

How are mining companies using technology to drive greater EHS and sustainability performance?



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Good Business

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# Executive summary

Mining companies are forced to confront a complex array of site-specific EHS and sustainability risks that workers face day-to-day. How can technology help save costs and drive greater efficiency in EHS and sustainability management? To find out, we engaged independent research and consulting company Verdantix to conduct telephone interviews with 52 EHS and sustainability executives in mining companies across Australia, Canada and the US. The research shows a majority of mining companies use multiple different technology tools that are either siloed or only partially integrated. This lack of integration means many of these companies are struggling to realize the expected benefits of their technology investments, with the monthly reporting activities of the survey respondents alone, costing these firms almost \$1m in employee time. This report sets out six steps for mining companies to ensure they maximize the value realized from their EHS and sustainability technology investments.



Mining companies turn to  
technology to drive greater EHS  
and sustainability performance

Fuelled by a sharp drop in commodity prices, mining companies across the world experienced extremely challenging trading conditions during the first part of this decade. The recovery in commodity prices in the last two years has driven a significant reversal in fortunes for the sector. With a more positive economic outlook, mining companies are again able to look at investment opportunities, and investments in digital initiatives are near the top of the list.

The role of technology is one of the most significant mega-trends impacting global businesses today. CEOs are now expected to have in place a digital strategy for their organizations to ensure they remain lean, relevant and commercially competitive. For mining companies with complex and dangerous operations and a product

subject to significant price volatility, digital investments which enable the more efficient flow of information have the potential to both lower costs and increase productivity.

EHS and sustainability functions have not typically been at the forefront of technology transformation efforts but, increasingly, executives within these functions are looking to determine how technology can help save costs and / or drive greater levels of EHS, sustainability and operational performance. To understand the priorities, purchase drivers and benefits in more detail, we engaged independent research and consulting company Verdantix to conduct telephone interviews with 52 EHS and sustainability executives in mining companies across Australia, Canada and the US.

# Mining companies wrestle with complex site-specific EHS and sustainability risks

As a high-hazard industry, EHS and sustainability professionals at mining companies are forced to manage a complex web of site-specific risks. The types of EHS and sustainability risks which can vary by site include:

Environmental risks including site contamination, erosion and biodiversity

Mining activities can contaminate the soil, air and water in different ways depending on the type of mine. Open pit mining, for example, exposes radioactive elements from crushed rock causing residual rock slurries which leak into the surrounding environments. In August 2015, the Mount Polley Mine – the Canadian open-pit copper and gold mine operated by Imperial Metals – leaked 4.5 million litres of toxic slurry into nearby waterways and forests. The government issued an emergency water-use ban as a result. Underground mining involves a large amount of vegetation displacement, disturbing the biodiversity; and in brine mining, the transport of materials can leak contaminants from corroded pipelines due to the high salinity of their contents.

## Health risks including respiratory difficulties and acute physical injuries.

Mining workers suffer significant health risks from working in oxygen deficient atmospheres, in the case of underground mines, or handling machinery that operates at high pressure or temperature in open pit mining, for example. On May 9th 2018, the US Department of Labor's Mine Safety and Health Administration (MSHA) cited Lhoist, a 6,400 employee mining company, for the fatality of a worker who received severe burn injuries while igniting natural gas to pre-heat a rotary kiln in a lime producing plant in Alabama. Exposure to diesel exhaust or high concentrations of dust is a problem in underground mines. Witness MSHA in August 2016, which introduced the final phase of the respirable dust standard in coal mines – reduced from 2.0 to 1.5 milligrams per cubic meter of air – aimed at preventing black lung disease.

