms in the industry and in adjacent sectors. These should help enable miners to think through the context in which decarbonization might work for their organizations.

Many companies are adopting a range of leading practices as they move from decarbonization commitments to action, balancing short-term economic factors with long-term environmental impact.

Practice 1: Stakeholder response scenarios

The mining industry is familiar with the potential for community grievances to spill over into unrest, and that's particularly true for matters related to ESG. As a result, many industry players are already preparing for potential litigation. In an increasingly divisive geopolitical environment, the risk of climate terrorism is also on the rise, opening the door to attacks, both physical and cyber.

Conversely, as companies consider abatement options, they can design in cobenefits for the communities in which they operate in order to lower emissions and build community support. For example, as companies establish carbon trading and offsetting strategies, including local nature-based solutions with the ecosystem and other local benefits, they could deliver good outcomes for all stakeholders.

To understand how different stakeholder groups might react if companies continue contributing to climate change or, alternatively, lower their emissions to deliver community benefits, Deloitte modeled various possible scenarios, ranging from moderate to extreme, over a 10-year timeline. For instance, could employees refuse to work for a company due to its weak environmental record? Could a company be sued for billions of dollars for contributing to climate change? How are core investor groups likely to react?

This is just one element in the effort to gain a comprehensive understanding of what the future of energy means from an organizational perspective. As companies attempt to execute against their decarbonization agendas, they should assess a wider range of physical and transition risks, taking regulatory, market, and stakeholder considerations into account to determine the climate risks that may affect all their operations.

Although there are various steps along this path, the process typically begins by aggregating current emissions data, creating realistic forecasts, and examining various abatement scenarios to pinpoint those that can enable companies to achieve their emissions targets and build strategic competitive advantage (see case study).

CASE STUDY

Moving to net-zero

After committing to a net-zero target in line with the 2015 Paris Agreement, a global resources company needed to evaluate a range of abatement pathway options to identify the costs associated with achieving this target. Through a series of in-person and remote workshops, the Deloitte project team:

- Analyzed the company's current and forecasted emissions data.
- Helped identify, quantify, and articulate potential abatement pathways for achieving and maintaining net-zero operations.
- Modeled the potential value, costs, timing, and technologies associated with various abatement solutions and how they interacted with the forecast demand for lower carbon commodities.
- Developed robust options for interim targets.
- Reviewed carbon offset pricing forecasts, which allowed the company to assess its medium- to long-term decarbonization options.
- Assessed and reported on emissions impacts, abatement partnerships, and procurement options.
- Analyzed how the company's valuation might be affected by potential stakeholder reactions, and estimated the cost of those capital impacts over the next decade.
- Explored options to integrate emissions data into the company's enterprise resource planning (ERP) system to enable fully informed decision-making.

This work generated a collection of papers that provided the executive team and board with guidance on global strategy, laying out the activities the company should consider as they transition to a low-carbon economy. As a result, an internal fund was established to help accelerate the deployment of abatement projects.

Practice 2: Deep-dive emissions plans

Although an important first step on the decarbonization journey involves setting a global plan and priorities, companies cannot achieve their objectives unless they understand the specific actions they're required to take at the site level. This speaks to the need to develop deep-dive emissions plans for specific assets and mine sites. Among the various considerations, three components to focus on include:

- **Site power.** As companies tackle the logistics involved in accessing electricity as and when it's required, they should consider a range of options. In some cases, for instance, it will make sense to enter power purchase agreements (PPAs) to acquire power through the grid. In other cases, they may choose to underwrite renewable development. Understanding the pros and cons of each course of action can be essential before proceeding. In a recent example, BHP entered new renewable energy contracts for its Escondida and Spence copper mines in Chile that allowed the company to reduce energy prices by 20% and displace 3 million tons of CO_2 emissions from the current coal-fired supply.[7] The company also signed a renewable PPA that will allow it to use low-emission energy sources to meet half of its electricity needs in its Australian, Queensland coal mine, a move that should see the company reduce its related emissions by 50% by 2025.[8]

- **Material movement electrification.** Once a company decides to replace diesel across its mining operations, it will need to think through alternative approaches, such as whether to transition to hydrogen or electric vehicles, what trolley-assist options exist, the availability of stationary power generation, and options for in-pit crushing and conveying. For Anglo American, this decision-making process saw the company partner with ENGIE to develop and fuel the world's largest hydrogen-powered mine haul truck, which it expects to roll out at its Mogalakwena platinum mine in South Africa.[9]

- **Processing.** When it comes to processing operations, machinery and vehicle electrification is only one element companies must consider. They should also implement any required process changes and seek to optimize their operational emissions through abatement projects, policy analysis, and portfolio assessment. This is an approach Rio Tinto is pursuing as part of its joint venture with Alcoa Corporation to eliminate carbon from the aluminum smelting process.[10]

"Regardless of the choice they make, miners should undertake an in-depth review of how these activities might impact worker safety and productivity," says John O'Brien, partner, Financial Advisory, Deloitte Australia. "This, in turn, should be balanced against appropriate capital planning to develop the optimum project mix."

Practice 3: ERP integration

Given the compounding impacts of climate change across the enterprise, there is a growing need to seamlessly integrate emissions data with a company's operational and financial data. In addition to positioning companies to make more informed capital project decisions, access to real-time data is essential if miners hope to understand the trade-offs they must make between emissions reduction, financial resources, and productivity.

Many ERP providers are already taking steps to turn this vision into reality. In early 2020, SAP undertook an initiative to understand how SAP S/4HANA and other SAP applications could help companies manage their carbon footprints. This review led to the establishment of the Climate 21 program, which aims to help companies track product-related emissions data and optimize their carbon transactions across both their supply chains and asset base.[11] In a similar move, Salesforce introduced the Salesforce Sustainability Cloud, which is designed to help users quantify their carbon footprint and take steps to reduce emissions by tracking, analyzing, and reporting on their environmental data.[12]

While it is still in its early days, the integration of emissions data into ERP systems promises to drive more informed decision-making, shed light on the strategic impact of various climate-related programs, and enable real-time assessment of the trade-offs between emissions, productivity, and finance.

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Practice 4: Scope 3 emissions

Greenhouse gas emissions are typically classified into three groups, or "scopes." Scope 1 emissions are those that companies emit directly from owned

or controlled sources. Scope 2 emissions are indirectly emitted through the generation of purchased energy. Scope 3 emissions are indirectly emitted across a company's value chain.[13]

Companies at the early stages of their decarbonization initiatives will typically focus on measures to reduce their scope 1 and scope 2 emissions. Now, however, companies are increasingly expected to work with their customers, suppliers, and other value chain partners to reduce their scope 3 emissions. Many organizations have begun to see the reduction of scope 1 and scope 2 emissions as the minimum and are making the reduction of scope 3 emissions their focus.

This appears to be reflected in growing industry participation in associations such as the:

- Australian Climate Leaders Coalition, a group of cross-sectoral Australian CEOs who are setting public decarbonization targets;[14]
- Japan Climate Leaders' Partnership, a coalition of Japanese companies that believes economic prosperity and sustainability go hand-in-hand;[15]
- New Zealand Climate Leaders Coalition, which is focused on helping the transition to a low emissions economy;[16]
- European Corporate Leaders Groups, which bring together business leaders committed to supporting the transformation to a net-zero economy;[17] and
- We Mean Business coalition, which is driving US policy ambition to accelerate the zero-carbon transition.[18]

Although each company must assess its strategic approach relative to scope 3 emissions, those choosing to play a part in addressing these emissions are now considering use cases that would allow them to aggregate emissions data and build partnerships across their extended value chains.

As an example, Rio Tinto and Baowu Steel signed a memorandum of understanding (MOU) to develop a hydrogen substitute as a way to lower emissions across the steel supply chain. The hydrogen would be used as a reductant in the steelmaking process to replace coking coal—a move that could potentially address the challenge of scope 3 emissions.[19]

Practice 5: Enhancing disclosures by improving traceability

Although early demands for provenance were likely sparked by the need to eliminate conflict minerals from supply chains, social expectations around ethical sourcing have burgeoned. With each passing year, a growing number of automotive manufacturers, technology companies, and global retailers are paying rigorous attention to the origin of the metals and minerals they source and sell—putting mining companies under greater pressure not only to improve product traceability but also to disclose the carbon footprint associated with the minerals they process.

"Beyond helping companies validate the source of specific commodities across the supply chain, blockchain technology can track the end-to-end carbon footprint involved in producing any particular ton of ore," says John O'Brien. "This could be critical as mining companies aim to certify both the ethical sourcing and carbon neutrality of their products."

As companies move from strategy to execution on decarbonization, they have the opportunity to create more resilient organization. By developing a clear road map and plan of action to meet their commitments to the market, they not only de-risk their organizations; they also lay the foundation for winning back the trust of the investment community.

The path toward decarbonization

- **Understand the impacts.** Before they can effectively decarbonize, organizations should seek to understand the impacts of climate change on both societies and their operations. Predictive analytics can help. Using historical data, companies can assess their current baseline and set targets accordingly, with the aim of proactively recognizing likely emissions generated from assets over their life cycle. Armed with this information, it can become easier to harmonize decarbonization efforts in primary operations, re-examine asset portfolios to identify opportunities for carbon reduction, and determine which technologies to invest in.
- **Consider multiple abatement pathway scenarios.** By leveraging scientific information from leading bodies and methodologies—including the Intergovernmental Panel on Climate Change (IPCC), Representative Concentration Pathways (RCPs), the International Institute for Applied Systems Analysis (IIASA), Shared Socioeconomic Pathways (SSPs), and the Science-Based Target (SBT) methodologies—companies can begin to compare the forecast emissions reductions associated with their proposed abatement projects. This can position them to assess the viability of a range of decarbonization initiatives, such as low carbon transition strategies, including target setting (e.g., net-zero emissions trajectories, science-based targets, least cost pathways); renewable energy procurement advisory and support, including PPA strategy; and renewable technology and policy scenario analysis, forecasting, and budgeting (financial and carbon use).
- **Optimize operations.** As companies move from strategy to execution, they should make operational adjustments to support their decarbonization agendas. This includes identifying innovative new technology to help drive energy savings; improving their sustainability reporting, assurance, governance, and compliance; taking advantage of tax credits to drive cleaner technology; and collaborating with other energy, resources, and industrial companies to build out cross-sector solutions.

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TREND 4

ESG: Working to overcome the social trust deficit

LINKING SOCIAL INVESTMENTS TO SUSTAINABLE OUTCOMES

Andrew Lane, Energy, Resources & Industrials leader, Deloitte Africa

Patricia Muricy, Mining & Metals leader, Deloitte Brazil

COVID-19 HAS SPURRED a shift in balance between government and business. As mining companies are often called upon to play the role of government in remote regions, an opportunity exists to create value beyond compliance by partnering more instrumentally with host governments and communities.[1] It's important to determine which investments are capable of creating long-term social impact by accurately measuring the socioeconomic returns of programs, projects, and policy interventions.

Environmental, social, and governance (ESG) mandates have long played a critical role in the mining sector, and nowhere is this truer than in the realm of community relations. For decades companies have tried to bring the "social" pillar of the ESG trio to life through significant investments in corporate social responsibility (CSR) initiatives. Yet some mining companies still struggle to earn community trust.

ESG mandates have long played a critical role in the mining sector, and nowhere is this truer than in the realm of community relations.

According to a recent report by the World Economic Forum,[2] mining companies have acknowledged, for the second year running, that their single biggest risk is the trust deficit with local communities. A large part of the challenge is that the industry is frequently judged by its lowest common denominator.

There is no denying the impact of recent tragic high-profile disasters in different parts of the world. Rather than being perceived as company-specific events, these missteps can taint the entire sector.

That may not be the case in other sectors. If an automotive company misrepresents its emissions targets, or an airline suffers a major accident, consumers typically would not shun a whole industry. The mining industry, however, is often judged as a collective—so overcoming the trust deficit could be a collective responsibility.

Driving deep-rooted change

Despite the assistance the mining industry is providing to bolster the government response to COVID-19, it seems these steps could be insufficient to drive deep-rooted change and overcome the trust deficit. As the balance between governments and businesses continues to evolve, the industry's approach to community investments will likely need to become increasingly sophisticated. This likely means investing in initiatives that deliver long-term sustainable outcomes.

"Given the fundamental role mining companies play in countless communities around the world, it's time for them to make evidence-based decisions about which investments and programs are capable of imparting true social impact," says Andrew Lane,

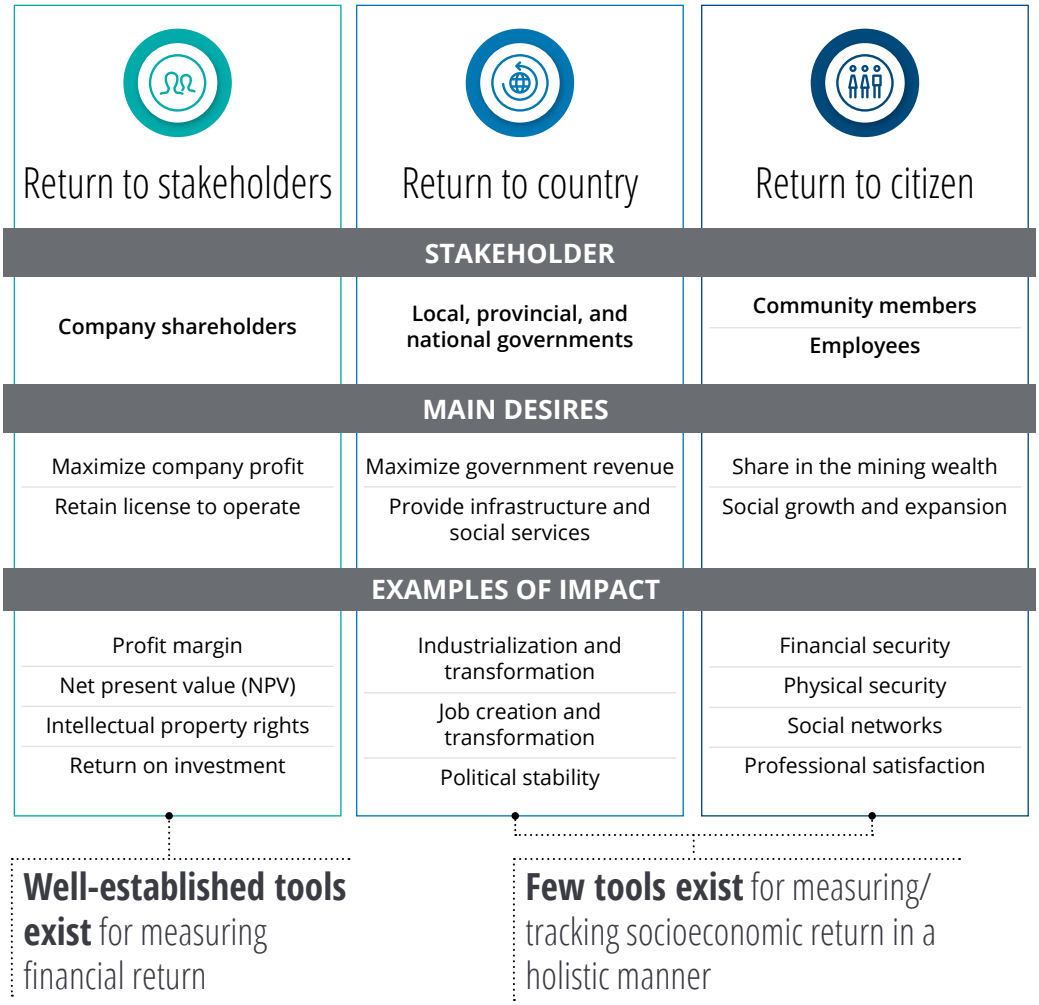
Energy, Resources & Industrials leader, Deloitte Africa.

