

An aerial photograph of a large-scale mining operation. The image shows several long, parallel conveyor belts or tracks running across the landscape. In the foreground, there are large, dark, circular tailings dams filled with a dark, slurry-like material. In the background, there are large, reddish-brown mounds of earth or tailings. A yellow crane or conveyor structure is visible in the upper right corner, and another similar structure is in the lower center. The overall scene depicts a complex industrial mining site.

**Top 10 business
risks facing
mining and metals
in 2019-20**

The EY logo, consisting of the letters 'EY' in a bold, white, sans-serif font. A yellow diagonal line is positioned above the 'Y'.

Building a better
working world

Does operating in a time of disruption take more than a license?

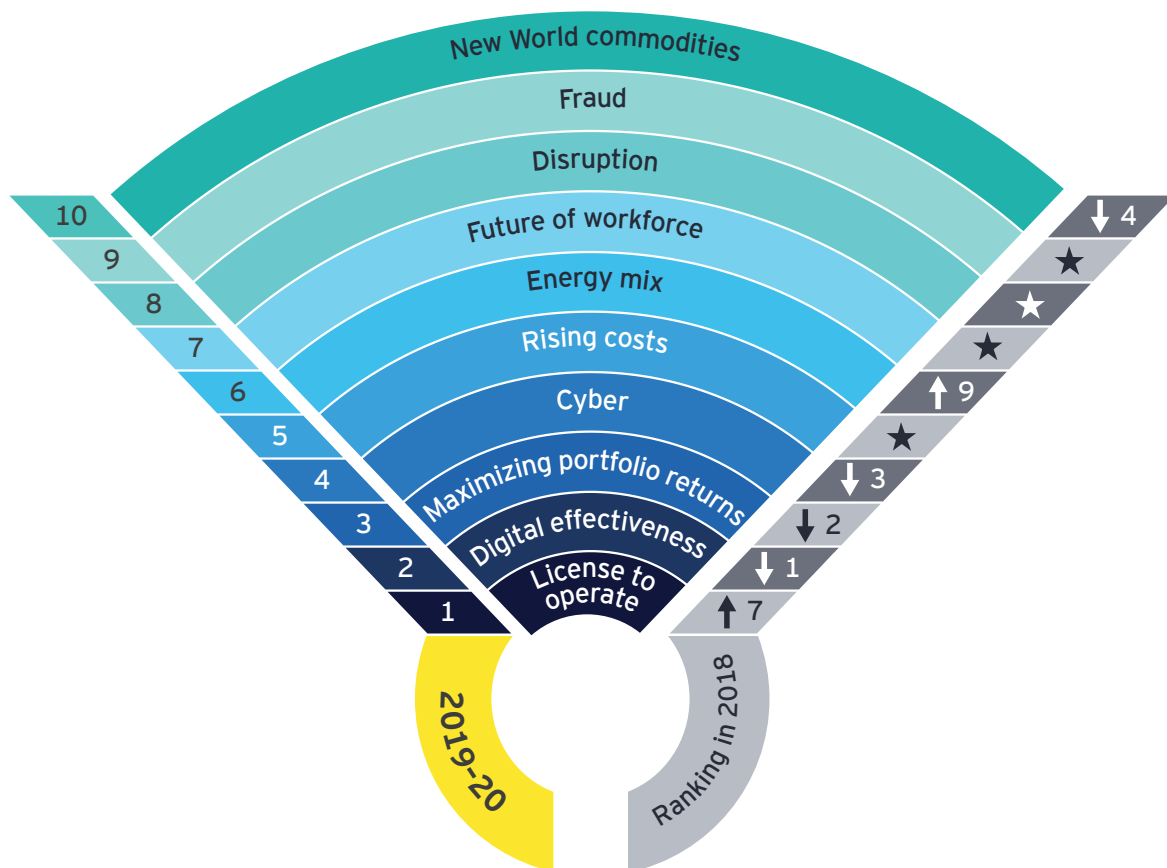
We believe our sector is facing an era of disruption like nothing it has ever experienced before – both from within and outside.

The themes of license to operate and disruption run through this year's risks as mining and metals companies have to deal with many new and variable factors, including societal expectations, digital

transformation, and unique challenges to portfolio and capital investment decisions.

What can organizations do to protect themselves against the challenges of keeping their license to operate, improving productivity and nationalism? They have to use capital and collaboration to their advantage as they transform and protect themselves from disruption.

Top 10 business risks



↑ Up from 2018 ↓ Down from 2018 — Same as 2018 ★ New to the radar



1 License to operate

Surveying over 250 sector participants from around the world, we have seen “License to operate” rocket to first position, with over half of our respondents nominating it as the No. 1 risk. There are a number of reasons why it has taken poll position:

- ▶ It is the key risk that CEOs and boards are discussing because the current approach is not broad enough, the stakeholder landscape is changing and miners need to adapt.
- ▶ We have seen the advance of nationalism globally.
- ▶ The necessity of digital transformation highlights the need for a stronger license to operate.

The sector is working to redefine its image as a sustainable and responsible source of the world’s minerals. But while many in the industry are saying all

the right things, their actions do not follow their words, and the many stakeholders are not fooled.

License to operate has evolved beyond the narrow focus on social and environmental issues. There are now increasing expectations of true shared value outcomes from mining projects. Any misstep can impact the ability to access capital or even result in a total loss of license.

Mining and metals companies need to transform their business models to remain more competitive and bring all their stakeholders along on the journey. A new approach is required, and license to operate needs to quickly become part of a mining company’s DNA in the same way as safety is.

2 Digital effectiveness

“Digital effectiveness” is key to gaining a competitive advantage. However, in a recent poll of over 600 mining and metals executives, it was revealed that a significant 37% of management have little or no knowledge of the digital landscape. The stark reality is that digital is the key to achieving productivity and margin improvements. It is no time to stand still in an age of business transformation that is largely driven by digital.

Miners are making significant strides in applying digital solutions to single issues or bottlenecks. But it is only when miners apply these solutions across the entire

value chain to create a digital mine that they can truly transform and emerge as the dominant players in the market.

To achieve this kind of transformation, CEOs need to take ownership of the digital agenda, combined with a sound strategy that is supported by a clear vision and a strong focus on people, as well as, the effective management of the cultural change required.



3 Maximizing portfolio returns

In the wake of higher commodity prices and rising cash flow, mining and metals companies are assessing where they should allocate capital to ensure higher future capital returns. A balanced approach to the portfolio is key. In addition to building or acquiring new mines, companies also need to consider how much capital they should be investing into innovation and transformative technologies. Over 70% of survey respondents are investing 5% or less of their budgets in digital. By increasing this to around 20%, they could be transforming their operations substantially and gain real competitive advantage.