## Safety risks associated with confined spaces, moving equipment and working at height

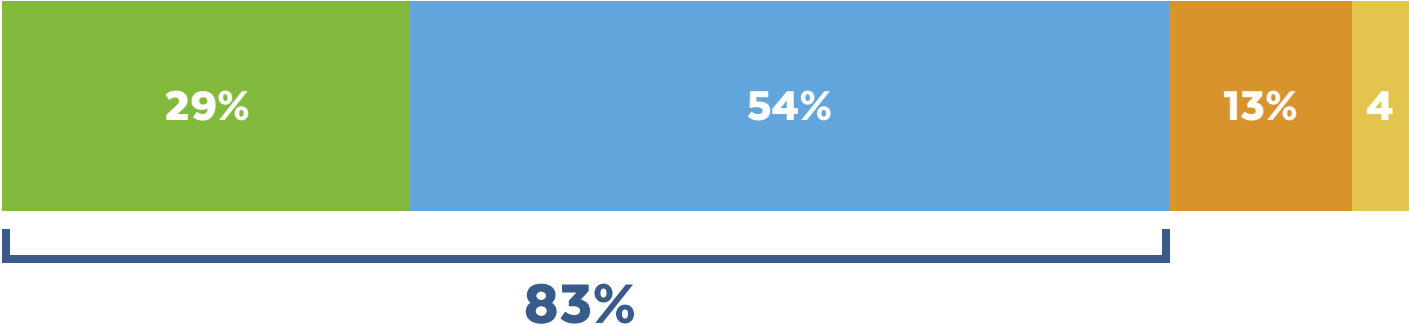
Roof and rib falls or coal bursts – relating to risks in confined space conditions – remain a leading cause of injuries in the mining industry. Since 2013, roof and rib falls or coal bursts led to the deaths of five US mining machine operators, and injured 83 other US operators. In February 2018 MSHA cited Wolf Run Mining, a coal mining operator, for the fatality of a maintenance worker who was pinned under a large section of rib used to support the mine, which lacked an adequate amount of rib bolts for the site-specific geological conditions of the mine. The safety risks associated with the heavy moving machinery used in mining operations have resulted in severe fines. In April 2017, MSHA fined North American Quarry and Construction Services, a New York rock drilling company, \$360,000 after a worker suffered fatal injuries when becoming entangled in a rotating drill steel when doing manual loading.

## Social risks including resettlement and cultural impact

The sparse surface area required for certain mining activities frequently causes risks of social impact on communities' cultural heritage. For example, in Australia indigenous communities are granted the right to negotiate with mining companies. Fortescue Metals Group, a mining company, pays \$10 million per year compensation for the mining of the Karijini traditional land. Or Adani, the Indian mining company, with \$16 billion in development plans of the Carmichael mine in the coal-rich basin region in Queensland, Australia. The representatives of the Wangan and Jagalingou people have formally rejected the land use agreement under the native title act.

# Figure 1: Eighty-three per cent of mining companies perceive technology as either critical or extremely useful for managing EHS and sustainability

“Which of the following statements best describes your firm’s mind-set towards using technology for managing EHS and sustainability?”



Technology tools are critical for effectively managing EHS and sustainability

29%

Technology tools are extremely useful for managing EHS and sustainability

54%

Technology tools are somewhat useful for managing EHS and sustainability

13%

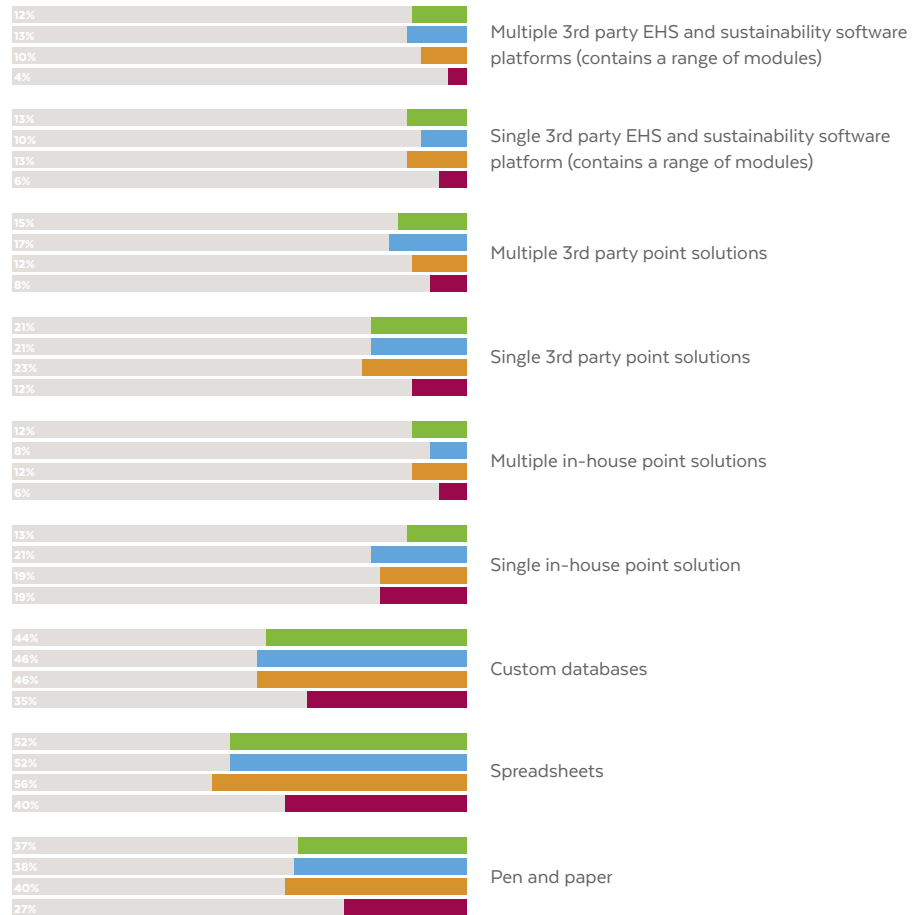
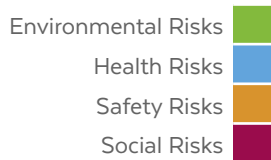
Technology tools are not useful for managing EHS and sustainability