This would require a shift from traditional stakeholder engagement to stakeholder collaboration. To move beyond mere compliance, companies should work with all stakeholders to define the concept of "value." While this is often described in financial, tax, or royalty terms, these metrics don't always resonate with all stakeholders. A more effective approach may involve the modeling of three sources of return: return to shareholders, return to country, and return to citizens (figure 1).

Innovation and analytics could be instrumental to accurately measuring socioeconomic returns. To properly assess the impact of community programs, projects, and policy interventions, companies need the analytical capacity to capture, store, and validate a wide range of performance data. For many years nonprofit organizations have been using sophisticated monitoring and evaluation techniques to gather data and explain their impact to philanthropists. The mining industry could learn from these organizations, so that through a rich dialogue, use of analytics, and impact measurement techniques, companies, community leaders, and policymakers can make more informed investment decisions.

FIGURE 1

Three sources of return



Source: Deloitte analysis.

The results gap

Before companies can begin to shift this balance, they should engage in open dialogue with communities to understand what their needs are. However, to date, the traditional community approaches of some mining companies have often failed to deliver. There are likely several reasons for this.

First, although many companies have set up large philanthropic funds to deliver on a huge range of community projects, their funding approaches often lack a strategic focus or an organized framework. As a result, companies frequently respond to local stakeholder requests for financing in a haphazard manner, allocating resources for short-term programs (such as supporting a local sports team) rather than projects capable of creating lasting benefits.

Second, while miners typically comply with their local content requirements, many of the jobs offered to local workers and suppliers remain low-level functions. For instance, rather than training locals in high-value skills—such as safety support, operations management, or civil construction services—they hire locals to deliver food supplies, provide cleaning services, install heating, ventilation, and air conditioning (HVAC) equipment, or assist with accounting. At the end of the day, this leaves the community with few added skill sets.

Third, some mining companies do not consistently focus on creating a sustainable legacy. This often sees them confining their training to mine-specific tasks instead of providing locals with transferable skills that will remain relevant within the community after the mining cycle is complete. In a farming community, this could include investments directed at improving crops, enhancing agricultural research, or providing locals with wider market access for their produce. In an indigenous community, it may mean extending access to health and education, promoting local culture, or helping communities preserve their land. The key is to use a long-term lens when allocating investment funds.

Fourth, even when companies do make larger infrastructure investments—by building a hospital perhaps, or a power plant—some don't consider what will happen to these facilities following project completion. Without ongoing investment and access to critical talent (such as medical doctors or engineers), communities often can't maintain this infrastructure and it falls into disrepair.

"All of this contributes to the public perception that mining companies are prospering at the expense of society by failing to deliver long-term socioeconomic outcomes," says Andrew Sedov, Mining & Metals leader, Deloitte Russia. "These deep-seated and largely negative views create a tumultuous stakeholder relations landscape. In worst-case scenarios, they also spill over into community protests, anti-mining advertising campaigns, abrupt tax increases, and dramatic changes in regulatory regimes."

Before companies can begin to shift this balance, they should engage in open dialogue with communities to understand what their needs are.

Mining companies stepping up

While in recent years efforts to tie investment to community impacts have seen the tide shifting, COVID-19 has made it clear that there is still some way to go.

The disproportionate impact of the pandemic on some indigenous communities has demonstrated that many of these populations continue to live in

poverty with limited health care resources. Difficulties educating communities about the pandemic's spread, sharing safety protocols, and supporting tele-medicine solutions have also exposed weaknesses in local communication infrastructures and internet access.

To close the gaps, mining companies are increasingly being called upon to play the role of government, particularly in remote regions where governments are undercapacitated and struggling to provide services.[3] The COVID-19 crisis has exacerbated the problem. This presents companies with an opportunity to create value beyond compliance by partnering with governments and host communities.

Mining companies have taken this idea to heart. In addition to bringing in doctors, keeping critical workers safe, and assisting with information dissemination and pandemic education, they have helped to operate virus screening and testing sites, put their vehicles to use as ambulances, and made their facilities available for quarantining purposes.

An analysis by Mining Technology identified numerous ways in which the mining industry has stepped up to the plate:[4]

- Rio Tinto allocated US$60 million to global COVID-19 relief to assist with the supply of masks, personal protective equipment (PPE), ventilators, and temporary medical units.
- BHP established a AU$50 million (approximately US$36.3 million) fund to bring critical health services to communities across Australia, and made further investments to assist health authorities in Chile.
- Newmont set up a US$20 million fund to bolster community health, food security, and local economic resilience.
- De Beers made a US$2.5 million donation to support governments and local communities in both Botswana and Namibia to help supply medical equipment, provide vulnerable populations with food and water, and increase awareness about the pandemic.
- In Zambia, Barrick Gold donated more than US$ 500,000 to help source medical equipment across the country.
- Vale bought five million rapid testing kits for Brazil's government, provided medical workers with PPE, and announced a stimulus program to shore up local suppliers.
- In South Africa, AngloGold Ashanti made two of its hospitals available to provincial governments to support the treatment and isolation of patients diagnosed with COVID-19, and collaborated with a local not-for-profit organization to distribute essential items such as groceries to vulnerable people across the region.
- Gold Fields provided Ghana's government with a financial aid package to help purchase PPE and mount an effective pandemic response.
- ArcelorMittal Liberia provided medical supplies to local health ministries.
- The Mining Association of Canada collaborated with 18 other associations to donate C$36,000 (approximately US$ 27,364) to local food banks.

These strategies and tools can highlight mining companies' efforts related to social good. These approaches can help companies build true value beyond compliance—enhancing their ability to attract capital and talent, strengthen their brand image, and overcome the trust deficit.

Providing shared value by creating social impact

- **Extend existing capacity.** One way mining companies can begin to focus their community investments is by considering how to put their existing infrastructure to greater use. Companies that have built railroads or local ports, for instance, could enable regional farmers to export their crops by giving them access to these transportation facilities. Companies that have installed high-speed fiber optic networks in a region could potentially support local service providers, such as hospitals, by leveraging these networks to provide medical training, or access to specialists, or tele-medicine services. These are relatively low-cost ways to create value.
- **Enhance localized procurement.** As governments become more stringent about the industry's local content contributions, miners may need to adopt integrated approaches that embrace regional clusters and foster industry collaboration among multiple right holders, regulators, original equipment manufacturers (OEMs), and local business forums. At the same time miners should consider involving local suppliers in more strategic and specialized capacities with the goal of developing a qualified, competitive local supplier ecosystem.
- **Collaborate regionally.** Individual companies can't deal with the challenges of unemployment, inequality, and poverty in local communities. To address these endemic issues companies should incorporate their activities into broader local development plans to reflect the real needs of local communities. For instance, rather than making individual efforts to engage stakeholders, companies can conduct joint stakeholder needs' analyses. Similarly, companies can implement programs together through an 'impact delivery unit'. Miners can also move from funding their own portfolios to pooled funding. Likewise, centralized or joint decision-making can take the place of company-level governance. To generate long-term benefits, miners should measure impacts through an integrated framework rather than having each company adopt its own methodology.
- **Re-establish trust.** COVID-19 presents an opportunity for mining companies to reshape their image in local communities. Miners are already taking steps to build trust by working to limit the spread of the virus into host communities, but there are many other steps they could take. For instance, companies can: enhance emotional trust by helping local workers manage the stress associated with COVID-19; enhance digital trust by continuing to invest in automation technologies to improve safety and streamline communications with local communities; and strengthen financial trust by investing in critical infrastructure, prepaying taxes, using their supply chain infrastructure to bring in PPE, and intensifying their commitment to local supply chains in a bid to bring direct value to local communities.
- **Engage diverse stakeholder groups to manage social risk.** To go beyond "tick box" compliance, mining companies should consider proactively managing social risk by evolving their stakeholder engagement strategies on three levels. On a strategic level, they should gain in-depth analytical intelligence about the needs, motivations, and influencing factors relevant to each stakeholder group. At the tactical level, stakeholder interaction should address nuances across the stakeholder landscape and communicate company performance relative to stakeholder needs. At the operational level, cross-collaboration between business functions is important to appropriately address stakeholder requirements.
- **Monitor the regulatory environment.** As mines become more autonomous and increased automation reduces employment, fewer people may see their personal welfare tied to the welfare of primary industries. Governments often address this disconnect between community and mining company needs by unilaterally changing their regulatory regimes. Rather than simply waiting for new regulations to come out, mining companies should consider proactive steps to influence local regulators. To strengthen their argument, companies should aim to develop a consolidated view of their community inputs—one that sees stakeholder relations, community development, safety, health, and environmental contributions as multiple dimensions of a single challenge: sustainability.

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TREND 5

ESG: Corporate governance adding to competitive advantage

EMERGING RISKS MANDATE GREATER OVERSIGHT

Andrew Swart, Global sector leader, Mining & Metals, Deloitte Touche Tohmatsu Limited
Patricia Muricy, Mining & Metals leader, Deloitte Brazil

IN ADDRESSING THEIR environmental, social, and governance (ESG) responsibilities, many companies have relegated governance to a backstage role. This opens the door to potential missteps that could result in a widening trust deficit and irreparable reputational damage, but if managed correctly, it could also create a competitive advantage for companies. To do this, mining companies should strengthen their governance processes, particularly around rapidly shifting issues that have only recently begun making their way onto corporate agendas. This includes their approach to issues such as human rights, ethical conduct, diversity, cybersecurity, and evolving social norms.

Stakeholders have the power to change an industry's focus. That has certainly been the case for many mining companies that have changed direction in response to both investor and community pressures.

On the one hand, investor demands for improved environmental performance have seen mining companies restructuring their portfolios and committing to ambitious carbon reduction programs. On the other hand, community demands for improved social performance, supported by local governments, nongovernmental organizations, and socially conscious consumers, are spurring miners to provide shared value by creating social impact.

However, there is a third pillar of ESG that often gets short shrift—governance. It is frequently relegated to a backstage role, a practice that has the danger of backfiring.

Although most mining companies understand the imperative to put effective controls into place, weak governance can result in significant missteps, and potentially cause companies to unwittingly breach not only their regulatory mandates, but also their commitments to investors, communities, and other critical stakeholders. Beyond resulting in a loss of the social license to operate, this can lead to irreparable reputational damage, lawsuits, community unrest, and plummeting market values.

Shifting from downside risk to competitive advantage

Good governance is often seen as a way to protect against downside risk, but it can also be seen as adding to competitive advantage. Companies with strong governance systems make themselves more attractive to investors given ESG pressure, strengthen their attractiveness to host governments and communities, and also help to attract some of the best talent.

Therefore, what are these critical stakeholders—investors, governments, communities, and employees—focused on? Typically, they expect management and boards to strengthen their governance processes, particularly around rapidly shifting issues that have only recently begun to make their way onto corporate agendas. For instance, in the past few years, investors, customers, communities, and governments, not to mention media and watchdog organizations, have heightened their focus on a wide range of corporate behaviors, including those related to human rights, ethical conduct, cybersecurity, diversity, and even responses to changing social norms.

To develop appropriate controls, standards, and policies, it's important that companies understand the governance mandates associated with each of these areas.

Protecting human rights

Although human rights obligations were once considered the sole domain of the state, there are expectations today that companies share this responsibility.

According to the UN's Guiding Principles on Business and Human Rights,[1] published in 2011, business enterprises—regardless of their size, sector, operational context, ownership, and structure—are required to respect human rights at all stages of their operations. Beyond avoiding, causing, or contributing to human rights impacts, businesses are also expected to seek to prevent or mitigate those impacts directly linked to their operations, products, or services by their business relationships "… even if they have not contributed to those impacts."

Although human rights obligations were once considered the sole domain of the state, there are expectations today that companies share this responsibility.

This can put a greater onus on companies to monitor their third-party relationships.

For example, after setting up a gold mine in Eritrea in partnership with the country's government, Nevsun Resources is alleged to have hired state-run contractors who used forced labor to build the mine's facilities. Although the company was not directly responsible for hiring these laborers, the Supreme Court of Canada recently ruled that the case by its former employees for breach of customary international law would proceed in the Canadian courts—requiring the company to answer for human rights abuses allegedly committed by a third-party contractor.[2] The case has subsequently been settled out of court.[3]

Similarly, in July 2020, a human rights organization in the United Kingdom is reported to have asked the London Bullion Market Association (LBMA) to decertify a mining company for failure to investigate allegations of human rights abuses at one of its source mines.[4]

The conduct of contractors, even when they're offsite, is also being called into question. "It's incumbent on mining companies to protect communities from the misbehavior of employees and contractors," says Patricia Muricy, Mining & Metals leader, Deloitte Brazil. "If a company brings outside workers into a vulnerable community, and one of those workers commits a crime, the company could be held responsible."