Improved commodity prices breathe new life into old risks

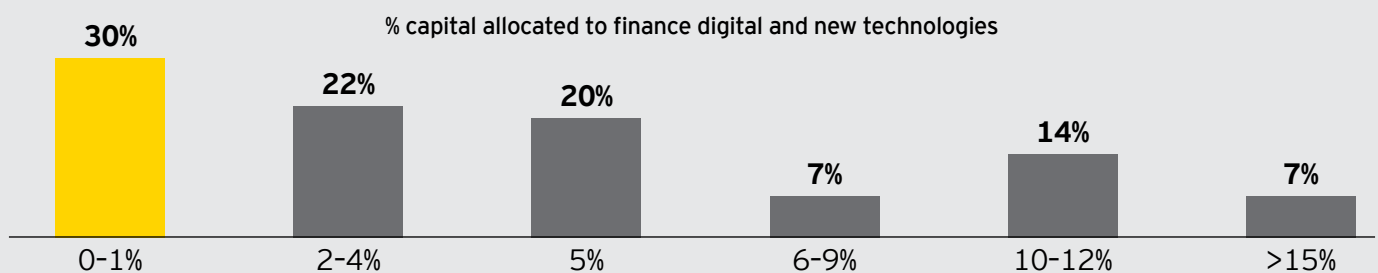
Given stronger commodity prices and a positive outlook on the sector, we have seen a return of risks like rising costs, and fraud and labor constraints. Mining and metals companies are flagging that higher input costs are impacting their bottom lines. In addition, there are also increased costs associated with the need to deal with the increasing complexity of operations or changes to the way mines operate – be it through investment in license to operate, the rising use of technology or changing skill sets.

Fraud and corruption was identified as a significant risk by the survey respondents. There are lessons to be learnt from the super cycle, particularly the implementation of stronger controls to deal with third parties such as contractors and suppliers. Overall, the ability to identify fraud has become more sophisticated, particularly with the growing interconnectedness of regulators, but social media also makes any allegations of impropriety visible with unprecedented speed. This places risk of fraud hand-in-hand with the risk to reputation and license to operate.

A time of disruption

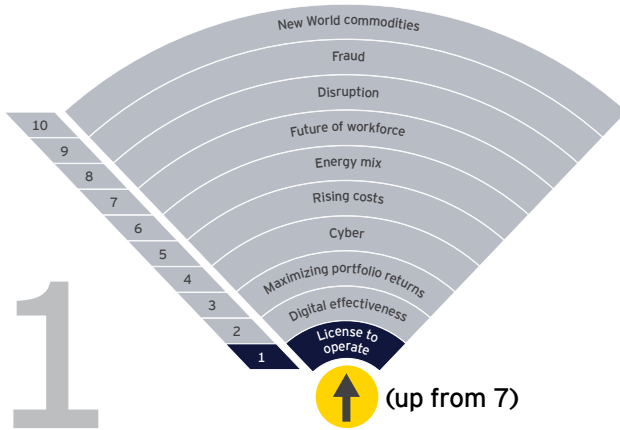
Societal change, new technologies and the race to transform business models are driving a whole range of disruption for mining and metals companies. Pressure on technology and automotive companies to secure the supply of New World commodities is opening another avenue of potential disruption to current business models. Over 31% of our survey respondents thought that technology companies have the potential to disrupt the sector. We agree. They have good access to capital and are already investing in the innovation and technology that mining operations need to be more effective.

Capital allocation to finance digital initiatives (% of respondents)



Source: EY survey of over 250 global mining and metals participants

01



License to operate

Is license to operate the disruptor you have missed?

A narrow, legacy focus on license to operate may be the strategy that puts you out of business. Applying just the social and environmental lenses, seeing it as a soft issue or allocating it to one section of the business will directly threaten your ability to operate. The stakeholder landscape is shifting. There is more information, bigger platforms and more at stake than ever before. Underestimating the power of each and every single stakeholder would be a mistake.

The issue of license to operate is now an issue that is broad with far-reaching implications, and should be at the top of the agenda of CEOs, their executive teams and boards.

The evolution of license to operate

License to operate will continue to evolve as a number of critical changes are redefining stakeholders' expectations, and miners need to ensure they are proactively and strategically managing this. These include:

- ▶ **An increase in societal participation (beyond local communities):** The expectations of society have increased, and social media and the internet are now able to move information quickly, which rallies issues-based stakeholder participation *en masse*.
- ▶ **The rise of minority voices:** The increase in societal participation in the sector has not only brought into focus the rights of groups, such as indigenous communities,

but has also allowed for the amplification of these voices through the combination of smaller groups.

- ▶ **The advancement in technology:** With the fast pace of progress in technology and digital capabilities, initiatives, such as the automation of jobs, will have an impact on stakeholders and the broader community.
- ▶ **A shift of ownership:** New business models will be sought whereby national or even community-owned operations could be favored over traditional models.
- ▶ **An increase in the expectation of shared value outcomes:** The increase in nationalization may lead to an expectation that there are true shared value outcomes from mining – society sees its role as granting access to resources, and expects more than just tax and employment opportunities in return.
- ▶ **The mushrooming of disclosure regimes:** The disclosure of the impact of any project (positive or negative) is required. Also, organizations will need to start thinking about how they disclose the value being created for local, regional, national and global communities, including tax contributions. Investors will also be relying heavily on such disclosures.
- ▶ **The founding of governance on an accountability framework:** Frameworks will measure the financial, environmental and social impacts of a project. The quality and extent of stakeholder engagement will also be measured.
- ▶ **A rise in litigation:** There will be more litigation, especially for past damages.

“Our industry needs to re-define the way we partner with communities, customers, suppliers and governments. The best way forward is to accept mining is an absolutely necessary and valuable activity but hold all of the industry to account for making sure we operate in a responsible way with care for the environment, our people and society, while remaining economically viable.”

Jean-Sebastien Jacques

Chief Executive, Rio Tinto¹

Provisioning will become a key issue for companies and regulators.

How do you manage license to operate?

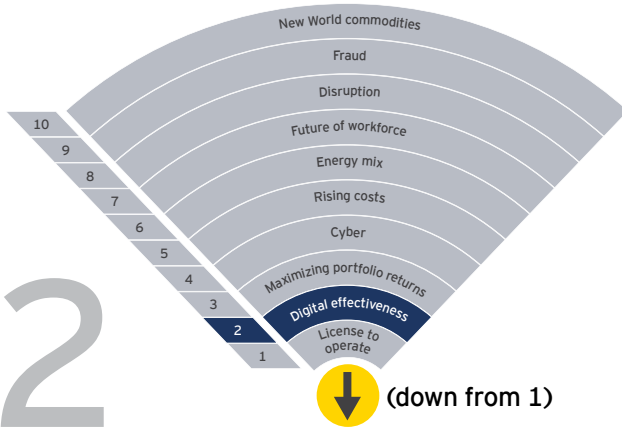
The time to more holistically address license to operate is here. A whole of business approach to license to operate is required, driven from the top down. In the same way as safety, license to operate needs to become part of a mining company's DNA; the commitment and contribution to community, government, employees and the environment needs to span beyond life of mine.

