A NEW PARADIGM OF WORK

Building resilience in mining and metals
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Introduction

The World Economic Forum’s Mining and Metals Industry Action Group (IAG), in collaboration with Accenture, explored and identified areas where the industry can collaborate to prepare for a world reshaped by COVID-19.

Three priority themes were identified to further industry resilience through collective action: A New Paradigm of Work, The Connected Value Chain and An Accelerated Purpose. This effort fits within “The Great Reset” initiative, a call to action for businesses to consider all stakeholders in building a more fair, sustainable and resilient future (Figure 1)—especially important for the mining and metals industry.
This white paper explores the imperative for a New Paradigm of Work to build resilience and flexibility in operations and the workforce.

It considers the stakeholder groups of future and current employees, contractors and operations. Industry collective action recommendations are outlined from this perspective for both the immediate and mid-long term.

Figure 1. The mining and metals industry response to COVID-19

The Great Reset
A World Economic Forum initiative to call on all stakeholders to manage the direct effects of the Covid-19 crisis and build a resilient future.

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**STAKEHOLDERS**
- Future and current employees
- Contractors
- Operations

**STAKEHOLDERS**
- Suppliers
- Customers
- Consumers

**STAKEHOLDERS**
- Society
- Communities
- Investors
- Governments
Moving into a New Paradigm of Work

COVID-19 exposed holes in current ways of working for the mining and metals industry, creating an imperative to build a new model that fosters a collaborative relationship between stakeholders, organizations and technology. The goal: to develop resilience and flexibility in operations and the workforce.
Prior to the pandemic, the industry was accelerating towards the Fourth Industrial Revolution (4IR).

The 2017 World Economic Forum Digital Transformation Initiative for the mining and metals industry found the transition to offer a number of benefits, but put some jobs at risk.

- Saved 1,000 lives and avoided 44,000 injuries from digitalization in areas such as autonomous operations and robotics, connected worker and remote operations centers.

- Generated $320 billion in industry value from digital initiatives like automation, digitally enabled workforce, integrated enterprises, and next-generation analytics and decision support.

- Jeopardized 330,000 jobs equating to almost 5 percent of the workforce due to digital transformation, such as integration of robots and smart machines.¹
COVID-19 has presented an opportunity for the mining and metals industry to take collective action and shift to a new paradigm of work. The three progressive stages—rebounding operations, evolving digital solutions and building a skilled ecosystem—provide a structure to build a more resilient and flexible organization. (Figure 2)

**Figure 2:** New Paradigm of Work framework

- **Nearer-term**
  - Individual company advantage
  - 
  - Rebounding Operations
    - Assess jobs to identify necessary skills
    - Minimize movement and exposure between sites
    - Focus on scheduling and planning flexibility
  
- **Mid-long-term**
  - Collective industry advantage
  - Evolving Digital Solutions
    - Connect people and assets
    - Enable automated decision making and scheduling
    - Implement autonomous operations and remote operating centers
  
- **Building a Skilled Ecosystem**
  - Start with a flexible organization
  - Build a leadership culture
  - Transition a workforce to work with technology
  - Create opportunities for skill building
  - Build industry attractiveness and engage new talent

Source: Mining and Metals Industry Action Group
Rebounding operations

The COVID-19 crisis required businesses to put employee safety first when operations began to rebound, as businesses cannot function without their people.

Many mining operations accelerated digitalization of planning, dispatch and asset health functions. To return to full-fledged operations safely, businesses can take several steps to evaluate their workforce.
Assess jobs to identify necessary skills

The pandemic sped up the need to manage skilling across siloes and minimize the number of people needed to operate. Only 44 percent of businesses say they systematically assess jobs for adaptability. Mining and metals businesses can implement a strategic assessment of job roles and responsibilities based on capabilities, rather than competency, to reduce redundancy in positions. For instance, businesses could execute a time and motion study to identify worker roles, tasks and impacts to determine where redundant positions may exist.

Minimize movement and exposure between sites

Once necessary skills have been identified, mining and metals businesses can address the safety risk posed by a mobile workforce. When the pandemic hit, the remote location of mines and manufacturing sites presented a unique challenge for continuing operations safely without impacting vulnerable communities. Businesses can take this opportunity to build on connected worker solutions, such as smart sensors from wearables. They can also opt-in to contact tracing applications to track and monitor the health and safety of all personnel on-site. Some mining and metals businesses already have turned to contact tracing mobile apps, like EVRAZ, to protect the workforce.