This makes it imperative for businesses to develop and embed appropriate policies, governance structures, and tools to mitigate human rights risks, both within their operations and across their supply chains. This could be doubly important for those miners that operate in regions with weaker human rights protections.

"By putting these human rights controls in place, companies can enhance and strengthen their reputations as valued and responsible partners in the regions in which they operate," says Patricia Muricy. "In addition to closing the trust deficit that the industry faces, this can serve to open up new opportunities and markets for miners looking to extend the life of mines, move into new jurisdictions, and seek new leases."

Ethical conduct

Similar issues can arise when it comes to ethical conduct, particularly in those cases where that conduct is backstopped by legislative guidelines. Enforcement action in both the United States and the United Kingdom makes it clear that companies can be brought to task for anti-corruption violations that may have occurred in foreign jurisdictions.[5]

The same is true when it comes to the management of so-called conflict minerals—mined in areas of armed conflict. In 2012, Section 1502 of the US Dodd-Frank Act came into effect, requiring all companies reporting to the Securities and Exchange Commission (SEC) to disclose if their products contain conflict minerals—such as tin, tantalum, tungsten, and gold—originating from the Democratic Republic of Congo (DRC) or its neighboring countries.[6] While enforcement of those audit requirements were suspended several years later, mineral provenance remains front and center for countless corporations. As tech giants, automotive manufacturers, and even major retailers become more vocal in their demands for ethically sourced minerals, mining companies are coming under growing pressure to improve their due diligence practices and transparency reporting.

With the European Union's (EU) Conflict Minerals Regulation coming into effect in January 2021, those obligations are expected to escalate. Under the guidelines, EU companies that import a range of minerals—including those frequently used to produce mobile phones, technological devices, automotive products, jewelry, and medical devices—will be required to conduct supply chain due diligence to disclose if those minerals originate (even potentially) from conflict-affected and high-risk areas.[7] As EU-based companies work to comply with these rules, they will unquestionably expect their suppliers to provide them with a wider range of disclosures as well.

The difficulty here is that many of the reporting obligations mining companies currently adhere to are reviewed at the corporate level, rather than at the asset level. While some emerging reporting frameworks, such as those outlined by the Initiative for Responsible Mining Assurance (IRMA), take an asset-based approach, that lens is not yet the norm.

Many of the reporting obligations mining companies currently adhere to are reviewed at the corporate level, rather than at the asset level.

"It is these types of risks that proper governance is meant to stem," says Kevin Xu, Mining & Metals leader, Deloitte China. "Ultimately, management and the board must have a sufficient line of sight to the operational level, even at mines that operate in a decentralized fashion."

The impetus to adopt strong governance processes is growing stronger, particularly as more and more investment funds mandate adherence to ESG principles. By 2025, more than 57% of European investment funds are expected to track ESG performance.[8] In light of this imperative, companies that improve performance in this area stand to gain not only a competitive advantage but also an enhanced ability to potentially attract investment capital.

A look inside

While issues related to human rights, corruption, bribery, and provenance play out at a macro level across the mining sector, companies should ensure that their focus extends to the enterprise level as well.

For instance, while digitization and automation have opened up significant productivity possibilities for mining companies, they can also put companies at greater risk of cyberattacks and privacy breaches. The proliferation of social media also increases the potential for reputational damage. Within this shifting risk landscape, companies may need to modify their control frameworks to identify and manage the emerging risks associated with automation. On the plus side, those with strong governance controls and systems could more effectively navigate mounting levels of global uncertainty and volatility.

Culture, conduct, and reputation play a role in this as well. Any mistakes related to the deployment of new technologies could lead to operational, financial, technological, cyber, data privacy, regulatory, legal, sustainability, or third-party risks—resulting in reputational damage, particularly if management's response is perceived to be inadequate. This is no small matter for mining companies that are already frequently depicted negatively.

Reputational missteps are not confined to digitization and automation. When it comes to the image of mining, leading companies have recognized that they must walk the talk if they hope to rebuild and retain trust with employees, investors, communities, governments, and the public.

Similarly, as issues around employee health and safety, personal data privacy, and community impacts come into sharp relief, they will increasingly need to be integrated into corporate governance strategies rather than being relegated to a corporate social responsibility (CSR) function.

"The more rapidly the world alters, the more important it becomes for companies to adapt their behaviors. Many mining companies that have demonstrated a clear commitment to environmental and social performance are already seeing payoffs from these initiatives. The time has clearly come to add governance to that mix," Patricia Muricy adds.

So what will investors be looking for in future? Put simply, governance and control systems that can navigate this new uncertain landscape. Companies that get this right could be able to enhance not only operational stability and reliability, but also their brand reputation, through being able to focus on their positive actions rather than defending missteps.

"For a long time competitive advantage in mining has been about being the lowest cost producer," says Roman Webber, Mining & Metals leader, Deloitte UK. "But as global uncertainty rises and accountability expectations change, companies should think about how to use governance as a source of competitive advantage."

From good to great governance

- **Strengthen board composition.** As new, emerging, and unexpected risks continue to impact operational realities, boards should become more agile and responsive. In addition to bringing professional capital to the table—including functional and technical skills, sector experience, and governance knowledge—board members should also bring social capital (e.g., professional connections, relationships, and networking skills) and behavioral capital (e.g., diversity, emotional intelligence, listening skills) into the mix. This can be particularly vital in the mining industry related to workforce diversity and inclusion. As a Deloitte Insights publication recently noted, "By setting an example of inclusion in the boardroom, by advocating for an inclusive culture both internally and externally, and by holding management accountable for taking concrete measures to embed a culture of inclusion throughout the enterprise, boards can move a needle that's been advancing far too slowly for far too long."[9]
- **Assess third-party risks.** Rising regulatory expectations that hold companies responsible for the behavior of their external contractors heightens the need to conduct due diligence across the supply chain. Although onsite inspections and audits have become difficult while COVID-19 persists, businesses can use data-driven assessments to more closely monitor supplier risks. This could include assessing human rights, corruption, and/or bribery-related risks across a business's operations and its supply chain. It can also include developing policies and program governance around the conflict minerals supply chain. Either way, it remains important to develop and implement in-house policies and procedures, as well as training and support programs, to ensure compliance and proactive issue management.
- **Modify the risk framework as needed.** A company's risk management framework should be flexible enough to accommodate new and emerging risks (such as digital disruption, cognitive technology deployment, or even COVID-19) without a major overhaul. If a strong framework and infrastructure have been established, risk oversight becomes largely a matter of understanding the risks, knowing who is accountable for managing them, and confirming that they are measured, monitored, and addressed. Given the challenge of quantifying them, it would be easy to omit risks and initiatives from statements of risk appetite, risk profile, and risk tolerances. The board should see that management addresses these matters explicitly, taking a top-down approach that provides a broader perspective of risks across the organization and breaks down siloed thinking. If the risk governance framework and infrastructure are not flexible enough to accommodate these risks, then a broader review and an overhaul or expansion may be needed.[10]
- **Be aware of reputation risks.** Risks to brand and reputation, and thus to revenue and shareholder value, are of particular concern to boards. These risks can emanate from seemingly small decisions and can be difficult to measure and track in terms of likelihood and impact. Candid discussions of what can go wrong and of all the steps taken to monitor and respond to these risk events are strongly recommended.

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TREND 6

Creating an agile supply chain

OVERCOMING THE VULNERABILITIES EXPOSED BY GLOBAL SHOCKS

Chris Coldrick, partner, Consulting, Deloitte Australia
Rhyno Jacobs, director, Consulting, Deloitte Africa

MINING COMPANIES HAVE long understood the imperative of devising a global supply chain to help them manage costs and enhance efficiency. It took COVID-19, however, to put supply chain risk squarely in the spotlight. As companies look toward the future and beyond the pandemic, it is becoming clear that they will increasingly need to take steps to uncover and mitigate supply chain risks by illuminating their extended supply network, creating alternate supply lines, and reevaluating their inventory strategies. Reducing supply chain risk is key to creating more predictable operations and building trust with investors.

Mining companies have long recognized the inherent value located within the supply chain, though not many can definitively claim to have extracted this value through strategic sourcing or supplier rationalization. Opportunities continue to exist across inbound supply and integrated planning, with upward of 6–12% of a mining organization's operating costs encapsulated within the supply chain.[1] However, the focus on the supply chain has begun to shift from a cost and efficiency perspective to one of risk and whether supply chains as they are configured today could pose a risk to continuous operations.

With sophisticated global supply chain networks, mining companies are closely aware of their reliance on third parties in widely spread jurisdictions; however, COVID-19 truly exposed the vulnerabilities of this interdependence. As a result, mining companies are now being forced to reassess the resilience of their organization and global supply chain models. This is particularly evident within inbound supply, which holds significant risk, quite often outside the visibility and/or control of the mining organization.

Inbound supply chains could be used as a cost reduction lever as the results of optimization programs are directly tied to earnings before interest, taxes, depreciation, and amortization (EBITDA) improvements. This movement toward the lowest total cost of ownership has placed pressure on suppliers and built risk at multiple levels within the extended network. This risk has been exposed with the impacts of COVID-19 on global supply chain networks and has forced mining companies to adapt quickly, sometimes unwinding decisions made over the last two to three years.

While many mining companies have taken steps to mitigate risks in their supply chain, for most, the true nature of the risks still remains unknown. The rate of response and priorities have varied; however, there is still a need for companies to assess and manage the risk by illuminating the extended inbound supply network and actively managing it through a so-called control tower view: a central hub with the required technology, organization, and processes to capture and use transportation data to provide enhanced visibility.[2] Balancing the inherent risk with continued cost focus will likely be key. Risk mitigation strategies should then follow suit, including establishing alternative supply sources—with an emphasis on building a sustainable local supply base—and reevaluating inventory strategies to have greater control over access to critical spares.

Illuminating the extended supply network

The lack of visibility for some mining organizations to accurately trace their supply chain beyond their tier-one suppliers, heightened the risk of supply shortages and disruptions as COVID-19 spread across the globe.

Part of the challenge is that extended supply chains are unavoidably global. Even mining companies that believed they were predominantly sourcing through local suppliers quickly learned that the many raw materials originate in foreign countries and are distributed through local agents.

Approximately 25% of the supply side disruptions occur at tier two plus, which makes it critical to understand and illuminate risks well in advance, providing enough decision-making space for mitigation actions.[3] Greater visibility into the extended inbound supply network allows for the identification of risks that are critical to cost, schedule, performance, security, and resilience. Supply chain illumination will remain critical, as visibility into only tier-one suppliers will likely be insufficient for most companies that are looking to manage supply disruption risks.

"As the supply of materials began to falter, companies found themselves asking difficult questions," says Rhyno Jacobs, director, Consulting, Deloitte Africa. "Do you need a sovereign source for certain supplies? If so, which supplies? And what is a 'sovereign source'? How do you get sovereignty when your orders account for only a small component of global demand? Does a fully local supply chain count as security? What happens if that supply chain is confined to an at-risk source? What does good hedging really look like?"

In answering these questions, many companies have realized that they have not built sufficient redundancy into their supply chains; meaning, even when they have multiple suppliers, inventory still comes from one source. It doesn't help that the suppliers themselves often lack an understanding of how supply interruptions may affect their own operations. Even if a supplier believes it has not been adversely impacted, mining companies likely need independent confirmation.

CASE STUDY

One mining company recently shifted focus toward illuminating their supply base. This includes tracing the inbound supply chain back to the raw materials and then utilizing a control tower to integrate their supply management, logistics, and demand management.

By doing so, the organization is better able to understand the specific risk lens they need to apply to their supply lines—financial, geopolitical, operational—and proactively monitor red flags as they arise in real time.

While COVID-19 helped highlight the vulnerability, the actions taken have provided a key input to their risk mitigation strategy for future supply chain disruption.

This illumination and subsequent control tower view allows for mitigation strategies to be put in place across supply network risk, production planning, logistics, and quality. It can drive data visibility, proactive alerts, prescriptive insights, and self-driving execution to improve overall resilience and allow organizations to make the shift from responding to the pandemic to thriving in the future.

Mitigating the risks

Several mining organizations have acted swiftly to mitigate inbound supply risks. Two major areas include the move to create alternate supply lines and reevaluating inventory strategies.

- **Creating alternate—and sometimes local—supply lines.** To mitigate risks with security of supply, many mining organizations have assessed or implemented an action plan that creates an alternative supplier for key categories. Some have moved toward a more sustainable and local supply base.

  But the answer isn't necessarily local; this requires evaluation. Suppliers with more complex, far-reaching supply chains may be able to provide better value and cost while local or regional firms may be able to guarantee security of supply. Understanding the risk adjusted trade-offs as well as community obligations to create local content requires a careful data-driven decision-making process.

  A resilient supply chain may require temporary or permanent alternate supply sources for materials. This approach reduces the number of choke points that could develop by working around congested ports of entry, mitigating shortages due to supply rationing and insurance against the collapse of suppliers. It is important to realize that even as regions emerge from the pandemic, supplier workforces could be forced to reduce operations or fully quarantine should the virus reemerge in specific towns or workplaces. Suppliers that are likely to become more permanent members of the supply network should review the tax, customs, and duty considerations.

- **Reevaluating inventory strategies.** Another approach to mitigating risk is to adjust the inventory strategy of an organization or specific region or mine site. Mining companies at all levels should reevaluate their strategy.

  Central to this is striking the appropriate balance between reducing supply risk and improving the working capital position.

  The approach to inventory has taken a more practical slant and can differ by region. Additionally, mining organizations are focused on the risk profile of specific categories, sometimes down to individual critical spares themselves. Responses have included redefining parts that are considered critical spares and stocking up and reassessment toward consignment or vendor-managed inventory models.

Several mining organizations have acted swiftly to mitigate inbound supply risks. Two major areas include the move to create alternate supply lines and reevaluating inventory strategies.

These more specific, regionalized, and practical approaches to inventory can be required to counter the vulnerabilities exposed by the pandemic.

Although there are no hard and fast answers to any of these challenges, one thing is clear: COVID-19 may be the black swan event that finally forces many companies, and even entire industries possibly, to rethink and transform their global supply chain model.