4%



# Figure 2: Companies are using a range of different technology tools for managing the four key sustainability risks in mining

“Please select the technology tools currently used for managing the following four risk areas within mining sustainability (multiple responses accepted)”



# Companies establish a portfolio of tools to manage EHS and sustainability risks

Mining companies are forced to manage a complex array of environmental, health, safety and social risks. What tools are mining companies using to manage these risks? Discussions with the 52 mining companies revealed that:

Eighty-three per cent perceive technology as a success factor to managing sustainability.

More than half of the respondents perceive the use of technology as “extremely useful” for managing EHS and sustainability (Figure 1). The second largest group of respondents (29%) perceive technology as “critical”. And only 17% of respondents perceive technology as either somewhat useful or not useful at all for sustainability management.

*“We think technology is critical; we have tablets in the hands of our EHS supervisors across every site as part of our sustainability risk management.”*  
**(EHS Manager, Mining company, Canada)**

Seventy-nine per cent are using multiple types of tools to manage their sustainability risks.

Seventy-nine per cent of the mining companies interviewed, use a combination of different tools for managing sustainability. These tools range from multi-purpose EHS and sustainability software, to point solutions - such as software specific to managing soil or water data- to custom made databases for storing historic data on worker health records, and spreadsheets for continuous air emissions data monitoring purposes (see Figure 2). Which combination of tools are mining companies using? This depends on the site-specific risks that need to be managed. On average, across the four risk areas - environmental, health, safety and social - the largest portion of respondents use either spreadsheets (50%), or custom databases (43%), in combination with other tools.

*“We are using multiple third-party point solutions for managing each of the environmental, health and safety risk areas.”*

**(Health and Safety Manager,  
Mining company, USA)**

Pen and paper is still a key component in supporting risk management.

On average, thirty-six per cent of mining companies that participated in the study still use pen and paper as part of their tool mix for managing EHS and social risks (see Figure 2). Whilst only 27% selected pen and paper as a tool for managing social risks, this can be partly attributed to the fact social risks are generally more challenging to quantify and monitor and so are being monitored less widely overall.

*“Our incident reporting is managed via a combination of pen, paper and email exchange.”*

**(Health and Safety Manager,  
Mining company, USA)**

Between 6% and 13% of companies have a single 3rd party platform for sustainability.