We offer seven key takeaways that organizations should consider to preempt and avoid license to operate risks in the future:

1. Think global and act global
2. Identify the leading indicators of license to operate to pre-empt and avoid an issue – provide a single source of truth – what we promised, what we delivered and how we measured it
3. Make an objective, detailed assessment of your activities – be purpose-led
4. Don't just listen to the loudest voices, listen to the important voices
5. Empower the business to make decisions that consider more than just financial returns and give them the tools to better value the broader returns
6. Make social development decisions that deliver lasting outcomes
7. Improve the collaboration and branding of the sector

¹ “We won't wake up tomorrow as Microsoft, but how will we pioneer the mining industry into the 21st Century?” *Rio Tinto documents*, 30 October 2018.

02



Digital effectiveness

Is riding the digital wave key to wiping out our competition?

Focusing on productivity is a great place to start, but alone, it is not enough to generate competitive advantage.

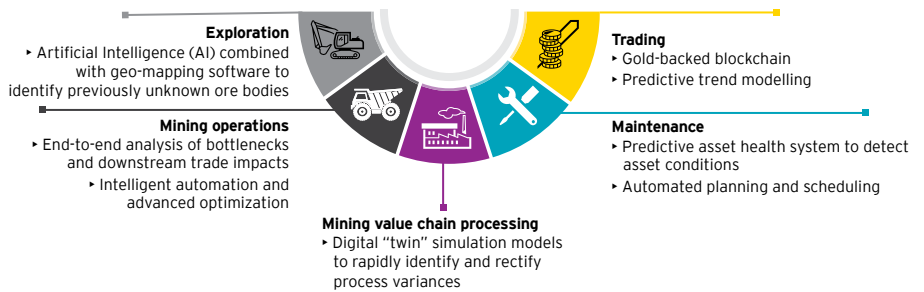
Miners have begun to make headway in using digital to improve productivity. There has been a great deal of success in the automation of haulage, rail, trucks and drilling; and also in the use of predictive analytics to reduce maintenance costs and improve equipment availability. Typically, these initiatives have been focused on solving single issues or bottlenecks, and while they have delivered some value, they have not been transformative.

We believe that real sustainable productivity gains will be realized only when digital initiatives span the value chain and are truly transformative. Market leaders have started to focus on broader initiatives that deliver margin in a number of ways through innovative marketing or supply arrangements. But we are yet to see many truly end-to-end transformative approach being adopted.

Invest to win

Digital effectiveness is still challenging the sector. Miners are challenged with deciding where to start and securing budget. Also, in many cases, their organizations' IT-related function owns the digital strategy. Without CEO ownership, any transformation will be purely technological. It will fail to have clear and shared vision across the organization, a comprehensive business case and associated budget, or proper resourcing.

Investment in digital solutions could drive a new wave of productivity and margin improvement across the value chain. If a miner manages to create a digital mine, and



in doing so begins to approach the levels of overall equipment effectiveness to what is achieved in the manufacturing industry, the miner can be truly disruptive and emerge as the dominant player in the market.

The stark reality is that digital is the key to achieving sustainable productivity and margin improvement, and staying ahead of your competition. It is, therefore, not the time to stand still in an age of business transformation that is largely driven by digital.

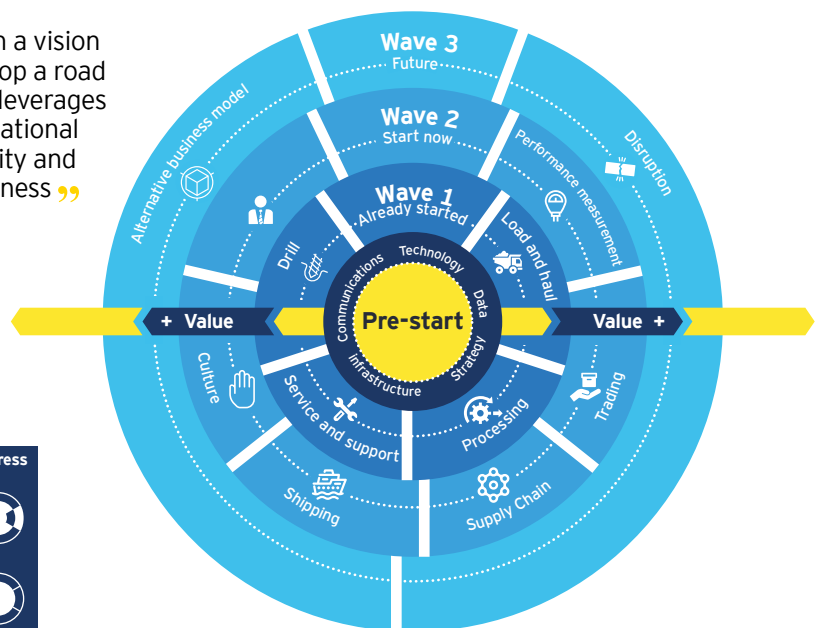
“Accelerating automation implementation and digital transformation will have a positive impact on costs and productivity and on shareholder support.”

Director of Innovation,
Global mining company

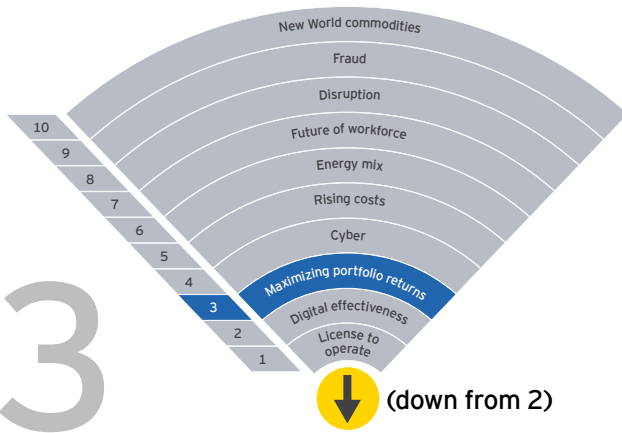
Laying the foundations for success

We recommend an end-to-end program of overlapping waves of increasing complexity and value. This structured "wave" approach can start to integrate different digital initiatives into a more cohesive whole, as discussed in our paper on EY's wave approach to digital transformation. Wave 3 disruption is a key risk to be managed (we will discuss how you can protect yourself from this risk later in this paper).

“Start with a vision and develop a road map that leverages organizational capability and readiness”



03



Maximizing portfolio returns

Is your strategy planning for the future or creating it?