Transforming the global supply chain

- **Get granular.** Companies that gain an accurate, granular understanding of their integrated supply chains—from demand through to the production of individual component parts—could be better placed to make proactive adjustments before supply issues occur and to make informed choices about where to apply their working capital to get the greatest impact.
- **Illuminate the extended supply network.** Mining companies should gain as much visibility as possible into the status of their tier-two suppliers—and beyond—so they have time to work with tier-one suppliers on alternative plans and/or to proactively mitigate supply-side constraints. Companies with complex supply chains will likely benefit from digital approaches to facilitate the analysis of their supplier networks and identify risks and opportunities. Augmented intelligence and machine learning, for instance, can enable rapid modeling of complex supplier networks and deliver multitier insights.
- **Source strategically.** While working with multiple suppliers can help hedge risk, too many suppliers can make it harder to access key materials. By simplifying their supplier portfolio, mining companies can reduce the variability of their inventory.
- **Refine production schedules.** Variable supply and ongoing supply disruptions mean companies should align their production schedules to inventory availability to avoid the risk of stock-outs. Traditional planning and scheduling processes and frozen periods to allow efficient production execution are unlikely to work well in this environment. Instead, companies should engage in shorter-cycle planning to identify emerging risks and respond proactively.
- **Stock up.** Stocking excess inventory may seem like a logical solution to potential supply disruptions, but it raises strategic questions. Who should bear the cost of storing additional inventory—the mining company or the supplier? To keep costs off their balance sheets, companies should be selective about their inventory investments. To prevent over-stocking, it may make sense to use predictive technologies to forecast demand patterns so as to plan purchases more strategically.
- **Renegotiate.** While the costs of raw materials, such as fuel and electricity, are dropping in response to market forces, the same is not true for industrial products, such as fixed plant, equipment, labor, and materials. To keep expenses under control, it's incumbent on mining companies to actively renegotiate their contracts to reset prices where possible.
- **Anticipate bankruptcies.** Sadly, not all companies will successfully navigate this crisis. As the business environment rebounds, some direct customers and suppliers may no longer be available. Proactively assessing customer and supplier financial health—both independently and through regular dialogue—can help identify challenges and potential solvency risks within the supply network.
- **Safeguard the logistics supply chain.** Develop operational scaling plans for a staged return to work by identifying "must have" services and roles, and devising both temporary and permanent succession plans. Consider staggering return dates based on prioritization, adjusting shift schedules and/or working hours to meet evolving operational needs. Adjust or establish approaches to workforce forecasting, in collaboration with unions where applicable, that use strategic scenario planning, to account for both real-time and anticipated future changes to workforce requirements.

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TREND 7

The path towards integrated operations

POSITIONING MINERS TO PIVOT IN THE FACE OF CHANGE

Dominic Collins, partner, Consulting, Deloitte Chile

Eamonn Treacy, director, Consulting, Deloitte Canada

THE RAPID PACE of technological advancement in the mining industry over the past decade has provided a significant increase in the amount of information available to support decision-making. This trend is expected to accelerate over time. To capitalize, more and more companies are driving toward integrated operations, but few have an aligned view of what they are or how to go about creating them. Why is this important? It not only facilitates a cost advantage, but also drives more predictable outcomes, which creates long-term trust with key stakeholders.

Digital initiatives and investments in automation have not yielded consistent results across the board. While some companies have realized widespread progress, others have experienced only incremental change. These variable results have raised the question of how to improve outcomes. On examination, it is becoming clear that before businesses can better respond to external events and internal variabilities, they will likely need to improve integration across all their functions by ensuring that people throughout the organization are empowered to make the best decisions for the organization as a whole.

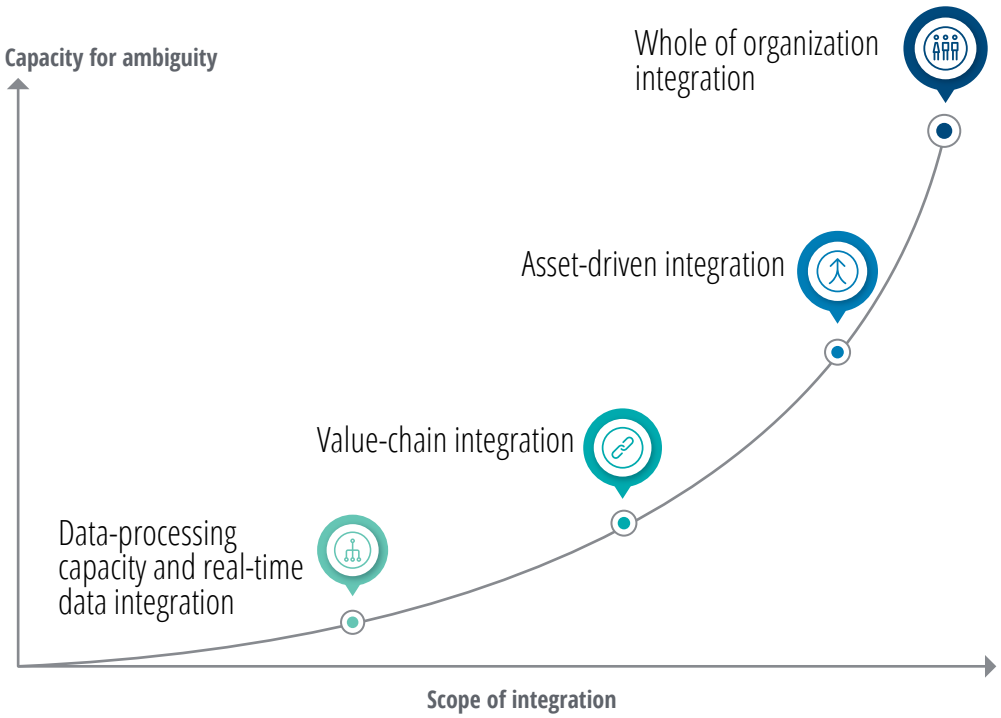
Companies are heading down this path for a range of reasons. Some have recognized the inherent inefficiency embedded within the organization and see this as an opportunity to effect a step change in performance in the future. Deloitte worked with one organization that transitioned to this operating model, which saw unit cost reductions in excess of 25% and improved productivity by more than 10% with almost no capital investment.

According to Deloitte's internal research, the foundation of integrated operations thinking was built about 60 years ago, but the mining industry only began pursuing these concepts in the past decade. That means most organizations are still involved in early-stage efforts, with integrated operations focused on optimizing the productive value chain. The focus here is on enhancing decision-making by enabling people across the organization to determine the optimal decisions related to production execution or adjacent to production execution. As customer pressures increase, deposits become more challenging, operations become more dispersed, and market behaviors remain highly variable. However, some organizations are now increasing their scope of integration to improve their ability to manage this growing complexity and ambiguity.

This has seen some companies shifting their focus from integrating across the value stream to integrating across the asset. This is achieved either by operating a group of assets as a single collective asset or by focusing on the requirement for every team and employee to drive the collective aim of the asset. Some organizations on the leading edge of this thinking are casting the net even wider, redefining their value chain as their operating ecosystem—including communities, legislators, third-party providers, and customers. These organizations are actively looking to develop an organization that leverages every part of this ecosystem to respond more effectively and rapidly to internal and external events. This evolutionary perspective is outlined in figure 1.

FIGURE 1

Evolutionary development of integrated operations



Source: Deloitte analysis.

Integrating the asset and the organization

As seen in Deloitte's Intelligent Mining vision (figure 2), this may result in accelerated technology investment in three domains: intelligent operations to improve the operational process through automation and digitization; nerve centers to bring data together from across the value chain; and intelligent enterprise to refine specific support processes.

Integrated operations provide a single source of truth built on real-time tracking of information. This positions companies to deliver step-change improvements in decision-making through advanced analytics, enable remote management of resources where feasible, and streamline workforce allocation and utilization.

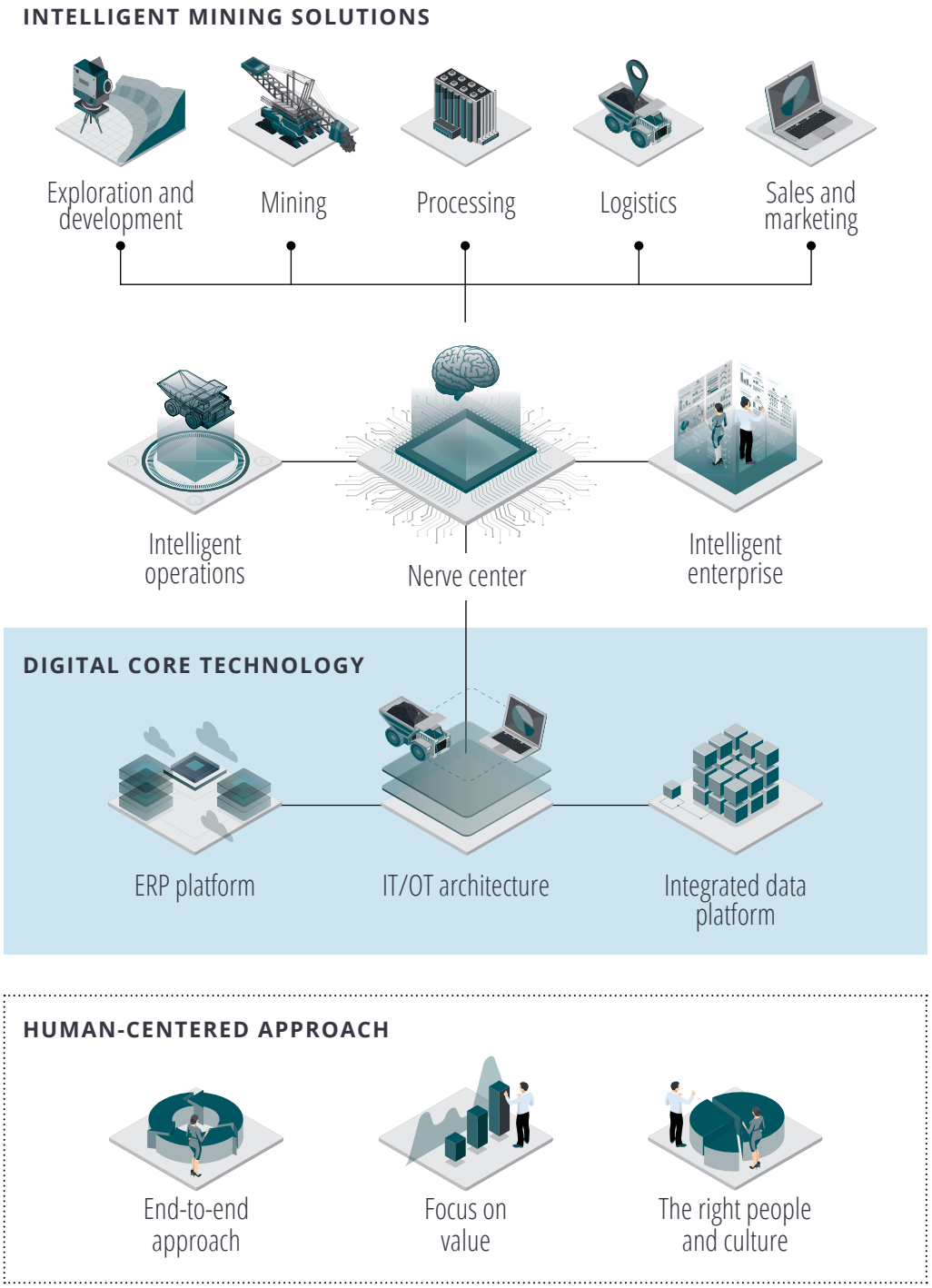
Ultimately, the aim is to optimize the entire asset value chain, asset, or ecosystem, rather than improving the outputs of individual isolated functions. This isn't merely a technology investment, however. Although centralization—such as the deployment of remote or centralized operations centers—is often part of the solution, that isn't always the case. Likewise, merely focusing on deploying a center, or attempting to replicate what other organizations have done, could yield few, if any, benefits. Ultimately, this change typically requires the adoption of an operating model that culturally embeds a coordinated and holistic approach to decision-making.

Successfully delivering these results will likely require a focus on the four key pillars that drive sustainable change: technology, process, workplace design, and people and culture.

FIGURE 2

Deloitte Intelligent Mining

The intelligent mine is connected and integrated, automated but human-centered



Source: Deloitte analysis.

PILLAR 1: TECHNOLOGY

As part of the digital journey toward organizational integration, companies need to understand the effort required to clean up their data, upgrade their technology infrastructure, and integrate data across the value chain. This includes consideration of their information technology or operational technology (IT/OT) and network requirements, as well as their advanced analytics capabilities.

"The main focus is on maintaining sufficient knowledge so the entire operation not only understands current constraints, but has the information required to resolve those issues and prioritize their actions," explains Dominic Collins, partner, Consulting, Deloitte Chile. "This type of situational awareness is necessary for the operation to act as one and consistently make the most valuable decisions for the operation as a whole."

"Situational awareness" is the ability to perceive the state and status of people, assets, and processes in real time so that companies can comprehend and project impacts across the entire value chain and create value through targeted interventions that optimize outcomes. This generally starts by improving perception by providing up-to-the-minute awareness of personnel movement, fixed and mobile equipment operation, and system health to help operators understand the impact of the current situation on the larger value chain. From there, companies can enhance their understanding by enabling personnel to deep dive into problem areas to solve deviations from the plan. At the highest level of maturity, situational awareness also permits projection, where advanced analytics allows data to be extrapolated forward to determine how future states of the operational environment will be affected.

As a deeper understanding of the system is developed, organizations can gain significantly more clarity on points of tension, missed decisions, and where standardized decisions can be better leveraged. This enables the development of operationally informed and relevant robotic and digital process automation transformation. Organizations have used this approach to realize the biggest "bang for their buck" by delivering a significant return on investment.

PILLAR 2: PROCESS

Process is about creating workflows that link defined value cases to specific roles and activities. The idea is to "wire" the organization to directly target its biggest risks and priorities, as determined by analysis.

"This step is about developing an appropriate operations strategy supported by effective operating models," says Eamonn Treacy, director, Consulting, Deloitte Canada. "The aim is to integrate operations and governance by bringing planning and execution together in a closed loop system."

To do so, mining companies should develop effective rhythms and routines, procedures and standards, and process KPIs and performance targets:

- Rhythms and routines are used to track performance and direct accountability to the right teams. For example, companies might implement targeted meetings between relevant

As part of the digital journey toward organizational integration, companies need to understand the effort required to clean up their data, upgrade their technology infrastructure, and integrate data across the value chain.

roles to discuss issues and recognize successes; develop handover routines to establish a culture of performance and accountability; conduct operational reviews to track performance against KPIs; and/or hold analysis and improvement meetings to generate ideas and respond to feedback.