Focus on scheduling and planning flexibility

Once the exposure is addressed, businesses can look to managing workforce costs. Many mining and metals companies are facing higher overtime costs from extended schedules. Rebounding operations is the fundamental first step to “getting the house in order” and mitigating risk. Once risk is mitigated and production is stable, mining and metals companies can focus on evolving digital solutions that aid human input to operations. The current disruptive environment provides the perfect testing ground for new ways of working.
Safer Mobility: Healthcare industry leverages technology to monitor mobility of workforce

In response to COVID-19, the healthcare industry is using blockchain technology for monitoring the health of people, sharing their clinical staff and authenticating credentials. SICPA proposed the use of a COVID-19 health passport. Leveraging the Guardtime KSI® blockchain technology, the passport would show the results of an approved test in a manner that cannot be falsified, allowing for controlled access to facilities and future uses as a digital vaccination record. The system is also being used to enable professional sport and being tested to allow the free movement of seafarers.5

Mining and metals industry could use blockchain in a similar manner to ensure contractors are healthy in a crisis, as well as verify authenticity of their certifications.
Evolving digital solutions

Businesses should build and strengthen their virtual operating models to support flexible ways of working.

A study found that even before COVID-19, 93 percent of executives believed that their companies’ existence was jeopardized by operating models that could not keep up. A virtual operating model is created by the integration and connectivity of devices, sensors and data across the enterprise. Holistically connecting these devices helps mining and metals businesses improve productivity, reduce operating costs and waste, and enable greater safety. Clean and accurate data is the foundation for any business to use advanced technologies that enable decision-making.
Evolving Digital Solutions

93% of executives believed that their companies’ existence was jeopardized by operating models that could not keep up.

Connect people and assets

Connecting people and assets allows for better-informed decision making and data gathering to minimize costs of operational disruption. Collecting data from pieces of equipment and vehicles across multiple processes can provide insights into potential failures. The more data available, the more opportunity to optimize safety and performance.

Enable automated decision making and scheduling

The use of algorithms and AI provide opportunities for mining and metals businesses to make real-time decisions and projections. For example, a global food manufacturer that invested in “digital twin” modeling capabilities was able to avoid idling a single factory due to decreased material supply during the pandemic. The digital twin allowed the food manufacturer to optimize its supply chain and move supplies closer to its production sites. Automated decision making can aid in drawing actionable insights from unpredicted events, and flexible scenario planning can identify the size of the workforce that needs to flex in core operations.

Implement autonomous operations and remote operating centers

COVID-19 accelerates the appeal of autonomous mining operations in order to reduce the human workforce on-site. Ultimately, the safest operations are the ones that do not expose the workforce to harm. This move to autonomous operations is not new for the industry. Even before the World Health Organization declared COVID-19 as a pandemic, the growth in autonomous haul trucks was expected to triple by 2023.
Building a skilled ecosystem

The foundation of the New Paradigm of Work framework is a skilled ecosystem that supports an adaptable and knowledgeable workforce.

That a skilled ecosystem requires thoughtful collaboration between businesses to maximize potential for all stakeholders.
Start with a flexible organization

To collaborate across organizations and tap easily into a skilled ecosystem of stakeholders, mining and metals businesses first should build a flexible organization that can respond to disruption and make fast decisions. This requires a move from siloed specialists to multi-faceted workforce roles. Seventy-two percent of executives believe that the proportion of multi-skilled generalists in their workforce will increase over the next three years. This bodes well for Generation Z employees who want more than one role at their business.

And it opens the door for organizing teams around a common objective rather than a function. Rethinking the organizational structure will help businesses build resilience ahead of the next crisis.
Build a leadership culture

Leaders need to be visible and manage morale while making transformative changes. Many leaders now realize that they need a new playbook to deal with the digital environment. Mining and metals Chief Human Resource Officers (CHROs) are taking on a new role as strategic partners and will be investing 30 percent of their resources on organizational transformation and 40 percent on workforce effectiveness where changes in operating models are necessary. In human resources, for example, leaders are shifting to “employee-centric workforce experiences,” adapting the workforce to human and machine partnerships in AI and automation, and using data and analytics to make decisions and predict outcomes. While leadership development mostly comes from within the business, C-suite leadership has the opportunity to instill “collaborative leadership,” which creates a connection with the entire organization. Mining and metals businesses can work together to define what this new leadership model looks like for the industry.
Transition a workforce to work with technology

As mining and metals companies accelerate digital solutions, workers must be brought along. The industry can only realize predicted value, safety and environmental benefits if the workforce can support the digital strategy. The roles and responsibilities of future mining and metals workers will shift, developing a new identity for the industry workforce. For instance, mechanics working on maintenance problems alone will become partners with an AI-driven future system to predict failures and perform preventative maintenance; and mining operators working on-site will shift to remotely overseeing multiple pieces of autonomous machinery.