At the core of corporate strategy is capital allocation. Future returns will only be competitive in the long term if the right decisions over capital are made now. In order to truly transform portfolios, and provide market-leading shareholder returns, the mining and metals sector must look across all strands of capital allocation, which increasingly involves the need to invest in transformative technologies.

Buy: Acquisitive growth preferred but good buys remain scarce

Given the risk-reward appetite in the sector right now, there is a preference for capital to first be invested in brownfield projects that provide scale and optionality to existing operations. Only once these portfolio opportunities have been funded, are we typically seeing an appetite for greenfield investments or acquisitions.

With relatively few greenfield projects providing low-risk investment opportunities, there is an increasing desire to consider acquisitions. However, finding valuations that meet seller expectations is proving difficult at this early stage of the investment cycle, which is creating some deal inertia for "the pack" and will require a bold move from one or two first movers to kick start M&A in earnest.

Build: Brownfield projects take most of the capital

While the market is relatively balanced, supply challenges across a few commodities are just over the horizon as project pipelines have shrunk significantly, and the projects that remain are often underinvested. This is creating a delay in approving new capital investments into early-stage developments, which is putting further pressure on new supply.

Return: New avenues sought

Strong cash flows and large cash injections from asset divestments have enabled many companies to initiate share buyback programs. This is to take advantage of equity prices that management believes to be undervalued and drive down the cost of capital.

“It’s key to deliver a balanced approach across shareholder returns, strong capital and balance sheet management, and sensible allocation to value creating growth.”

Finance Director,
Global mining company

We expect the level of capital through share buybacks to reduce as the majority of divestment processes have now concluded. However, the overall quantum is likely to fall as a result, and a preference to return capital, rather than invest, will remain a focus.

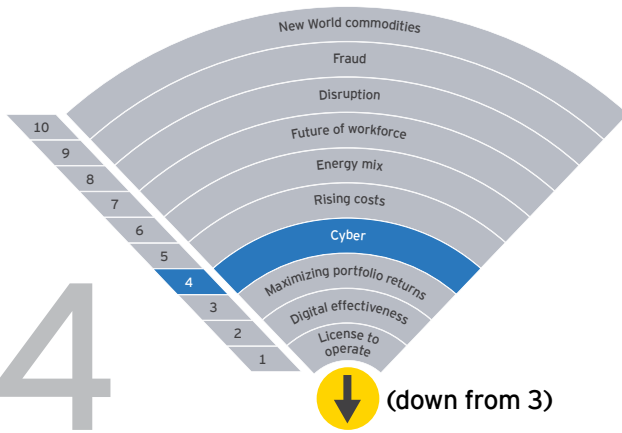
Transform (invest): Innovation is the new disruptor

Historically, capital allocation strategies have focused just on “buy,” “build” and “return.” However, given the ongoing innovation and transformative technologies available now, should organizations be investing capital into transforming existing operations with technology?

Those who invest in technology, data analytical capabilities and operational transformation will have an edge over their competitors. According to our survey respondents, the majority are investing 5% or less of their budgets in digital. How much more could they be transforming their operations if they invested up to 20% of their budgets in digital and put capital at risk? This could be disruptive to the way mining and metals organizations operate. Also, it could provide economic return on existing reserves that otherwise wouldn’t be accessible, and ultimately form future portfolio growth in a way that historically could only be achieved through buy or build strategies.

Disruption is inevitable and those with thoughtful capital allocation to digital and innovation will become the innovative, predictive as well as higher margin-generating mines and metals operations.

04 Cyber



of mining and metals companies have had a significant cybersecurity incident in the last year.

Source: EY Global Information Security Survey 2018-19

Is cybersecurity about more than just protection?

Due to the increasing size of the threat, organizations are spending more on cybersecurity, devoting additional resources to improving their defenses and working harder to embed security-by-design. As the digital transformation agenda forces organizations to embrace emerging technologies and new business models – often at pace – cybersecurity needs to be a key enabler of growth.

All mining and metals organizations are digital by default – in an increasingly connected world, the digital landscape is vast, with every asset owned or used by an organization representing another possible entry point. At the same time, it has never been more difficult for organizations to understand and secure the digital environment in which they operate, or their interactions with it.

As a result, the attack surface is only getting larger across physical assets, digital infrastructure and business processes; and can even extend to a company's connections with suppliers and customers. For example, the embedding of internet of things into equipment by engineering vendors extends and blurs the "network

perimeter." Attacks can be malicious or unintentional; however, the resulting impacts can be similar, regardless of intent. These impacts include prolonged and widespread outages, safety incidents, liability claims and associated legal costs, data clean-up costs, reputational damage, management distraction, and physical damage to assets.

An innovative cybersecurity strategy based on good risk management principles needs to be applied

The focus should be on how cybersecurity will support and enable enterprise growth. The aim should be to integrate and embed security within business processes and build a more secure working environment for all. To achieve these goals, organizations will need an innovative cybersecurity strategy based on good risk management principles.

Mining and metals companies need to understand the business risks, critical assets and scenarios that pose a cyber risk event.

Effective cybersecurity firstly requires the organization to conduct a baseline cyber controls maturity assessment. This is supported by a risk-based approach to prioritize strategic, long-term cyber investment for the top cyber threat

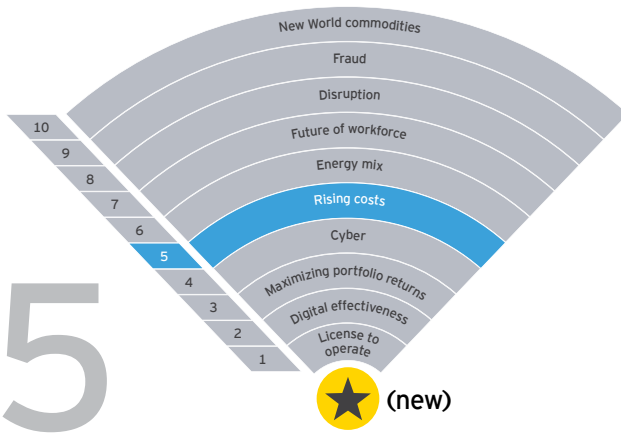
scenarios. It is then essential to apply a cybersecurity framework to identify the critical cyber control gaps that need to be closed.

Every cybersecurity transformation should promote three key principles across culture, governance and capabilities:

1. **Expect excellence in security fundamentals:** Be highly mature at "security basics," practice good security hygiene and optimize your current information security solution capabilities.
2. **Establish a strong governance program and a culture of accountability:** This should include adequate progress and performance metrics, the development of a security-savvy culture and a shift in culture to ensure security practices as a part of people's everyday responsibilities.
3. **Build a commitment to continuous improvement:** Adapt to new requirements based on evolving threats and trends, regularly assess security posture to remediate gaps, and remember that cyber strategy roles and responsibilities are for everyone in the organization no matter what their roles.

05

Rising costs



“A focus on cash flow and costs will ensure better shareholder returns.”