- When it comes to procedures and standards, certain changes may be required to support integrated operations. This may include updating existing operational procedures and workforce instructions, as well as developing training packages for new and modified roles.

- For its part, the KPI framework ensures that KPIs are wired down to the role level. Rather than adopting traditional KPIs that focus on individual performance drivers, the aim is to identify those that measure systemwide performance. This encourages people to make decisions that drive the greatest overall value rather than acting in silos.

This approach to process encourages continuous improvement by soliciting ideas from many people and prioritizing those that require action. Designed effectively, this should enable active follow-up and communication. To embed new practices into day-to-day operations, people should also receive continuous training about the organization's main value drivers, the appropriate tools for problem-solving, how to manage bottlenecks, and systems for rapid improvement.

PILLAR 3: WORKPLACE DESIGN

Workplace design considers where the work should be executed by looking at things such as facility location and design, workplace design, floor design, and ergonomics.

"The mining industry has a bigger opportunity than most to tailor and redesign their workplaces so that technology and organizational change can empower the future organization, rather than restricting it," says Steven Walsh, partner, Consulting, Deloitte Australia. "For large parts of a mining organization, there is significant and increasing flexibility in where, when, and how their work gets done, if we challenge how humans can interact with technology and each other."

Workplace design considers where the work should be executed by looking at things such as facility location and design, workplace design, floor design, and ergonomics.

In purposefully designing their integrated operating centers, mining companies should consider ways to encourage multidisciplinary collaboration. An open plan design, for instance, enables ad hoc interactions and can maximize the use of technology by giving teams access to the tools they need to effectively execute their work. Similarly, flexible workspaces, such as breakout rooms and quiet zones, can accommodate different work styles. However, it's important to remember that the workplace extends to the physical site, and recent advances in wearable devices, as well as the presence of ubiquitous connectivity throughout the field, are enabling organizations to seamlessly integrate workers with one another.

At the end of the day, the objective is to design workplaces that foster interaction, communication, and knowledge-sharing between individuals and across functions.

PILLAR 4: PEOPLE AND CULTURE

Even when organizations get their technology, processes, and workplace design right, their integrated operations initiatives can fail if they do not adopt an appropriate leadership and team culture. This generally means giving due consideration to issues such as decision rights, escalation protocols, and role accountabilities.

Consider decision rights, for example. To ensure people are responsible, accountable, supported, consulted, and informed (RASCI), some processes may have to change as network connectivity becomes ubiquitous across the mine. Perhaps mining companies will need to provide supervisors with access to information in the field and empower them to respond to deviations from plan without returning to the office. Or maybe they'll need to give workers down the line the authority to use this information to make operational decisions.

"The bottom line is that it's not enough to simply provide people with greater access to information," notes Pieter Lottering, director, Integrated Operations, Deloitte Australia. "Mining companies must also help their people understand how they're expected to use that information."

Laying the foundation for integrated operations

- **Understand the context of your value chain.** Spend time defining your end-to-end value chain. Although organizations often have clarity on their value chain from a production perspective, the reality is that "value" can be created or destroyed within a longer time horizon—for example, at mid-term planning—or throughout the ecosystem, such as with sales and marketing or third-party vendors. How would you think about your value chain differently given this context?
- **Understand your critical interfaces.** Once your value chain is defined, determine which parts of the chain provide the most opportunity, or potential loss, when variability events occur. Consider a risk-driven approach to this information and drive clarity on how the organization needs to collectively respond to these challenges. Although "net new" variability events occur from time to time, you can preplan collective responses to about 80% of events.
- **Determine what technology you really need.** Recognizing that the ability of the organization to respond is limited by its collective understanding of the current situation, what is the right technology investment required to provide this clarity? Taking an approach that considers the specific organizational outcomes before focusing on technology can be critical to controlling technology spend and delivering the targeted outcomes.
- **Think about a balanced approach to deploying the change.** Different groups in an organization are more ready than others to embrace change, and not all of the change needs to be deployed immediately. Think about three factors in determining how to get the ball rolling and establishing a reputation for success: 1. How much value might be realized from deploying a specific change? 2. How complex is the change from a process and technology perspective? 3. How culturally ready are the impacted teams and groups to effectively implement the change?
- **Be prepared to change the conversation on what success means.** What you're really asking teams to do is recognize that although functional excellence is critical to your organization's success, it must come from a perspective of consistently making the best, highest-value decision for the organization as a whole. How do you need to change the conversation on identifying and celebrating your successes to demonstrate that the organization is "walking its talk" on integration?

TREND 8

Advancing the future of work

REDEFINING LEADERSHIP AND ADAPTING THE WORKPLACE CULTURE

Janine Nel, partner, Consulting, Deloitte Canada
Eamonn Treacy, director, Consulting, Deloitte Canada

WHILE MINING COMPANIES have been considering for several years how digital transformation might alter the future of work, COVID-19 has accelerated this imperative. Many companies are taking this opportunity to review work routines, evaluate remote work, and even outsource key areas. However, to truly enable the future of work and build trust with their talent, organizations should focus on the role of leadership and culture in the new environment.

While the conversation around digital transformation and the future of work has been continuing for some time, COVID-19 has caused a significant change in how many organizations approach and manage their operations. This has created an opportunity for miners to streamline the adoption of digital technologies and capabilities in line with the significant increase in remote working. There is a window of opportunity to accelerate digital transformation and advance the future of work. Never before have technologies and new ways of work been adopted as quickly. As we transition through the current crisis and move from responding to recovering and ultimately thriving in the "new normal," mining leaders have an opportunity to avoid falling back into conventional ways of working. Instead, they can chart a new path and embed recent changes sustainably by re-architecting work, adapting the mining workplace culture, and creating elevated workforce experiences.

Charting this new path and embedding change sustainably requires mining leaders to craft the business models of tomorrow, challenge their conventional definition of productivity, embed a culture of trust, replace command-and-control management with empowered collaboration, and manage the cultural and engagement issues associated with long-term remote working.

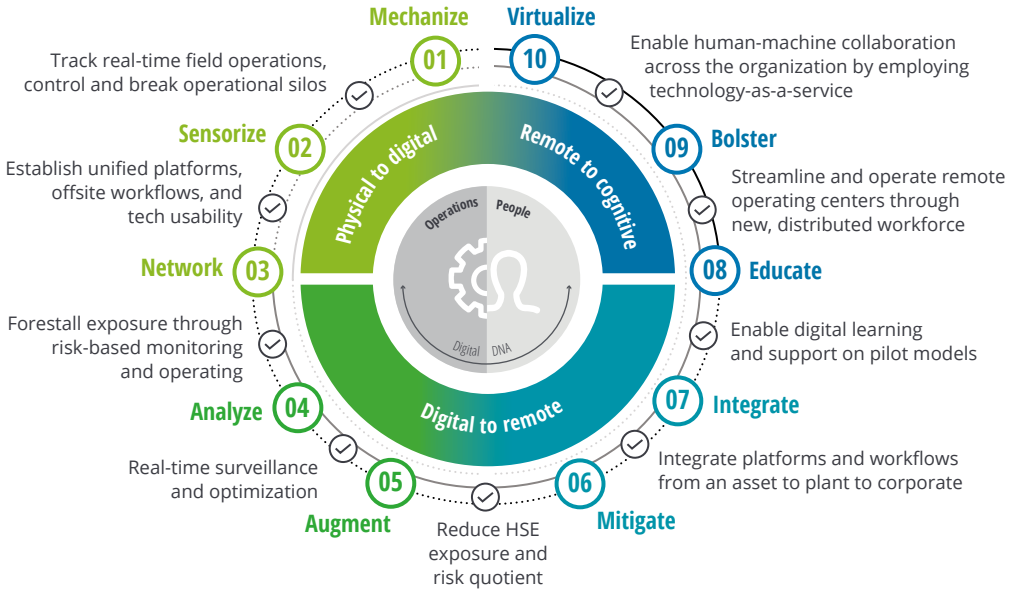
There is a window of opportunity to accelerate digital transformation and advance the future of work.

In recent years, mining companies have adopted a growing range of digital solutions. Many have mechanized their operations, moved from the physical to the digital realm by adding equipment sensors, and adopted unified networks to transmit data. Despite this progress, in many ways these steps are only a beginning. The true power of digital transformation lies in a structured road map that extends changes from an individual asset level to the entire organization, to create a platform for innovation and collaboration—ultimately ensuring that digital transformation goes beyond replacing workers and instead augments the workforce and collaborates with it (figure 1).

FIGURE 1

Digital road map powered by human-machine collaboration

Business objective Primary focus Peripheral focus (asset, system, corporate)



Source: Duane Dickson et al., *The future of work in oil, gas, and chemicals*, Deloitte Insights, October 5, 2020.

By bringing together data from on-field physical assets and enabling off-field remote and virtual access, mining companies can improve their abilities to analyze real-time information; augment their digital capacities; and create platforms to integrate their data, analytics, and workflows.

In recent years, mining companies have adopted a growing range of digital solutions.

Enhanced digitization and remote support of work activities offer an opportunity to take a more integrated view of assets, business units, and the organization as a whole. For the first time, many organizations have the breadth and depth of visibility into their operations needed to focus on driving system-level thinking and performance. Doing this, however, often requires not only technology but also a change of leadership style and the creation of a supporting culture.

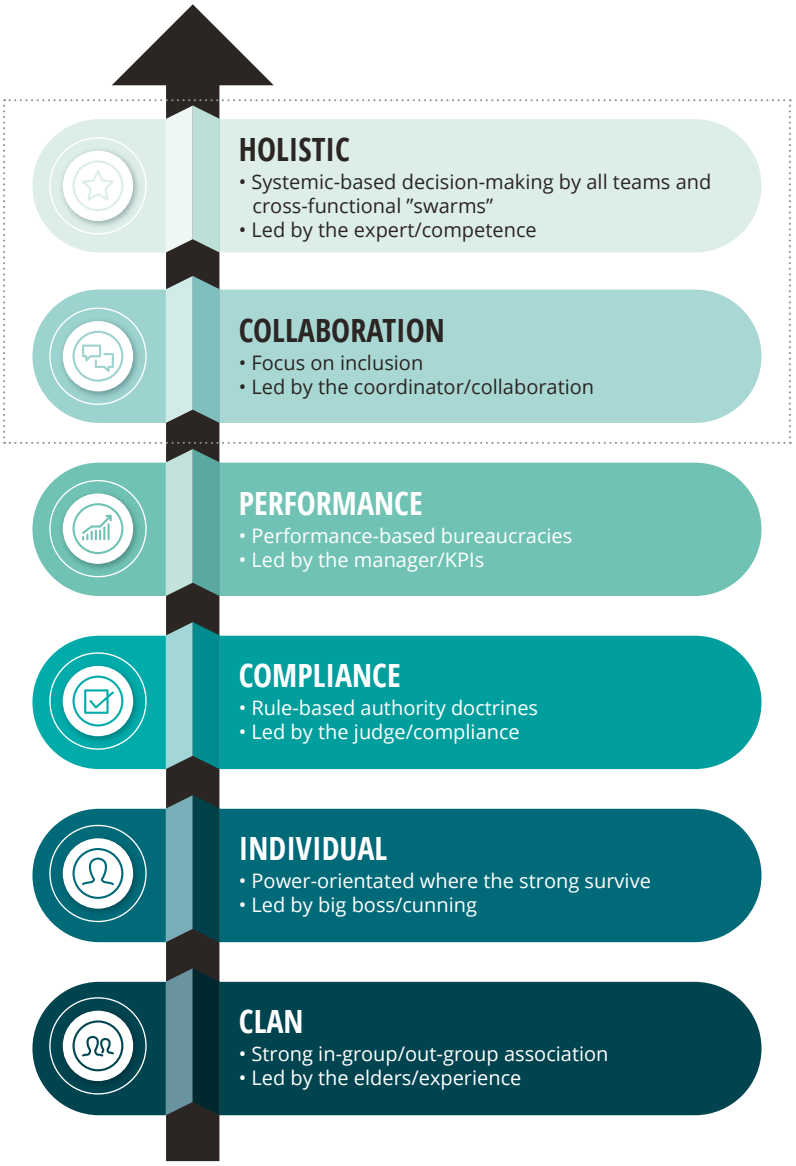
Enabling transformation through leadership and culture

To transition to a more integrated way of working, leadership should drive the evolution of the organization's value system from being primarily compliance- and performance-based to encompass collaborative and systems-driven capabilities. This can be a critical challenge as research demonstrates that only about 10% of people automatically work in this way. Leaders should create an environment in which their teams can think differently about the work they do while still ensuring that the focus on performance and compliance doesn't waver (figure 2).

FIGURE 2

Evolutionary value system

Leaders should support holistic and collaborative values



Source: Clare W. Graves, "Levels of existence: An open system theory of values," *Journal of Humanistic Psychology* 10, no. 2 (1970): pp. 131–55.

Being able to tackle the more ambiguous and complex opportunities associated with adopting collaborative and holistic value systems also typically requires a change in leadership approach. Although providing positive support to the team will always remain a key part of effective leadership behavior, enabling integrated problem-solving requires additional leadership capabilities. In the wake of COVID-19, the need for resilient digital leadership has possibly never been more relevant. Digital leadership can be described as providing vision and purpose, creating conditions to experiment, empowering people to think differently, getting people to collaborate across boundaries, and creating a culture of distributed leadership.[1] Resilient leadership can be described as designing for the heart and the head, putting the mission first, aiming for speed over elegance,

owning the narrative, and embracing the long view.[2] Resilient digital leadership for mining executives generally involves:

- A strong sense of self-awareness, increasing leaders' ability to identify their own biases and limitations (including the unconscious bias for conventional, tried-and-tested ways of working).
- The ability to take a balanced view, relying on data.
- A human-centric, outcomes-based approach to mining (e.g., designing mining organizations, processes, shifts, and teams with the outcome in mind but from a human-centered, meaningful, and safety-first perspective).
- Transparency in relationships within the organization.
- A strong moral perspective that allows the team to trust that the leader is consistently focused on making the best decision for the team and the system as a whole.
- Actively creating a culture of distributed leadership by pushing decision-making to lower levels through integrated data analytics.
- Leading the way in creating elevated and curated experiences for the full workforce ecosystem (e.g., from corporate functions to core operations, from full-time permanent staff to contract workers).
- An inclusive leadership approach characterized by the traits of cognizance, commitment, curiosity, cultural intelligence, collaboration, and courage, which allows leaders to have inclusive mindsets, habits, and experiences in the workplace that drive employee diversity and authenticity for the organization as a whole.