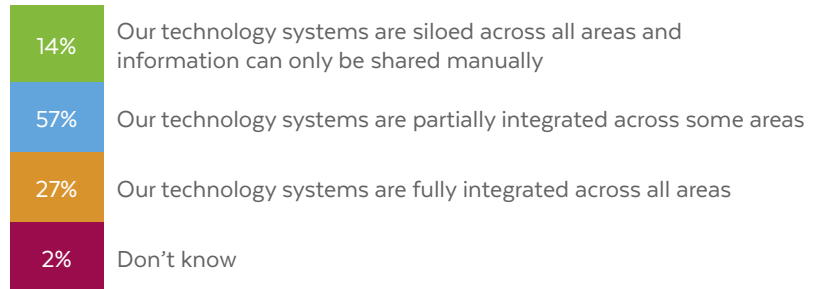
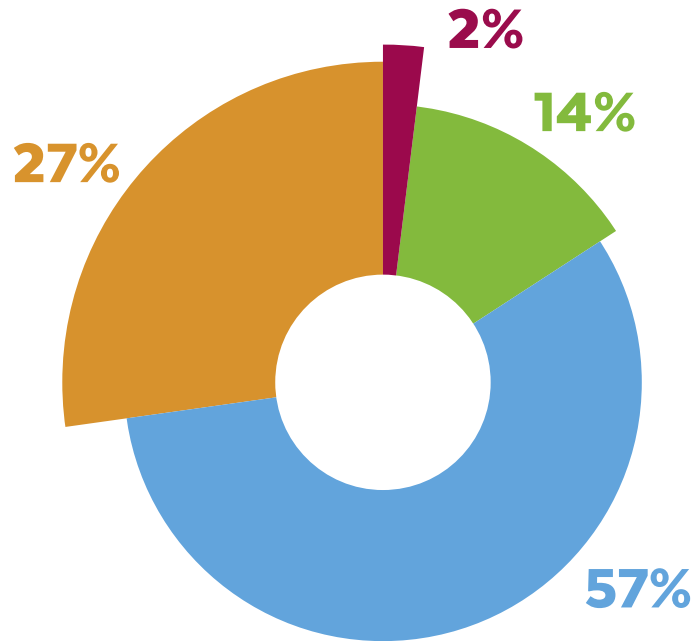
Analyzing the technology tools used to manage risks across each of environment, health, safety and social areas, between 6% and 13% of the 52 mining companies interviewed use single 3rd party software as their main technology tool (see Figure 2). Single 3rd party platforms were deployed most widely to manage environmental risks (13% of respondents) and safety risks (13% of respondents). Only 6% of interviewees were using a single 3rd party platform for managing social risks.

*“We use multiple third-party point solutions for managing EHS risks as the health and safety function is separate to functions that are responsible for indigenous engagement and environmental management.”*

**(Head of Sustainability,  
Mining company, Australia)**

Figure 3:  
Seventy-one per cent of mining companies use EHS and sustainability technology tools that are either entirely siloed or only partially integrated with one another

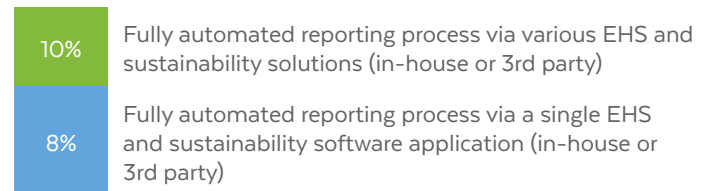
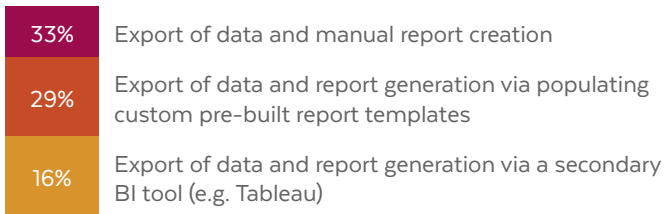
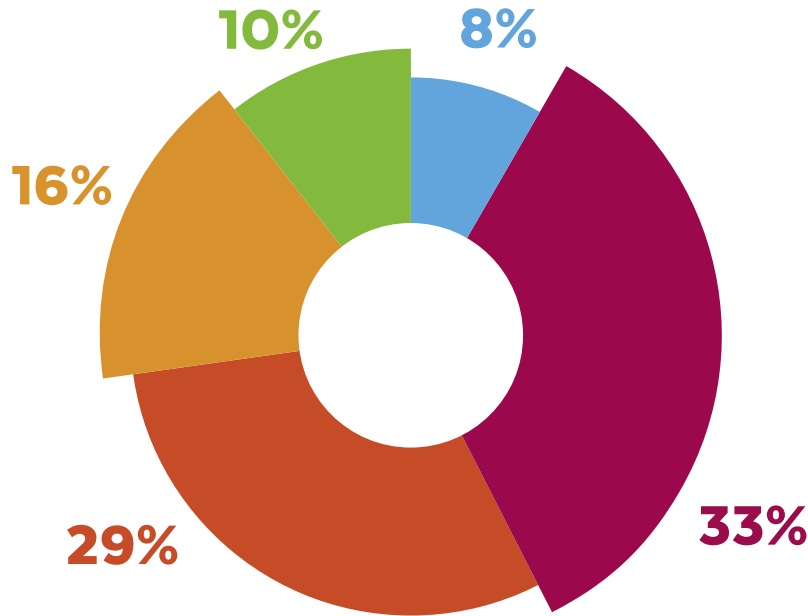
“Which of the following statements best describes the level of integration of your EHS and sustainability technology tools?”