VP of Global tax,
Global gold company

How can you cut costs and still remain competitive?

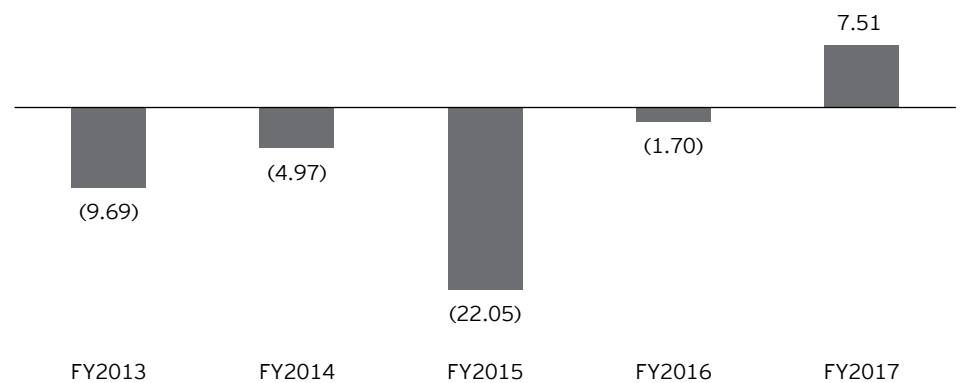
Cost inputs in the mining and metals sector are highly susceptible to inflationary pressures. While global inflation is not expected to rise as rapidly as it has in previous cycles, there will be a steady increase from around 2.7% in 2016 to 3.5% in 2019.² However, during periods of higher commodity prices, mining input costs, such as wages, consumables, diesel and energy, often increase at a higher rate than general inflation.

Upward pressure on wages is particularly prevalent. In certain areas of Australia, advertised salaries were up 35% in the first nine months of 2018, although this is off a low base.³ There is also increasing pressure from unions in South Africa and Chile to increase the wages of mine workers. Mining and metals organizations have been flagging that these higher input costs are already impacting their bottom line.

In addition to inflation, there have also been incremental changes to how mines operate that are resulting in rising costs. These changes include increasing complexity of mines, rising use of technology, a changing workforce and a rising investment in license to operate.

The complexity of mining is increasing as many low-cost mines reach the end of their life. Miners need to go deeper for lower

Changing costs of diversified miners (% change)



Average % change of BHP, Rio Tinto, Vale and Anglo American
Source: S&P Capital IQ and EY analysis

quality ore and manage increased distances to processing plants, water removal and other physical constraints that come at an increased cost.

Automation and increased maturity in the use of data is proving to have significant benefits to large mining operations. To be able to stay competitive, all organizations will need to invest in both automation and data analytics technologies. While these may increase efficiency, there are also other associated costs that need to be factored in. In particular, the introduction of a more complex technology and greater reliability on data will require a different skill of your workforce. Recruiting and retaining this workforce will increase the spend on salaries.

How organizations can respond to this:

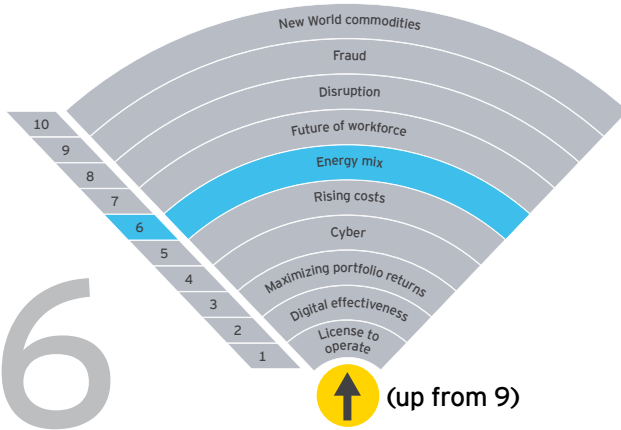
- ▶ Focusing on sustainable cost-reduction programs
- ▶ Carefully managing general expenses
- ▶ Sourcing from low-cost countries
- ▶ Reviewing capital tied up in high levels of pre-stripping, advance development and stockpiles
- ▶ Considering the use of contract mining versus sale or leaseback
- ▶ Implementing front- and back-office automation
- ▶ Reviewing supplier contracts
- ▶ Offshoring or outsourcing
- ▶ Divesting noncore assets

² Consumer Price index via Oxford Economics as at 9 November 2018.

³ Sam Jacobs, "Soaring wages growth in key mining regions is a bright spot for the Australian economy right now," *Business Insider*, 4 September 2018.

06

Energy mix



“The pace of change we are witnessing across the energy sector is unprecedented. Choosing the right path toward our energy future will require strong leadership, and above all, a clear vision.”

Benoit Laclau
EY Global Energy Leader

What is the recipe for tomorrow's energy mix?

Mining and minerals processing operations are very energy-intensive, estimated to be 6.2% of total global energy consumption.⁴

The cost of energy represents up to a third of a company's total cost base, making it a keenly managed component of operations. While cost is an important consideration when choosing an appropriate mix of energy sources, it is only one aspect of a larger strategic decision. Other considerations include:

- ▶ Social and reputational implications of choosing energy sources
- ▶ Viability of energy sources, particularly in remote locations
- ▶ Management of the availability of energy over the entire mine life and the counteracting of fuel price volatility

To date, mining operations have largely relied on fossil fuels to run equipment and electricity for processing. In remote operations, there is an even greater reliance on diesel power generation. For example, the mining sector in Australia derives 41% of its energy from diesel.

Energy costs already represent a significant part of mine operating costs, and as mines are beginning to extend to depths beyond current norms, their energy demand is growing even larger.

To minimize these risks, companies are opting for a mix of energy sources – fossil fuels, hydroelectricity and renewable energy.

In addition, as mines seek to reduce costs and greenhouse gases, they will be investigating ways to replace diesel-powered equipment with electric ones, particularly as battery storage technology becomes more reliable and affordable. There has been a trend in which new digital mines are seeking to eliminate diesel and increase the use of electrification on mines, e.g., Borden mine in Canada. This does bring a number of benefits including the issues of diesel emissions underground and a reduction in ventilation costs.