However, leadership is only part of the solution. Culture should be seen as a continuing process of acting on ideas that helps teams try and fail and, most importantly, learn to be flexible in an increasingly complex networked environment. Adapting the workplace culture requires leaders to understand and optimize the environment in which work gets done, maximizing workers' potential and focusing on inspiring rather than controlling them. As mining organizations grapple with the need to reconfigure the way work is done, it can become increasingly difficult to integrate old ways of working with the new. With a shift toward cross-functional, networked teams, organizations have to operate as they do currently and start to work in new ways, to innovate into the future. Sustaining cultural connectivity often becomes increasingly complex in this bimodal state where new ways of operating (concurrently driving productivity and optimizing cost) call for a move from reactive crisis management to proactive problem-solving and human-centered, as opposed to production-driven, mining.

To foster, develop, and sustain the right organizational culture, mining companies should:

- Establish resilient, digital leadership that leverages technology to curate experiences to elevate and better engage the workforce.
- Lead with courage and decisiveness, prioritizing speed over elegance in a rapidly evolving world of work.
- Champion a culture of innovation for sustainable mining.
- Diversify their talent-sourcing methods, thereby diversifying the potential pool of talent as well as the hiring pipeline.
- Increase women and minority representation across functions and in corporate offices, while extending opportunities for support and mentoring.
- Challenge entrenched organizational attitudes, practices, and systemic processes, such as clock watching and viewing flexible work as a "perk," etc.

- Cultivate a relationship of trust, respect, and open communication, and ensure there are clearly defined deliverables and touchpoints to maintain productivity and morale.

- Challenge entrenched behaviors and talent practices to create an inclusive environment where employees bring their authentic selves to the workplace, to form a higher performing, better engaged, and productive workforce.

- Consider empowering the workforce to have input into re-architecting the work (e.g., how and where work gets done) as well as how to maintain optimal collaboration across physically dispersed teams.

- Proactively leverage evolving collaboration tools and technologies for effective digital workforce engagement, teaming, collaboration, and culture enablement.

As progressive mining companies seek to embrace proactive problem-solving and human-centered mining, many are starting to select candidates who exhibit the behaviors needed to enable this systemic and holistic thinking. This can mean candidates with different skill sets and behaviors to those generally found in the traditional mining environment. These changes include, for example, a respect for competence above experience, which represents a significant change from many conventional operations, where experience is often favored.

With the shift away from experience and toward competence, we see other new beliefs and behaviors, such as the use of factual-based thinking systems, flexible problem-solving skills, and an overarching perspective that starts with "trust" as the default position.

This challenges many of the aspects of conventional thinking, which often focuses on a perspective that "there's only one way to do the job," or that the only way forward is either with 100% consensus or by following the most powerful representative of the group.

"Of course, one of the challenges with targeting for these sorts of cultural outcomes is reaching a broad enough talent pool to give yourself a really good chance to get there," says Janine Nel, partner, Consulting, Deloitte Canada. "People who have grown up in the mining industry are more likely to exhibit the 'conventional' behaviors that they have been trained into."

To combat this, many organizations are now spending their time thinking about the skills required and how they are analogous to those required in other industries. Naturally, for professional roles the options are more limited, but for the majority of front-line workers, there are lots of potential options, especially now that so many of these roles are or can be delivered remotely. For example, many of the key roles and activities in mine dispatch are essentially the same as emergency services dispatch. In the case of one organization, the pay rates were much higher for mining dispatchers. This provided access to a much wider pool of skillful applicants, experienced in shift work, who saw a transition into mining as an opportunity. Taking this alternative approach significantly widened the available applicant pool and improved the culture and professionalism of the dispatch teams. Organizations are increasingly thinking much more broadly and analogously about the skills necessary to deliver the work required by the workforce of the future.

Culture requires continuous development. As miners push the levers for transformation set out above, the leadership and culture dimensions can become fundamental to success. Mining is a talent-starved industry; these shifts in leadership and culture are key to retaining and building trust with the current and future talent that mining companies will rely on.

Re-architect work, redefine leadership, and adapt culture for the future

- **Optimize the opportunity COVID-19 has created to rethink business and operating models.** Rethink the modality of work based on the outcomes to be achieved. Let the work outcomes and modality of work guide decisions relating to operating model design. Embrace the possibility of decentralizing work, letting go of control and challenging the status quo in terms of the mining workplace of the future.
- **Challenge the work outcomes that you seek to achieve.** Move beyond production targets and identify the value generators for the mine (e.g., the type of value the mine needs to deliver to stakeholders, employees, and communities). Identify the work outcomes that will generate the required value, and design the operating model around these outcomes.
- **Assess systems thinking and behaviors in the organization.** Challenge leaders to let go of control and embrace systems thinking, and challenge employees to step up and engage in integrated, data-driven decision-making.
- **Identify "adjacent roles" and consider a recruitment approach to maximize diversity and cultural change.** Focus on the work outcomes, identify the required skills and capabilities to deliver these outcomes, and rethink the composition of roles to deliver on the outcomes—and don't be surprised if these roles do not take the form of traditional mining roles.
- **Conduct an assessment of the value systems exhibited by leaders.** Establish a baseline and develop a plan to actively target the development of collaborative problem-solving approaches for distributed leadership.

ENDNOTES

1. Gerald C. Kane et al., *Coming of age digitally: Learning, leadership, and legacy*, MIT Sloan Management Review and Deloitte Insights, June 2018.

2. Punit Renjen, *The heart of resilient leadership: Responding to COVID-19*, Deloitte Insights, 2020.

TREND 9

On the road to zero harm

CREATING THE NEXT GENERATION OF INTEGRATED PREDICTIVE SAFETY SYSTEMS

Gerhard Prinsloo, partner, Consulting, Deloitte Canada
Shak Parran, partner, Consulting, Deloitte Canada

COVID-19 HAS PUT safety in the spotlight for everyone, driving heightened awareness of our actions and movements as we go about our daily lives. While the focus on safety is obviously not new for the mining industry, conditions are now in place to move the dial toward a goal of zero harm through the use of predictive analytics and wearables. In doing so, however, companies will likely need to integrate different data pools and systems, while more proactively driving industry collaboration. If this does not happen, we may still be highlighting the potential for improvement a few years from now, without having seen much progress.

While safety has always been central to mining, COVID-19 has highlighted that it is essential to maintaining employee and community trust. As a result, companies are now going beyond putting robust internal controls in place and are investing in intensive training. Many are also taking steps to move workers out of harm's way through the accelerated rollout of automation and robotics solutions.

To move the dial on safety outcomes, however, the industry should embrace a new generation of integrated and predictive systems. The spread of COVID-19 may have smoothed the way for wearables by making people more comfortable with tracking and tracing mechanisms. However, wearables are likely just a first step.

To take this to the next level, mining companies would need to create programs designed to prevent safety incidents before they occur. The ability to pool data to drive increasingly complex analytics now makes it possible to move from historical safety analysis to predictive solutions. The key is to leverage this confluence of issues to usher in a new wave of safety systems that put companies on the path to zero harm. This means harnessing the power of safety analytics in a more integrated way than in the past.

An integrated approach to safety analytics

There is little question that the next generation of advanced analytics and artificial intelligence (AI) has the potential to move significantly toward zero harm. With the right data, analytics can help companies go beyond a simple analysis of past events to identify potential future scenarios that create a higher risk of an incident occurring. These predictive models can help prevent safety incidents before they occur.

One of the sticking points for advanced analytics, however, involves aggregating the right data. Many companies have learned the hard way that simply collecting massive amounts of safety data is insufficient. Most mining companies have in-depth reports tracking the number of worker injuries sustained, the frequency rate of safety incidents, and many other metrics. But this data is all collected after the fact. Companies serious about monitoring conditions to proactively prevent incidents need greater insight into the circumstances and drivers of those incidents.

While this begins with the ability to recognize early warning signs, it does not stop there. "There are numerous stories of companies around the world

that were forewarned of a potential safety hazard but that failed to take appropriate action to prevent it," say Karla Velasquez, Mining & Metals partner, Deloitte Peru. "This underscores the very real need for some companies to improve their internal controls."

To reach zero harm, most companies must consequently go far beyond their current practices. What additional tools and training are needed? Do certain working conditions enhance safety outcomes? Are there particular behaviors companies should encourage or avoid? Insights to consider related to these questions and more can be found in data that already exists (figure 1).

However, many companies struggle to access this level of data. That's partly because it often resides in disconnected systems. "As mining companies move toward integrated nerve centers and begin to build enterprisewide data lakes, they'll be able to harness the data necessary to run advanced predictive models," explains Shak Parran, partner, Consulting, Deloitte Canada.

FIGURE 1

Safety analytics: Data sourcing

Building on the core data contained by health and safety systems, policies, and procedures, safety analytics relies on the integration of disparate data sets to deliver deeper insights.

INTERNAL DATA SOURCES

Existing safety management data and enterprise systems:

- Safety standards, policies, and procedures
- Incident data, safety audits, and field observations
- HR, timekeeping, training, operations, and maintenance data

TELEMATICS AND WEARABLES

Integrated with technology devices that track data and information related to environmental and physical factors of the machine/person and its surroundings:

- Personnel vitals and environmental monitoring
- Geolocation and movement tracking
- Onboard equipment system alerts and condition-based monitoring
- Equipment operations metrics

EXTERNAL DATA SOURCES

Open source and other external data sources broaden the perspective beyond the organization:

- Industry standards, research, and benchmarks
- Weather, demographics, and geospatial data
- Social media

Source: Deloitte analysis.

By allowing companies to combine vast amounts of data, rather than viewing each in isolation, an integrated approach can help them uncover hidden patterns of behavior or conditions that contribute to incidents. At the same time, predictive models can position them to target high-risk operational scenarios and employee groups in order to intervene before these incidents occur.

A key here will be for miners to unify their disparate data sources to provide everyone across the organization with access to consistent, reliable, and always available data. If data ownership remains informal, with undefined accountability and inconsistent data standards, safety analytics simply can't yield the benefits it promises. Real insight hinges on mature data governance, which may see mining companies appointing chief data officers or other executives responsible for establishing data standards across the organization. Turning the potential for a zero-harm future into reality may also require mining companies to look beyond their own internal data sources.

"To successfully predict the risk level of activities, many disparate data sources are required—sometimes even from several companies," Shak Parran adds. "This underscores the need for greater cross-industry collaboration."

CASE STUDY

Uncovering safety insights

A mining company was looking to improve its already strong safety record through the use of data and analytics. To help it prepare for its safety analytics journey, we:

- Assisted with the aggregation of more than 5,000 safety incident reports and all historical human resource (HR), payroll, timekeeping, equipment and maintenance, production, census, geospatial, and climate-related data for a period of five years
- Provided safety insights based on patterns of behavior and trends, as well as insights relating to key safety management questions identified by the company
- Created an interactive dashboard providing the ability to deep dive into the company's safety management and other data
- Uncovered hidden relationships between the company's individual performance incentive program and incident likelihood; the effects of changing production levels; and the impact of age, tenure, and other socio-demographic characteristics of its employee base
- Identified opportunities to improve data quality and enhance the collection and management of safety data

As a result of this engagement, the company was able to execute diagnostics at several of its mine sites and design interventions to facilitate both short-term safety gains and long-term strategic changes. With improved data quality, the company now also generates more accurate insights and has been able to centralize a vast amount of distinct data sources into one common source of truth—positioning it to clearly identify instances where safety initiatives may need to be improved, dynamically select and predict the impact of factors on incident occurrence, and recognize high-risk activities in advance.

The world of wearables

One way in which companies have been looking to collect safety data is through wearable technologies. As the march of technological innovation continues apace, countless wearable devices have been developed to help improve health and safety outcomes. These span a wide range, with an array of hard hats, watches, clothing, eyeglasses, and more, designed to deliver various benefits—from collision avoidance and environmental monitoring to fatigue management and personal injury reduction.

While a strong business case exists for many of these devices, mining companies looking to boost their safety performance frequently run into challenges as they begin to use this technology. The primary issue is again a lack of integration. Rather than providing a view of safety performance in alignment with the shift toward integrated operations throughout the enterprise, these solutions remain disconnected and siloed.

"The main reason these technologies are likely struggling to gain traction is because they each operate as stand-alone solutions," says Gerhard Prinsloo, partner, Consulting, Deloitte Canada. "In some cases, they even compete with one another."

One way in which companies have been looking to collect safety data is through wearable technologies.

The inability to link disparate safety systems together can limit the utility of each individual device and result in cost escalation as new wearables are added to the mix. Additionally, without one integrated solution, workers might end up outfitted in a number of stand-alone devices.

Most critically, however, a lack of integration can prevent companies from using these devices to achieve their strategic health and safety objectives. It's one thing to use a point solution for a narrow application, such as radio frequency identification (RFID) tags to track people's movement through the site to optimize workforce mobilization. It's another thing entirely to extend that solution into an operating environment. That's especially true when not all technologies can be used in high-risk zones and where there is no open platform that enables enterprisewide analytics.

Lack of interoperability is only one of the issues companies face as they look at implementing wearable solutions. Other concerns involve:

- Donning gear—Basic personal protective equipment (PPE) is routine for most, but additional devices can be unintentionally (or intentionally) omitted or delay workers readying for their shift.
- Catch hazards—Intrusive or bulky devices can hinder work functions, causing frustration or even injuries.
- Harsh working environments—Devices that lack the ruggedness to endure the work environment can become ineffective.
- Connectivity—Unless the device uses lower frequencies, such as those used for site radio systems, real-time feedback and communication is limited, resulting in information lags.
- Infrastructure—Many devices, such as location services, require the underground mine to be equipped with costly infrastructure that can be difficult to install.
- Data collection and storage—In the absence of integration with management systems, the data

collected from devices often requires manual input before it can be analyzed. At the same time, devices recording data need adequate storage capability.

- Privacy—To protect worker privacy and gain buy-in, companies need to consider how to manage personal data collected from devices.