Source: Verdantix & IsoMetrix ©

Figure 4:  
On average, 33% of mining companies generate reports using an entirely manual process

“What percentage of your EHS and sustainability reports are generated through the following methods?”



# Lack of integration between technology tools creates huge additional costs

A majority of the mining companies interviewed perceive technology as a key success factor to managing EHS and sustainability with most companies deploying a wide range of different technology tools to support them with this. In speaking with the interviewees about technology integration, it was found that:

Only 27% of companies have fully integrated EHS and sustainability technology tools

Seventy-one per cent of the mining companies interviewed have technology systems that are either completely siloed or partially integrated across some areas (see Figure 3). One particular company interviewed conducts site audits with a mobile app, and manually enters the audits into a 3rd party software for tracking incidents. The portion of mining companies (27%) that describe their technology systems as being fully integrated will save their workers a significant amount of time needed for manually sharing information across siloed systems.

*“We use spreadsheets, and depending on the person using it, spreadsheets can be different. It is very decentralised and siloed. It’s not ideal.”*

**(VP Health & Safety,  
Mining company, Canada)**

More than half create reports using an entirely manual or near manual process.

On average, 62% of respondents generate EHS and sustainability reports either manually or with support of custom pre-built report templates (see Figure 4). Only 18% of respondents fully automate their reporting process via a single or multiple EHS and sustainability software. These involve minimal manual labour as the pre-built report templates are automatically uploaded from monitoring systems that feed directly from the source located on the mining site.

*“Automating the reporting process is not considered realistic. It is a fantasy of mine.”*  
**(Health & Safety Manager,  
Mining company, USA)**

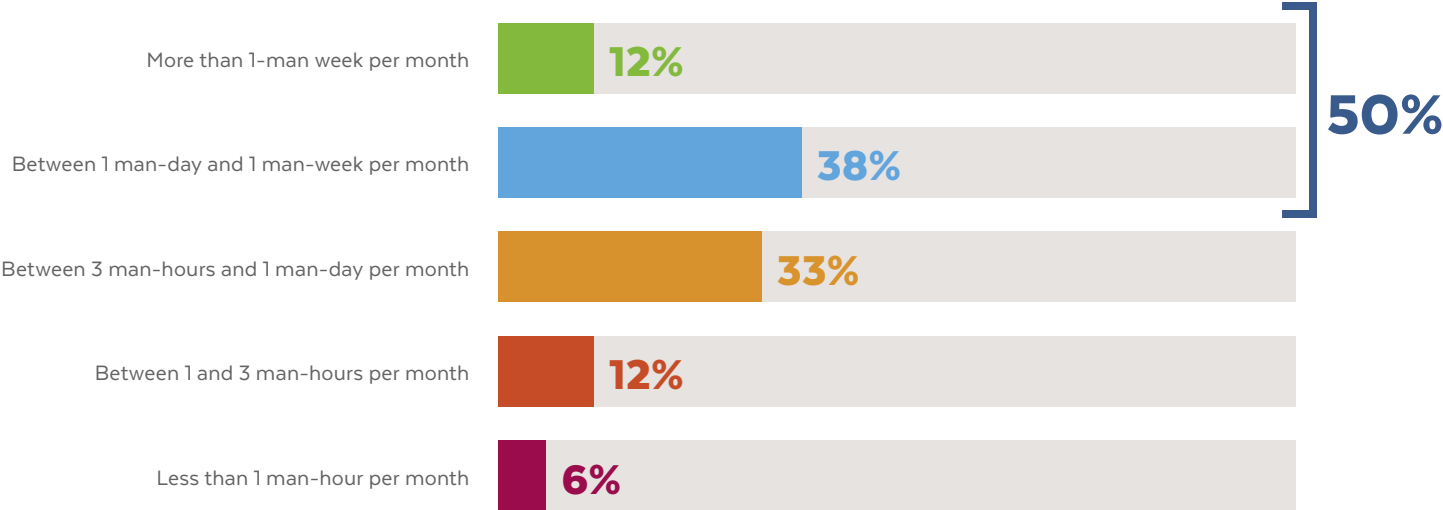
Twelve percent of EHS managers interviewed spend more than one man week per month on reporting.