Equity in learning and skilling is important for businesses to consider. As numerous mining and metals sites operate in remote locations around the world, their social license to operate engages the local Indigenous populations through employment, schools and local economy. With the increase in automation and digital solutions in the industry, there is an increased threat to more manual and routine roles. The New Paradigm of Work threatens the employment of Indigenous populations as automation is integrated into the industry, as there is a significant percentage of Indigenous people employed in those routine jobs in areas of drilling, blasting and train and truck driving. More programs that provide training in digital skills will be necessary to continue engaging Indigenous people in the industry’s workforce.

A broader response is necessary from the industry and local governments to enabling Indigenous people to succeed in the future workplace. By having an engaged culture, community and organization, mining and metals businesses can create higher-value jobs for more people.
Create opportunities for skill building

As roles and responsibilities shift, mining and metals companies can provide tremendous value in building skills.

There are mining and metals businesses that have already started addressing the skills gap through public and private partnerships. Some private sector companies have already offered clients a combination of classroom training, high-tech simulators and hands-on instructions to automation systems. These examples of collaboration leverage partnerships across governments, private technology firms and educational institutions, enabling businesses to make rapid progress toward digital skilling the workforce for the future of mining.

Build industry attractiveness and engage new talent

To attract the talent needed, the mining and metals industry will need to compete with other industries for the skills of the future.

The average age in the mining workforce in the United States is six-and-a-half years older than the non-mining workforce. Rising talent want to work for organizations that exhibit greater responsibility for the environment and communities.

The industry can cater to a new generation that has different job preferences, such as location and inclusion. The industry must attract new talent as its workforce ages out, and COVID-19 provides a platform that makes this easier to accomplish.
Recommenadations for resiliency in the New Paradigm of Work

The COVID-19 crisis has created an opportunity for mining and metals businesses to ride the winds of change and collaborate.
The mining and metals Industry Action Group identified three priority areas for collaboration:

01  
Build a future-ready workforce.

02  
Increase industry attractiveness.

03  
Enhance accessible education for all.
Build a future-ready workforce.
Given the impacts of COVID-19, new skillsets and leadership can be defined together as an industry.

The mining and metals industry can look to achieve outcomes with its future workforce through specific skills rather than outlined job descriptions. Those skills should be defined together through initiatives such as the World Economic Forum’s Preparing for the Future of Work initiative.

Insights around key-automation technologies, an industry definition of digital literacy and a current-state analysis of skills offerings can help shape future work in the industry along with the skills, knowledge and behaviors required. The industry can build an interactive skills map, overlaying with the desired regions and commodities specific to that region.
Increase industry attractiveness. Develop an industry-wide response to attract new talent. Use existing workforce and partners to define the future mining and metals worker identity.

The pandemic has provided an imperative for change in the mining and metals industry to increase industry attractiveness as the current workforce ages out while simultaneously building a better brand with society at large. If the mining and metals industry cannot succeed in establishing an improved reputation, then the ability to compete for future talent could be lost.

The industry collectively can work to understand what potential employees desire around the world. Combining those inputs with the workforce trends and preferences that have changed from the pandemic is a powerful way to inform the direction the industry can take to attract new talent.
Enhance accessible education for all. Collectively invest in different educational pathways to build skills and future talent that embraces local communities.

The stakeholders and partners across various levels of developing economies need to be included and consulted for the industry to create a truly valuable investment. Mapping the key stakeholders in the education ecosystem, like universities, communities and cultural institutions, can identify opportunities for partnerships and collaboration, such as online learning curriculums.
These recommendations are a high priority for collective action for the mining and metals industry and will help the industry emerge from the current climate with a new paradigm of work.
Notes & References


10. Ibid.


13. Ibid.


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