"To break this deadlock, it's important to bring technology developers together in an experimental culture to encourage the sharing of intellectual property," says Rakesh Surana, Mining & Metals leader, Deloitte India. "The ultimate aim should be the development of an integrated solution that can aggregate safety data collected from wearables into a single dashboard with the ability to drill down to a single individual."

There is also a role for the wider industry to play by coming together and driving collaboration in some key areas. For example, industry associations continue to work on defining common standards of interoperability for these wearable devices. Furthermore, there may be an opportunity for the industry to more systematically pool safety and related data to understand trends and aid the development of more systematic and predictive insights.

The solution may be closer than we think. In many ways, COVID-19 has made data sharing more feasible. If mining companies can now work together to share data, we could be on the verge of building truly predictive safety models, designing a fully integrated wearable solution, and laying the foundation for the next generation of predictive safety systems.

Improving safety outcomes

- **Expand your horizons.** To stay informed about the safety practices in your work environment, consider implementing a camera-based solution that leverages AI on the edge of your network to anonymously monitor compliance with safety protocols. With centralized data delivered through the cloud, you can strengthen safety compliance while respecting worker privacy.
- **Start with the right questions.** Organizations willing to embed data and analytics into safety decision-making should begin the journey with a hypothesis or a plan to answer specific questions (e.g., how do we uncover hidden correlations that may be resulting in safety incidents?). This is important to provide an initial foundation without constraining the analysis and filtering out potentially valuable insights.
- **Think broadly about big data.** Use incident-specific sources of data that aren't related to safety—including operational, financial, human resources, and training data—as well as open-source weather and demographic data to integrate into a safety analytics data set. An enriched data set reveals deeper insights and connections that could not be detected otherwise, thereby exposing hidden risks that can be managed proactively.
- **Revisit your control environment.** While recognizing early warning signs can be critical to the avoidance of safety incidents, it might be insufficient if you lack the capacity to proactively respond. Companies that continue to rely on paper-based safety protocols and verbal reports can limit their ability to devise actions and interventions to prevent future risk scenarios. To gain a comprehensive and objective view of your current-state safety performance, it's important to put actionable practices and policies into place to enhance the overall safety culture and drive safe behaviors.

TREND 10

Meeting demand for green and critical minerals

MINING'S ROLE IN THE TRANSITION TO A CLEAN ENERGY FUTURE

Dr. Adriaan Davidse, director, Consulting, Deloitte Canada
Dr. Jacek Guzek, associate director, Consulting, Deloitte Africa

THE CONVERSION TO renewable energy sources, accelerated adoption of electric vehicles (EVs), and general move toward increased electrification are all aspects of the global move toward the future of energy—which promises to drastically alter the demand dynamics of the mining industry. It also heralds new opportunities for miners and could reshape mining portfolios in the next few years. To position for success, however, miners likely need greater visibility into emerging demand drivers as well as regulatory support to diversify the supply chain for critical minerals.

On a global basis, the mining industry is not generally perceived as "clean and green"—but the sector's realities have been shifting in recent years. Driven in large part by mounting stakeholder pressure to abandon fossil fuels, many mining companies have begun to reimagine the role they will play as the world transitions to a clean energy future. The energy transition presents a significant opportunity for the industry to rebuild trust with society at large as a supplier of critical and green minerals produced in a sustainable and ethical way.

Pressures to transform

Growing concerns surrounding climate change and pollution led to some of the biggest climate protests ever in 2019 as millions took to the streets to demand immediate action.[1] These concerns came into even sharper focus in 2020 when shutdowns in response to COVID-19 delivered measurable environmental benefits, underscoring the significant impact of the world's industrial practices. In early April 2020, when the global lockdown was in full swing, carbon emissions were down by 17% year over year.[2]

Environmental activists are no longer operating in isolation. Investors, governments, and major corporations alike have taken up the gauntlet to reduce carbon emissions. In a charge led by the power and utilities sector, countries across the world are consequently positioning for the large-scale adoption of renewable energy—a move supported by the continuing exponential decline in the cost of renewable energy solutions. Solar photovoltaic (PV) is now the cheapest source of energy in history, and further improvements are expected.[3]

Energy storage provides another case in point. In 2019, average market prices for battery packs fell to US$156/kWh, representing an 86% drop since 2010, according to a report released by Bloomberg New Energy Finance (BNEF). The report further forecasts that by 2023 the price of battery packs will fall further, to US$100/kWh.[4]

Girding for the future of energy

The rise in alternative power sources is only one factor paving the way for the future of energy. Yet another is the shift from internal combustion engines (ICE) to EVs.

In 2019, the combined annual sales of battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs) tipped over the 2 million vehicle mark for the first time ever.[5] Although the spread of COVID-19 has affected short-term vehicle sales

forecasts, this impact has not been uniform. Tesla's sales exceeded expectations, rising by 44% in the third quarter of 2020.[6] Similarly, global EVs are expected to enjoy a compound annual growth rate of 29% over the next 10 years[7] aided in part by the likely banning of ICE vehicles in several countries between now and 2040.[8]

Vehicles powered by hydrogen fuel cells are another important development. In the past few years, Germany launched the world's first hydrogen-powered train,[9] San Francisco became the first US city to transport commuters via hydrogen fuel cell ferries,[10] and three major automakers began selling hydrogen fuel cell vehicles.[11] A recent report from Information Trends predicts that 6.56 million such vehicles will be sold or leased between 2014 and 2032.[12] In the same vein, a joint report by Deloitte and Ballard Power Systems indicates that by 2027 the total cost of ownership for a fuel cell EV could be less than either a battery electric or ICE vehicle.[13]

Underpinning these trends is a larger move toward electrification in general. "In a bid to improve operational energy efficiency, reduce costs, and minimize their carbon footprints, companies across sectors have begun to electrify their industrial fleets, processes, and spaces. Many are also exploring the viability of using alternative energy sources to power their operations," says Dr. Jacek Guzek, associate director, Consulting, Deloitte Africa.

This has certainly been the case in the mining industry. As part of its FutureSmart Mining™ innovation program, Anglo American is developing the world's largest hydrogen-powered haul truck in collaboration with ENGIE and expects to put it into use in early 2021.[14] As a completely renewable system, the hydrogen will come from on-site solar power generation.[15] Newmont Goldcorp officially opened an all-electric mine in Canada in 2019,[16] and Gold Fields in Australia now meets over half its energy needs through renewable sources after backing up its hybrid power microgrid with a lithium-ion battery energy storage system (BESS) in 2020.[17] For its part, BHP, a strong proponent of electrical transport, reports being on track to reduce its operational greenhouse gas emissions to below FY2017 levels by FY2022. Some of the initiatives it has adopted include moving toward 100% renewable electricity in its Chilean operations and investing in low emissions technologies to decarbonize its operations.[18]

The conversion to renewable energy sources, accelerated adoption of non-ICE vehicles, and general gravitation toward increased electrification are all central elements of the future of energy. They promise to drastically alter the demand dynamics of the mining industry as demand for a range of commodities, such as copper and nickel, rises.

The conversion to renewable energy sources, accelerated adoption of non-ICE vehicles, and general gravitation toward increased electrification are all central elements of the future of energy.

The list goes on (and on)

Which commodities will be the stars of a climate-neutral future? As with any forecast that requires a high level of prediction, it's hard to say. Ramping up renewable energy generation is bound to heighten the need for nickel, cobalt, lithium, heavy rare earths, and copper. That list would further include graphite and manganese if lithium-ion batteries win the race for supremacy of the EV market. Redox flow batteries—just one proposed alternative to lithium-ion batteries in stationary energy storage applications—would require greater supply of vanadium and zinc. Conversely, if hydrogen fuel cells gain greater traction, demand for platinum seems likely to spike.

"While there could potentially be dozens of minerals considered critical for the future, no one wants to take the risk of losing access to the commodities they deem essential," says Richard Longstaff, managing director, Deloitte Consulting LLP, Deloitte US. "As a result, we're already seeing a worldwide scramble by governments, state entities, and original equipment manufacturers (OEM) to lock in supply."

In February 2020, for instance, battery maker Samsung SDI entered an agreement with Glencore to secure a five-year supply of cobalt.[19] In June, Glencore entered a similar supply agreement with Tesla.[20] Then, in a more sweeping move, Tesla effectively entered the mining industry in September 2020 after securing the rights to mine lithium in Nevada.[21]

However, while these demand drivers signal good news for the mining industry, challenges remain.

"While the industry could arguably meet this demand, few mining companies may be prepared to assume the investment risk associated with building up significant capacity before it becomes clearer that the demand will materialize," says Dr. Adriaan Davidse, director, Consulting, Deloitte Canada. "To move past this 'wait and see' approach, mining companies and manufacturers could explore entering into longer-term supply agreements that equitabl[y] share the commodity price and supply risk and optimize the value for both parties."

When it comes to the critical and green minerals required for clean energy technologies, a commonly cited challenge revolves around potential supply shortages.

Commodity quagmires

When it comes to the critical and green minerals required for clean energy technologies, a commonly cited challenge revolves around potential supply shortages.

Nickel is a case in point. Most nickel produced today is used for stainless steel production and has neither the proper chemical form nor sufficient level of quality to be used in batteries. The production process is sufficiently different that miners cannot simply switch from producing lower-quality class two nickel to the higher-quality class one nickel required for battery applications, and there is currently little incentive to switch as battery makers now consume only 5% of global nickel output.[22] As the world's electrification mandate gains steam, however, that could change. Depending on which forecasts one follows, the demand for battery-grade nickel is expected to rise 10-to-20-fold by 2030[23] and could rise even more if it becomes a critical catalyst in the hydrogen economy.

Demand/supply imbalances are not the only challenge associated with a transition toward a clean energy future. One of the most pervasive concerns revolves around the sourcing of cobalt. With 50% of global cobalt reserves located in the Democratic Republic of Congo (DRC),[24] the country's human rights practices have come under intense scrutiny. To address the challenges associated with cobalt mining, hundreds of companies have joined the Responsible Minerals Initiative in a bid to improve global supply chains within conflict-affected and high-risk jurisdictions.[25] Several companies, BMW among them,[26] have also refused to purchase cobalt sourced in the DRC.

Although battery manufacturers and tech giants alike are avidly seeking cobalt alternatives—including Tesla, which seeks to make zero-cobalt batteries[27]—the search continues. As a result, considerable hope now pins on creating an effective recycling ecosystem. While low recovery rates may make recycling of commodities such as lithium and

manganese less attractive, that's not the case with cobalt, 95% of which can usually be recovered during the recycling process.[28] A key now is to develop a road map that makes large-scale recycling economical, an initiative unlikely to come together over the next decade, as there are insufficient EV batteries being returned for recycling at this stage.[29]

Then there are rare earths. While the United States once led the production of rare earth elements, cost challenges, combined with the environmental impact of mining these elements, saw the country pull back from producing them in the 1990s.[30] China quickly filled the vacuum, gaining a stronghold on the global rare earths market in the process. Although Western economies could potentially reenter the market, the capital commitment required may be prohibitive, especially given the difficulty of separating rare earths into their component elements. Similarly, while the rare earth minerals discovered off the coast of Japan could arguably supply the whole world, the country has yet to determine how to efficiently mine them from the sea floor.[31]

To counter these obstacles, in 2019 the United States launched the Energy Resource Governance Initiative (ERGI). A collaboration between the governments of the United States, Canada, Australia, Peru, and Botswana, ERGI aims to promote resilient energy mineral supply chains. Part of its mandate includes diversifying supply chains for rare earth elements, which are considered strategically critical minerals.[32]

This is not an isolated quest. Potential alliances between the United States, Canada, Australia, and the United Kingdom are purportedly in the works, and the European Union (EU) has initiatives to reduce its reliance on China as well.[33]

This focus on diversification may have already yielded results. According to USA Rare Earth and Texas Mineral Resources Corp., Round Top Mountain in Texas offers a 130-year supply of most of the rare earth elements currently produced in China.[34] With sufficient support, there is hope that Western economies will soon be in a position to open local facilities capable of separating the rare earths into their individual metals. Although this gain alone will not resolve all the supply challenges associated with critical minerals, it does point to the long-term feasibility of sourcing and processing these commodities in an ethical and reliable manner, while still adhering to strict environmental standards.

Preparing for the future of energy

- **Get strategic.** Although numerous commodities may play a role as the world embraces alternative forms of energy, predicting long-term demand remains problematic. That's especially relevant in light of the long lead times and massive capital investments currently required to develop new mines. Without a clear view of the future market, however, many mining companies are struggling to identify where to allocate their investment dollars. Strategic planning is essential in this regard, not only to assess how to identify demand signals but also to clarify your investment options. As with all major capital expenditures, it's imperative to pursue only those opportunities aligned to your strategic objectives, rather than taking a scattered approach. At the same time, your plan should be sufficiently flexible to enable you to respond as different technologies either gain supremacy or fall out of favor. Given the complexity of battery applications—and the constantly shifting parameters related to required levels of performance, safety, cost, and environmental impact—there will always be room for niche materials and nonmainstream technologies.
- **Consider new business models.** One way to reduce the risk associated with mining battery minerals is by embracing more flexible business models. Rather than investing upfront to build massive mines in anticipation of future demand, companies should consider developing smaller, modular, and rapidly scalable models instead. This can provide them with a lower risk, lower capital way to develop more options, positioning them to scale up fast when opportunities present themselves. Additionally, mining companies with the processing expertise may want to consider diversifying into recycling. Rather than selling metals to OEMs, could they "lease" these metals for a reduced price in exchange for a commitment to return the metals for recycling at the end of the battery's life? Beyond helping mining companies reduce risk, these innovative business models can also confer a long-term advantage, especially for first movers.