Half of the respondents spend a man-day or more per month on generating reports for EHS and sustainability (see Figure 5). A further 12% of managers spend more than one man-week per month on reporting. Looking at the aggregate responses to time spent on reporting across the 52 respondents, this translates to a total annual spend of \$978,000. Those companies that have invested in technology for automating aspects of their reporting process through business intelligence tools, for example, have to dedicate less man-hours per month to this purpose. Eighteen per cent of the mining managers interviewed spend 3 man-hours or less per month on their sustainability reporting.

*“Each week the guys generate the monthly report. We have approximately 50 safety professionals working on this.”*  
**(Safety Area Manager,  
Mining company, Australia)**

# Figure 5: Fifty per cent of managers interviewed spend more than one man-day per month on reporting

“How many man-hours per month does your firm require to generate reports for mining sustainability?”

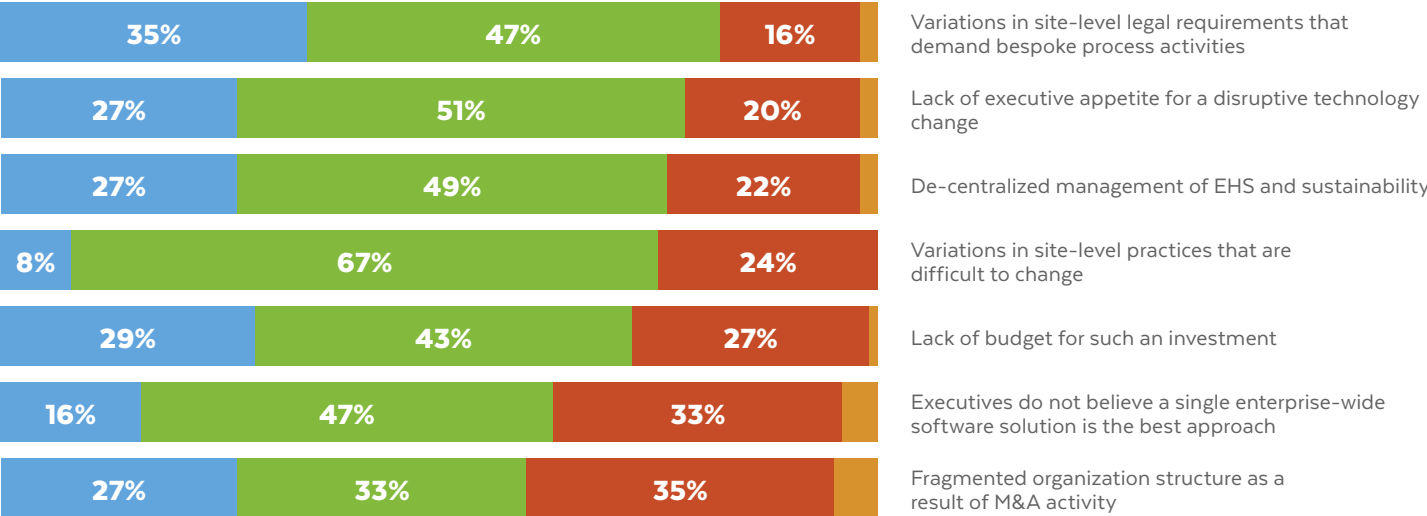


Percentages are rounded to the nearest percentage point.



# Figure 6: Variations in site-level requirements is the top barrier to adopting a single enterprise-wide software solution

“How significant are the following barriers to deploying one single enterprise-wide software solution for managing all EHS and sustainability areas?”



Percentages are rounded to the nearest percentage point.



# Three barriers are stalling the technology aspirations of EHS and sustainability leaders

Mining companies recognize the value of technology; this study has already shown 83% consider this a success factor in managing EHS and sustainability. Looking at how this translates to the deployment of technology, 96% of mining companies in this study have deployed some type of technology solution (e.g. custom database, point solution, EHS and sustainability software platform, etc.). Despite this, a number of firms are struggling to realize the promised benefits as they wrestle with a complex portfolio of poorly integrated solutions.