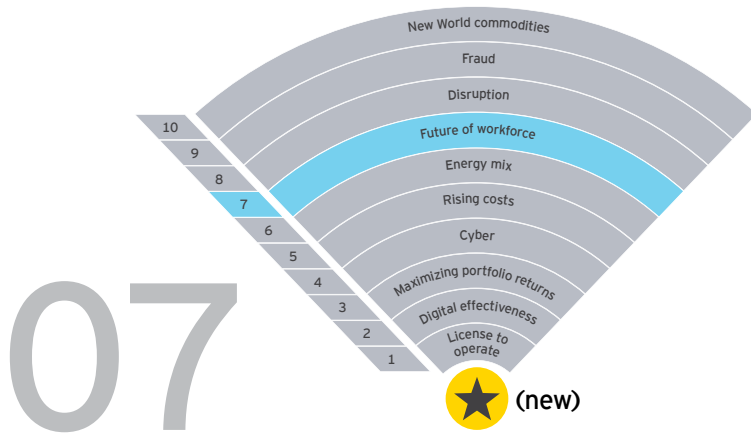
The integration of conventional and renewable sources is critical to ensure reliable and safe power for the mine, with people often working underground relying on power for lighting and ventilation. If the sun stops shining or the wind stops blowing, the conventional sources or energy storage has to cover the shortfall. It is this factor that causes some renewable projects to be put into the “too hard basket” and conventional solutions persist.

In our recent blog, Dr. Ali G. Madiseh, Canada Research Chair in Advanced Mine Energy Systems, noted that the ultimate solution lies in the development of a range of novel ultra-efficient energy systems for mining operations, which make them greener, less expensive and more sustainable by:

- ▶ Preventing energy wastes by using combined heat and power or waste heat recovery systems
- ▶ Taking advantage of the renewable energy sources available on-site such as wind and solar for power and geothermal for heating

Such solutions will enable the mining industry to diversify its energy sources, reduce its consumption of fossil fuels and carbon emissions, and cut costs. This will ultimately create a new generation of mines that will enhance the industry's global competitiveness and long-term sustainability. It will also allow companies to build in optionality for future capital projects so that they can take advantage of future developments and the reduction in the cost of renewables.

⁴ KBR Consulting, “Fuelling the future of mining,” via <https://www.raconteur.net/sponsored/fuelling-future-mining>, accessed on 27 October 2018.



07 Future of workforce

How will mining tap into its next great resource?

Within the mining and metals sector, the talent management practices often still mirror the commodity price cycle: miners hire rapidly in upswing and shed excess resources in a downturn. As a result, many of the workers laid off during the downturn in commodity prices moved to other sectors and never came back, taking invaluable knowledge and experience with them. Also, there are other inexorable trends that continue to reshape talent and labor supply in the sector, some of which are discussed below:

- ▶ **Changing technology**
Disruptive technology is changing the skills mix required. However, there is a limited pool of people with these skill sets such as data science, analytics, predictive modeling and mechatronic skills. Mining and metals companies are currently not able to compete with other sectors for this talent. Some of this lack of competitiveness relates to the need for companies to have a better narrative around their purpose, which will build employer brand and attract a millennial workforce.

Organizations need to take advantage of the existing workforces' desire to re-skill. This will also enable some of the change management required to make digital transformation work.

- ▶ **Changing social and demographic forces**
Attracting younger talent, particularly in light of the changing skill sets required, is a challenge. The sector is not in vogue with the more conscious younger people, particularly in a contemporary social media-informed world. There are fewer people moving into secondary education in mining, and building the workforce of the future is challenging.

At the same time, retaining the older talent also poses an ongoing risk to leadership. Insufficient attention has been given to understanding how an ageing workforce will impact the sector, and needs to be countered with innovative retention and succession planning efforts.

- ▶ **Global talent markets**
While the majority of a company's workforce will be sourced locally, globalization adds real complexity to how companies attract leaders and technical talent. Globalization has meant access to a wider global talent pool, and has also resulted in increased competition for talent on a global stage.

Building the workforce of the future

Mining and metals companies need to ensure they have a strategic workforce strategy that enables them to attract the required capabilities for new ways of working, while at the same time re-skill those skill sets that will be redundant or

“With digital enablement, it attracts increased technological skill and specialization among employees and opportunity for business disruption. A board member asked: ‘Are we in mining or IT?’”

Anonymous respondent of EY Business risks survey 2019-20

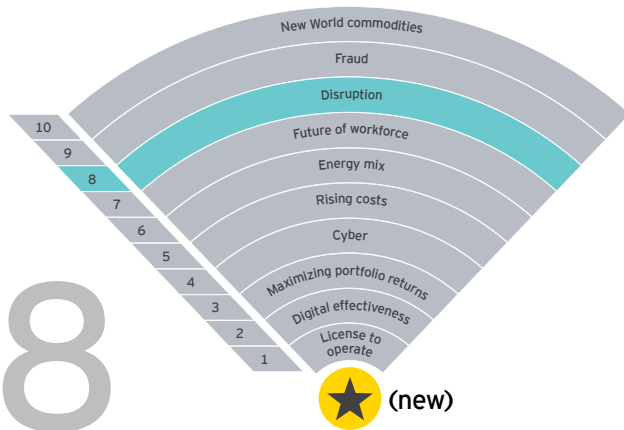
changed in the future. It is also important to maintain the critical skills that are typically found in the older workforce.

What the sector needs is an agile, resilient and affordable workforce that is capable of thriving in an environment of ongoing commodity price volatility and digital transformation of the sector. Companies need to take a short-, medium- and long-term view of requirements, and invest accordingly.

Some considerations for creating a workforce of the future:

- ▶ **Think about the future now** – create a strategic workforce strategy to guide through how you attract and grow required capabilities, while re-skilling the existing workforce with skill sets that will not be required in the same way 5 to 10 years from now
- ▶ **Build a brand or purpose**
- ▶ **Seek alternative sourcing mechanisms** across short, medium and long terms
- ▶ **Challenge conventional resourcing and development strategies** – for instance, it may be easier to source planning capabilities from outside the industry including those from a manufacturing or analytics background
- ▶ **Utilize a flexible resourcing model** that provides mechanisms to balance workforce supply and demand, retain ageing employees, and attract top talent

08 Disruption



“We are now in an era of constant disruption, and it is coming from unexpected places. Instead of seeing it as a threat, you should see it as a great opportunity to innovate, evolve and thrive.”

Paul Mitchell
EY Global Mining & Metals
Advisory Leader

Unwelcome disruption or transformational opportunity?

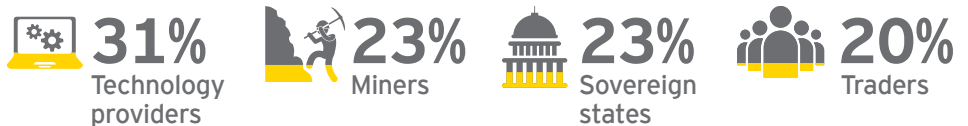
Many consider disruption as being sector-wide, but disruption has already begun at the value chain level within the sector:

- ▶ **Job disruption:** Automation is in the process of creating job disruption both within the back office (through robotic process automation) and in operations (through autonomous vehicles), but the next types of jobs to be disrupted will be those that schedule and plan work.
- ▶ **Customer disruption:** This is already occurring in some commodities. For instance, Morgan Stanley predicts that 15% of gem quality diamonds will be synthetic diamonds by 2020.⁵
- ▶ **Asset disruption:** Automation and electrification will disrupt assets. Electrification of mines is starting to climb the agenda of CEOs and COOs as a driver of cost reduction, energy efficiency and license to operate stewardship. New mines are being built as “digital mines,” which will create a new wave of assets as these become commonly adopted.
- ▶ **Economic disruption:** This will occur through regulatory and macroeconomic changes such as mining code and government changes.