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LEADERSHIP CONTACTS

Rajeev Chopra
Global leader—Energy, Resources & Industrials
Deloitte Touche Tohmatsu Limited
+44 20 7007 2933
rchopra@deloitte.co.uk

Andrew Swart
Global sector leader—Mining & Metals
Deloitte Touche Tohmatsu Limited
+1 416 813 2335
aswart@deloitte.ca

REGIONAL/COUNTRY CONTACTS

Africa

Andrew Lane
+27 11 517 4221
alane@deloitte.co.za

Argentina

Alejandro Jaceniuk
+54 11 4320 2700 ext. 4923
ajaceniuk@deloitte.com

Australia

Ian Sanders
+61 3 9671 7479
iasanders@deloitte.com.au

Brazil

Patricia Muricy
+55 21 3981 0490
pmuricy@deloitte.com

Canada

Andrew Swart
+1 416 813 2335
aswart@deloitte.ca

Chile

Dominic Collins
+5 622 729 8089
dcollins@deloitte.com

China

Kevin Xu
+86 10 8520 7147
kxu@deloitte.com.cn

Colombia

Andres Roa
+57 1 426 2008
andresroa@deloitte.com

Ecuador

Jorge Brito
+59 32 381 5100
jorgebrito@deloitte.com

France

Veronique Laurent
+33 1 5561 6109
vlaurent@deloitte.fr

Francophone Africa

Damien Jacquart
+33 1 5561 6489
djacquart@deloitte.fr

India

Rakesh Surana
+91 22 6122 8160
rvsurana@deloitte.com

Indonesia

Ali Henry
+62 21 2992 3100
ahery@deloitte.com

Japan

Yuichi Shibata
+81 80 9087 4406
yuishibata@tohmatsu.co.jp

Mexico

Cesar Garza
+52 871 7474401
cgarza@deloittemx.com

Peru

Karla Velásquez
+51 1 211 8559
kvelasquez@deloitte.com

Poland

Zbig Majtyka
+48 32 508 0333
zmajtyka@deloittece.com

Russia—CIS

Andrew Sedov
+74 95 787 0600
asedov@deloitte.ru

Southeast Asia

Jiak See Ng
+65 93 877 958
jsng@deloitte.com

Switzerland

Geoff Pinnock
+41 58 279 6066
gmpinnock@deloitte.ch

Turkey

Elif Dusmez Tek
+90 312 295 4700
etek@deloitte.com

United Arab Emirates

Bart Cornelissen
+971 4 376 8888
bpcornelissen@deloitte.com

United Kingdom

Roman Webber
+44 20 7007 1806
rwebber@deloitte.co.uk

United States

Duane Dickson
+1 203 905 2633
rdickson@deloitte.com

AUTHORS

Trend 1: Building resilience amid volatility

Andrew Swart | Global sector leader, Mining & Metals, Deloitte Touche Tohmatsu Limited
Andrew Lane | Energy, Resources & Industrials leader, Deloitte Africa

Trend 2: M&A in an altered world

Ian Sanders | Mining & Metals leader, Deloitte Australia
Robert Noronha |Partner, M&A Advisory, Deloitte Canada

Trend 3: ESG: Getting serious about decarbonization

John O'Brien | Partner, Financial Advisory, Deloitte Australia
Henry Stoch | Partner, Risk Advisory, Deloitte Canada

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Andrew Lane | Energy, Resources & Industrials leader, Deloitte Africa
Patricia Muricy | Mining & Metals leader, Deloitte Brazil

Trend 5: ESG: Corporate governance adding to competitive advantage

Andrew Swart |Global sector leader, Mining & Metals, Deloitte Touche Tohmatsu Limited
Patricia Muricy | Mining & Metals leader, Deloitte Brazil

Trend 6: Creating an agile supply chain

Chris Coldrick | Partner, Consulting, Deloitte Australia
Rhyno Jacobs | Director, Consulting, Deloitte Africa

Trend 7: The path towards integrated operations

Dominic Collins | Partner, Consulting, Deloitte Chile
Eamonn Treacy | Director, Consulting, Deloitte Canada

Trend 8: Advancing the future of work

Janine Nel | Partner, Consulting, Deloitte Canada
Eamonn Treacy | Director, Consulting, Deloitte Canada

Trend 9: On the road to zero harm

Gerhard Prinsloo | Partner, Consulting, Deloitte Canada
Shak Parran | Partner, Consulting, Deloitte Canada

Trend 10: Meeting demand for green and critical minerals

Dr. Adriaan Davidse | Director, Consulting, Deloitte Canada
Dr. Jacek Guzek | Associate director, Consulting, Deloitte Africa

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ABOUT THE AUTHORS

Andrew Swart
Global sector leader, Mining & Metals, Deloitte Touche Tohmatsu Limited
aswart@deloitte.ca | +1 416 813 2335

Andrew Swart is the global and Canadian leader of the Mining & Metals practice. In his global roles, Swart is responsible for setting the strategic direction and go-to-market strategy for the global practice. With more than 20 years of industry and consulting experience, Swart is passionate about client service, having worked across many major mining and metals geographies including Canada, Chile, Russia, Ukraine, Kazakhstan, Brazil, Germany, India, South Africa, the United Kingdom, and the United States. Swart's areas of expertise include corporate and competitive strategy engagements, digital and innovation systems, and large organizational transformation programs.

Andrew Lane
Energy, Resources & Industrials leader, Deloitte Africa
alane@deloitte.co.za | +27 (0)11 517 4221

Andrew Lane is a senior partner at Deloitte Africa, where he leads the Energy, Resources & Industrials practice, as well as the Monitor Deloitte strategy capability, and the CEO program at the Deloitte Executive Institute. His professional career spans 32 years including 18 years in consulting. Lane leads strategy, operational improvement, organization redesign, and implementation projects within various industries including mining, utilities, revenue collection, general industry, aviation, manufacturing, and media.

Ian Sanders
Mining & Metals leader, Deloitte Australia
iasanders@deloitte.com.au | +61 3 9671 7479

Ian Sanders is the Energy, Resources & Industrials leader and the Mining & Metals leader at Deloitte Australia. Sanders has more than 25 years of experience providing audit and advisory services to a wide range of clients including ASX listed companies and multinational companies, with a specialization in the resources sector. He began his career as a cadet in December 1987, in the assurance and advisory practice at Deloitte. Sanders has worked across several sectors including manufacturing services, renewable energy, and energy and resources. Currently, he serves as the treasurer and finance committee chair of the Stephanie Alexander Kitchen Garden Foundation.

Robert Noronha
Partner, M&A Advisory, Deloitte Canada
rnoronha@deloitte.ca | +1 416 601 6526

Robert Noronha is a Financial Advisory partner with Deloitte Canada and leads Deloitte's Toronto M&A Transaction Services practice. With more than 25 years of M&A experience in Canada, the United States, and globally, Noronha has spearheaded over 300 M&A transactions and led transaction support engagement teams on small and large M&A transactions for strategic investors and private equity firms. He advises clients with respect to deal execution, financial due diligence, and providing innovative transaction solutions and deal insight. He has significant experience in M&A transactions in the manufacturing, life sciences, and services sectors, especially with regard to understanding the drivers of value and the areas of risks and opportunities.

John O'Brien
Partner, Financial Advisory, Deloitte Australia
johnobrien@deloitte.com.au | +61 4 1982 6372

John O'Brien joined Deloitte Australia in 2018 as a Financial Advisory partner. With more than 20 years of experience in the Australian and Asian clean energy and clean technology sectors, he provides strategic guidance to government, private sector operators, and large energy consumers and investors on issues around decarbonization, energy transition, and environmental technologies. His key expertise includes technology assessment, project development, project financing, risk and opportunity assessment, commercial and financial analysis, policy advice, and strategic growth strategies. In 2007, O'Brien established Australian CleanTech, a corporate advisory firm focused on environmental technologies, which he ran until joining Deloitte in 2018. He has also published two books on the opportunities emerging from the transition to a low-carbon economy. O'Brien has engineering degrees from Oxford University and Trinity College, Dublin, and holds an MBA from Adelaide University.

Henry Stoch
Partner, Risk Advisory, Deloitte Canada
hstoch@deloitte.ca |+1 604 640 3393

Henry Stoch is a Risk Advisory partner and leads the Sustainability & Climate Change practice at Deloitte Canada. He has extensive experience in management system design, implementation, assessment, and audit. Stoch's career started in the mining industry 20 years ago in southern Africa, and over the years he has become an expert in operational risk management and assurance with a strong focus on social and environmental issues management. He has been advising Canada's most significant companies on how to transform their businesses in line with societal, customer, and investor expectations, and is a strong believer in purpose-driven organizations. He is a regular speaker on the topic of sustainability risks and opportunities at conferences across Canada and has written articles on these topics.

Patricia Muricy
Mining & Metals leader, Deloitte Brazil
pmuricy@deloitte.com | +55 21 99975 7388

Patricia Muricy is the Mining & Metals leader at Deloitte Brazil. From 2017 to 2019, she was also the chair of Deloitte Brazil's Growth Committee, which focuses on increasing the number of women in leadership positions within the Brazilian member firm. With more than 22 years of experience, Muricy started her career with Deloitte in 1997 in Rio de Janeiro. She has also worked in Deloitte Canada as a part of their Global Development Program. From 2013 to 2019, Muricy led the Risk Advisory practice in Rio de Janeiro with a group of 200 professionals that provided services in all risk categories: strategic and reputation, regulatory, operational, cyber, and financial. In 2020, Muricy was named as one of the 100 Global Inspirational Women in Mining released by Women in Mining UK in 2020. She holds a bachelor's degree in mathematics and information technology and an MBA in finance.

Chris Coldrick
Partner, Consulting, Deloitte Australia
ccoldrick@deloitte.com.au | +61 3 9671 8909

Chris Coldrick is a Consulting partner in the Melbourne Supply Chain and Procurement practice at Deloitte Australia. He has more than 20 years of experience in leading supply chain operations, network design, and optimization practices across different industries. His experience also spans managing technology-driven analytics and providing unique solutions for business problems. Coldrick's passion lies in the use of data to eliminate waste and has focused on waste in the supply chain, such as excess working capital and complex supply networks. He is also passionate about performance maximization, decision-making, data capture, and cost prevention.

Rhyno Jacobs
Director, Consulting, Deloitte Africa
rhjacobs@deloitte.co.za | +27 11 304 5299

Rhyno Jacobs is a Leadco member of the Strategy and Operations business in Deloitte Africa. He is a qualified mining and industrial engineer with more than 22 years of operational, project management, consulting, and advisory experience in the fields of operation excellence, innovation in mining, business improvement, supply chain management, shared services, and corporate strategy. He is an expert in operational engagement with a focus on mining and heavy manufacturing industries.

Dominic Collins
Partner, Consulting, Deloitte Chile
dcollins@deloitte.com | +5 622 729 8089

Dominic Collins is a Consulting partner and leads the Energy & Resources Operations Transformation practice at Deloitte Chile. He has 15 years of operational experience in smelting and mining operations in Australia and has six years of mining consulting experience in Australia, Latin America, and North America. Having led multiple, large-scale, and highly successful, integrated operations projects within the resources sector, Collins specializes in the design and implementation of operating models for mining companies. Collins holds a master's degree in supply chain management and information systems from Curtin University of Technology.

Eamonn Treacy
Director, Consulting, Deloitte Canada
etreacy@deloitte.ca | +1 514 369 8315

Eamonn Treacy is an experienced technology and operations consultant with Deloitte Canada and specializes in integrated operations and value chain optimization. With more than 20 years of experience, Treacy has a proven track record for delivering high-quality strategic and operationally relevant solutions. He has a broad range of experience across all phases of the project life cycle, including identification, selection, planning, execution, and operations. Over the course of his career, Treacy has undertaken many roles, including study leadership, program delivery, value case development, operational and technology design, deployment governance, and operational improvement delivery.

Janine Nel
Partner, Consulting, Deloitte Canada
jnel@deloitte.ca | +1 403 261 8100

Janine Nel is a part of the Human Capital Organization Transformation and Talent service at Deloitte Canada. She has extensive consulting experience in human capital. Nel's expertise includes managing large-scale transformation projects and culturally diverse teams. Her specific specialization includes leading delivery and thought leadership in areas of digital and the impact on work, the workforce, and the workplace. Having worked across the HR continuum, Nel has robust expertise in strategic change and digital enablement, organization design, talent, and leadership.

Gerhard Prinsloo
Partner, Consulting, Deloitte Canada
geprinsloo@deloitte.ca | +1 403 261 8167

Gerhard Prinsloo is a Consulting partner at Deloitte Canada. With more than 20 years of experience, he specializes in advising clients in oil and gas, mining, petrochemicals, EPC, and field services, and focuses on strategy, performance improvement, and organizational transformation. For many years, he has served as a board of director of one of the largest publicly listed mining companies in the world. Prinsloo holds a bachelor's degree in commerce from the University of Pretoria.

Shak Parran
Partner, Consulting, Deloitte Canada
sparran@deloitte.ca | +1 416 775 7284

Shak Parran is a Consulting partner at Deloitte Canada. He is the AI Insights leader and the Energy, Resources & Industrials leader for Omnia AI, Deloitte's artificial intelligence practice. With more than 20 years of experience, he's recognized as the firm's leading expert in delivering predictive analytics, optimization, analytics strategy, and AI projects across various industries, including transportation, oil and gas, mining, forestry, utilities, life sciences, health care, and the public sector. Prior to joining Deloitte, Parran led the advanced analytics team at a major consulting firm and founded a successful engineering startup. He is the author of numerous articles on AI in mining and ER&I at large. He holds a degree in physics from the Technion (Israel Institute of technology) and an executive MBA from the Ivey Business School.

Dr. Adriaan Davidse
Director, Consulting, Deloitte Canada
adavidse@deloitte.ca | +1 416 874 3176

Adriaan Davidse serves as a director in Consulting at Deloitte Canada. He has spent more than 25 years working with senior executives on issues related to strategy and innovation, and how to sustain value creation for all stakeholders over the long term. Davidse helps companies better understand the potential threads and significant opportunities of "exponential technologies" that will have a transformation impact on society and businesses over the next decades.

Dr. Jacek Guzek
Associate director, Consulting, Deloitte Africa
jguzek@deloitte.co.za | +27 11 209 6894

Dr. Jacek Guzek is an associate director in the Consulting practice of Deloitte Africa. He is responsible for strategic sensing and insight for the energy, resources and industrials industry. A nuclear physicist by training, Guzek spent much of his career in R&D for mining companies before making a shift into business with an MBA some two decades ago. From 2014 to 2017, he spent time nurturing and growing his startup into a nationally recognizable brand with international presence. He has published numerous refereed papers, presentations, business proposals, reports, and patents around nuclear physics and his business interests. He pursued his MSc in engineering physics from Silesian Technical University; a PhD in nuclear physics from Wits University; and MBA from Bond University.

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