Why aren't mining companies deploying a single enterprise-wide software solution for managing EHS and sustainability? Looking at **Figure 6**, seven different barriers were explored with the interviewees. At least 60% of interviewees identified each barrier as either significant or very significant. Three factors emerged as most significant:

## Variations in site-level legal requirements

Eighty-two per cent of respondents perceive “variations in site-level legal requirements” as a “very significant” or “significant” barrier. Legal requirements can vary substantially according to site-specific conditions. In subsurface mines, companies typically have to comply with a range of air quality regulations to protect worker safety. For example, on April 5, 2010 a coal dust explosion killed 29 out of the 31 miners in the Upper Big Branch coal mine, located 300 meters underground in West Virginia. In surface mines, regulations related to vehicle/mobile equipment are more prominent for worker safety protection. According to the Mine Safety and Health Administration (MSHA), powered haulage accidents are the leading cause of fatalities in the mining industry, accounting for 50% of fatalities in 2017.

## Lack of executive appetite for a disruptive technology change

Second on the list is “lack of executive appetite”; 78% of respondents perceive this as a “very significant” or “significant” barrier. The CEO’s high-level objectives may not prioritize digitization of EHS and sustainability management. Particularly if the transition calls for a step change from traditional forms such as pen and paper, excel and custom databases, to an enterprise-wide EHS software which streamlines the multiplicity of EHS and sustainability risks across the organization.

## De-centralized management of EHS and sustainability

Seventy-six per cent of respondents perceive “de-centralized management of EHS and sustainability” as a “very significant” or “significant” barrier. Due to the unique site-specific requirements that are characteristic of mining companies, there has been a historic tendency to de-centralize the management of EHS and sustainability to the individual site level. This has promoted site specific management practices and technology purchasing decisions, which has helped create complexity in the technology portfolio.

# Six steps for mining companies to enable their technology vision for EHS and sustainability

This report sets out six steps for mining companies to realise their technology vision for EHS and sustainability:

## 1. Establish the rationale and expected business benefits of your technology vision

The very first step requires the rationale for the investment to be determined. Rather than the detailed business case, this is about the top level benefits an investment will potentially deliver for the organization. This could include enhanced process efficiency, reduced workers compensation or a reduction in EHS and sustainability risks. Providing some broad level estimates of the % savings that could be achieved would be helpful at this stage.

## 2. Map existing processes and technology solutions at relevant sites

EHS and sustainability professionals need to get a clear sense of what existing processes are being supported by which technologies and at which sites. Having

a company-wide view of the current technology adoption will help EHS and sustainability professionals identify the different attitudes towards technology or whether certain sites are using traditional manual processes or forward-looking automation tools for reporting. Another action item is to map the functional and technical requirements across the sites for the future EHS and sustainability solution.

### 3. Liaise with vendors to determine the solution types that could match your requirements

EHS and sustainability professionals should initiate discussions with vendors to understand if solutions exist which broadly matches their requirements. It is recommended that companies prioritize vendors with a strong track-record in the mining sector since these companies are most likely to have a solution which can meet some of the key challenges in the mining sector (e.g. variations in site-level legal requirements).

### 4. Develop a phased roll-out plan

A phased roll-out plan is often the most sensible implementation approach since it enables some quick wins to be achieved and helps reduce the risk of major implementation issues. The phased approach can take many flavours (e.g. by country, by site, by module, etc.) but the most suitable approach for an individual company will depend on its own precise circumstances and priorities.

### 5. Build a formal business case

The fifth step is to build a formal business case around the adoption of the EHS and sustainability solution. This will formalize some of the initial assumptions made during step one. The financial benefits need to be the priority in this exercise. Cost savings will be the obvious category to examine linked to process efficiencies, workers compensation and reduced regulatory fines. Outside of that, there are increased productivity considerations

linked to greater asset up-time. Beyond the financial benefits, it is also useful to consider and detail the further benefits which are delivered such as increased safety of employees, or reduced reputational risks associated with EHS and sustainability.

### 6. Sell your vision to individual internal stakeholders

Finally, the well-crafted technology vision needs to be sold to internal stakeholders on an individual basis. The executive board can sometimes be treated as a single entity which is looking for a single message. In actual fact, each individual within the board has specific interests and priorities for the company's success. Understanding the motivations of each of these individuals and applying this to the communication strategy can be the key to succeeding with the technology adoption strategy.



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## About IsoMetrix

IsoMetrix is a world leading developer of integrated risk and compliance management software solutions.

For the last 20 years, global mining companies have trusted IsoMetrix to help manage their Environmental, Health, Safety and Social risks.

With offices in the USA, Canada, Australia and South Africa, IsoMetrix is well positioned to provide international companies with support across the globe.

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