Who could create sector-wide disruption?

Broader sector disruption is inevitable. The question is, “from who?” While we don’t think there will be an Uber-equivalent in the mining sector, market leadership could be lost as dominant players respond slowly, or ineffectively, to sector and external

Major disruptors of the mining sector



Source: An EY global survey of 336 mining and metals executives.

changes, and an environment is created that is attractive to new participants.

Breaking from tradition: The miners of the future

In a recent webcast, we polled executives on their view of where disruption would come from; and it is largely in line with our views:

Technology companies may take the decision to become direct or indirect investors as a way of shoring up supply. For example, with limited global cobalt and lithium supply, we could see companies adjusting their investment models to ensure that they can continue to produce phones.

Sovereign states have the capital to become major stakeholders in the sector to secure supply for national industries and protect jobs. We may also see major sovereign wealth funds investing in the sector such as Saudi and Norway.

Traders are once again cashed up and looking for opportunities. In the past, this group has taken an interest (full or partial) in operations to shore up the supply of key commodities (e.g., the JV investments in Australia). We would anticipate that this group will emerge as a more prominent player in the sector again.

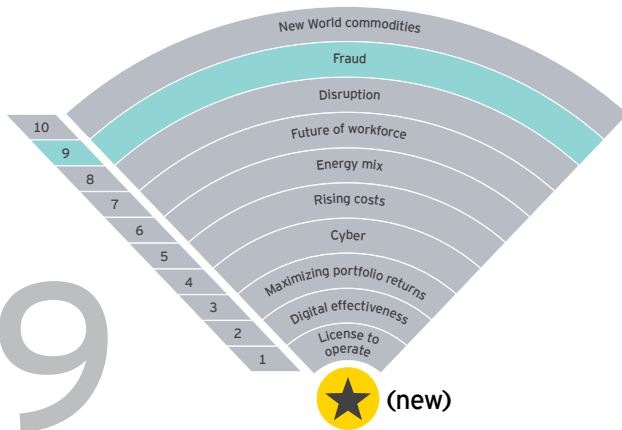
So how can mining and metals companies respond to this risk?

Think differently about capital	Should the traditional capital agenda of “Buy – Build – Return” change
Invest heavily in digital and innovation	Drive productivity and margin improvement through digital and innovation
Accelerate the disruption process	Look for new opportunities – ventures? Consider collaboration
Broaden license to operate	Strengthen relationships with sovereign stakeholders to influence and prepare for regulatory change

⁵ Sue Lannin, “De Beers to launch synthetic diamond jewellery in United States to shake up gemstone market,” ABC News, 4 July 2018.

09

Fraud



38%
of respondents stated bribery or corrupt practices occur widely in business in their country and **13%** would justify a cash payment to win a contract.

EY Global Fraud Survey 2018

Does fraud only become an issue when it's exposed?

Fraud and corruption have re-emerged as a significant risk for many mining and metals companies. We don't believe this is a result of more fraud and corruption taking place, it is just that the capacity to identify it has become more sophisticated. In addition, social media has made globally visible any allegations of impropriety with unprecedented speed, regardless of whether or not the allegations are founded. This places risk of fraud hand-in-hand with the risk to reputation and licence to operate.

Increasing use of technology

Mining and metals companies are increasingly using digital technology to change the way they do business, which is heightening their exposure to fraud, corruption and other risks. Increased global connectivity means that anyone with access to company data, anywhere in the world, can exploit weaknesses in data security. Organizations' critical digital and physical assets are therefore at greater risk of theft, damage and manipulation than ever before.

Increasing fraud and corruption risks as activity increases

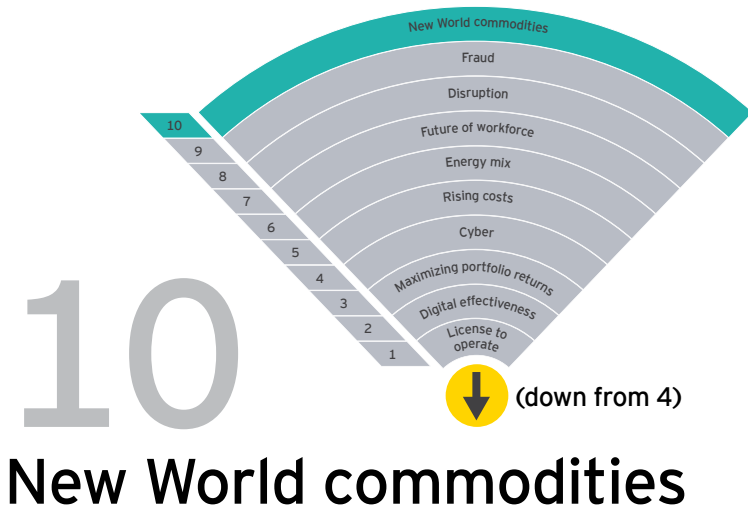
Higher commodity prices and rising cash flows have led to the restart of exploration programs and progressions with brownfield mining projects. A key gap identified during the last boom was the lack of active management and monitoring of contracts. Organizations spend billions per year on contracts to deliver capital projects and maintain operations. This expenditure often involves multiple contractors, some of which may be managed by third parties. In our experience, between 1% and 2% of capital project expenditure is contractually noncompliant or misallocated, with an average of 8% that can be identified across recurrent operational expenditure.

How are companies responding?

The effects of fraud and corruption are far-reaching, and can seriously impact a company's reputation and social license to operate and, in turn, shareholder value. Many businesses have reached a level of

maturity in their compliance programs, with the majority of executives interviewed in the EY 15th *Global Fraud Survey* aware of anti-corruption policies, procedures and intent from management. Advances in the predictive capabilities of "big data" mean that analytics has advanced from a detective tool and can now be used to make real-time assessments, helping identify and prevent fraud, and providing management with more effective oversight. Leading companies are using AI technology to replace classroom and web-based training with individualized risk-based communications in real time.

Mining and metals companies face the challenge of influencing the behavior of diverse, dispersed employees and third parties amidst intense competitive pressures and increased regulation. With this pace of change, management and compliance functions need to evolve how they work to identify new fraud and compliance risks. The EY 15th *Global Fraud Survey* results suggest that the benefits of demonstrating organizational integrity go beyond the avoidance of penalties and can actually improve business performance. This makes sense: doing the wrong thing is a lost opportunity to do the right thing.



Urbanization and rising demand for infrastructure, such as buildings, roads and railways, have been key drivers of demand for Old World commodities. More recently, however, technological disruption and the ongoing transformation of downstream sectors, within an increasingly "green" economy, have resulted in a change in commodity demand.

For example, the rise of electric vehicles has boosted demand for critical minerals such as cobalt, lithium and copper. On the other hand, an increasing focus on recycling, as companies seek to become more sustainable, is likely to result in reduced demand for certain commodities. For example, it is estimated that 20% of cobalt demand may be met by battery recycling by 2025⁶. In addition, this shift to recycling is likely to impact iron ore demand as steel companies, particularly in China, increase their use of electric arc furnaces, resulting in higher demand for scrap steel.

Understanding the impact of these changes on miners' portfolios, and keeping a balance between New and Old World commodities has become a complex task in such a rapidly changing environment.

Competing for the next wave of demand

Competition for New World commodities is only going to increase as they become central to the production of an ever-growing variety of high tech and green technologies, from batteries, smart phones and laptops to advanced defense systems. And it's not just mining and metals companies seeking to secure new projects.

Countries and regions, such as the EU, South Korea, Japan and the US, are deeming some minerals as "critical" to ensure they are available for their future

“EVs will underpin the growth of alternative metals and demand for copper.”

Executive Director of M&A,
Global banking and financial
services company

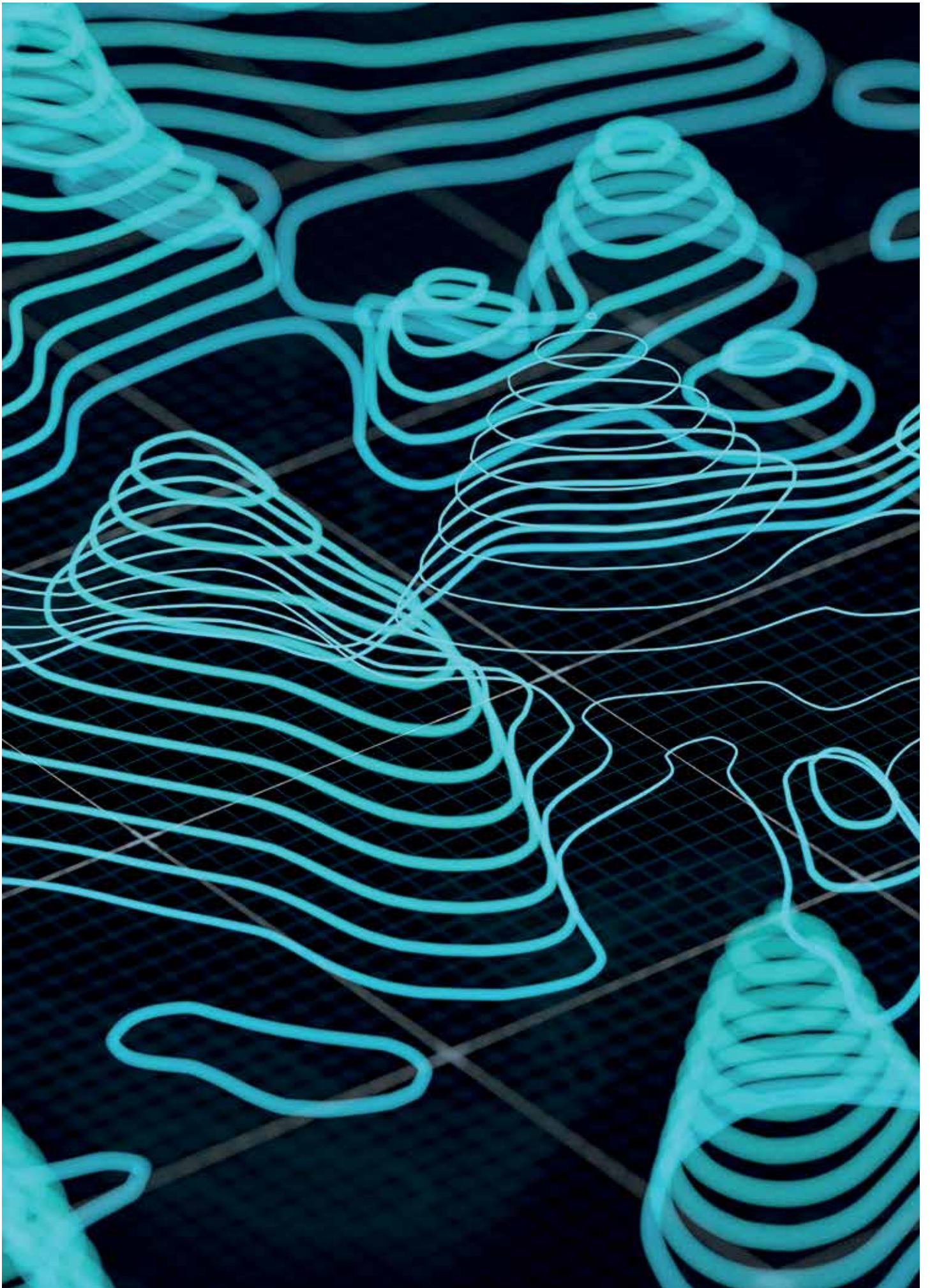
prosperity. Chinese state-owned enterprises are also already taking a significant proportion of the lithium-ion battery supply chain by purchasing and funding lithium and cobalt mines as well as downstream processing. In addition, downstream sectors, such as technology and automotive, are exploring how they might secure supply.

Planning and expanding your horizon

The mining and metals companies that will be the winners in the future will ultimately be those who have collaborated with many sectors and captured value across the chain. Some miners are either using VC firms or setting up specialist internal teams to identify more specialized mining prospects as they seek to capture value beyond their core portfolios. Rio Tinto Ventures, for example, is assessing new opportunities based on key new technologies that will influence future metal demand.

Portfolio optimization is critical. Miners need to understand the interaction among various parts of their portfolio to enable decisions on investment, divestment and rationalization to enhance value of the entire portfolio. Decisions around where to invest and allocate capital will need to be taken long in advance. Miners will, therefore, need to adopt a level of flexibility in their business models to be agile to change and regularly review their portfolios, considering all future growth assets – new and old.

⁶ "Future of Mobility and Battery Service," EY analysis, September 2018.



How EY's Global Mining & Metals Network can help your business

The mining and metals (M&M) sector is returning to growth, but companies face a transformed competitive and operating landscape. The need to improve shareholder returns will drive bold strategies to accelerate productivity, improve margins and better allocate capital to achieve long-term growth. Digital innovation will be a key tool, but the industry must overcome a poor track record of technology implementations. If M&M companies are to survive and thrive in a new energy world, they must embrace digital to optimize productivity from market to mine.

EY teams take a whole-of-value-chain approach to help you to seize the potential of digital to fast-track productivity, balance portfolios and set a clear road map for the new energy future.

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ED None.

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