Willis Towers Watson

Mining Risk Review 2017

The future of mining is now

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Notes

- Our Review uses a mixture of American and English spelling, depending on the nationality of the author concerned.
- We have used capital letters to describe various classes of insurance products and markets, but otherwise we have used lower case to describe various parts of the energy industry itself.

Introduction

Welcome to our Mining Risk Review for 2017. The global mining industry is going through a period of tremendous change and, much like the oil and gas sector, is experiencing unprecedented uncertainty and volatility.

Driven by robust growth in emerging markets, the mining industry's priority in the post-recession era leading up to 2011 was to grow volumes. This was achieved by applying capital, but perhaps without the cost discipline required. With the subsequent cooling of the commodities super-cycle, the emphasis shifted to bringing down cost and maintaining margin as prices dropped.

Miners have risen to the challenge – rethinking their risk profiles, embracing technology and exploring innovative ways of working in pursuit of greater efficiency and productivity.

This has served the industry well. Amongst the wider spectrum of natural resources sectors, mining companies are seen as leading the charge towards digitalisation, automation and remote operations.

New frontiers produce new risks

But as mining turns to more exotic locations in volatile geopolitical environments, and pushes technical frontiers at depths of 3 km to access more complex ore bodies while relentlessly reducing costs, the industry risk landscape continues to evolve. Demand for commodities such as cobalt and lithium for batteries within consumer electronics, renewables and electric vehicles adds to this trend, with miners being driven to newer geographies and methods of production.

Sitting above core operating risk is the renewed focus on linking societal outcomes to business success, such as workforce safety, community engagement and environmental sustainability. This is the new license to operate, and no longer optional.

Societal outcomes critical to business success

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The future of mining is now!

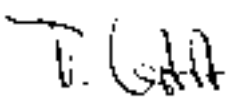
So what next? We think miners have done a great job at creating their future. But with it comes a new set of questions, and indeed, risks. For example, how will the environmental risk profile of the mining industry change as climate pressures increase over the course of the next decade? Or, what will the mining workforce of the future look like? While some of the fundamental questions will remain (for example: where will we find the mineral deposits of the future or what will fuel demand growth for the next decades?) it is clear that the future of mining is already here and the time to respond to new risks is now.

We at Willis Towers Watson strongly believe that human capital risk and asset risk are inextricably linked and should always be addressed together. Our mining experts would be delighted to discuss how you can better manage or transfer your risks.

I hope you find the 2017 Willis Towers Watson Mining Risk Review valuable and informative. Part one focuses on four key challenges the mining industry must address in new and innovative ways - geopolitics, stakeholder relations, digitisation and people; Part two focuses on risk mitigation and transfer issues.

We would of course love to hear from you and receive any feedback that you might have.

Yours sincerely,



Thorsten Querfurt
Global Industry Leader,
Natural Resources

Editorial - the future of mining is now

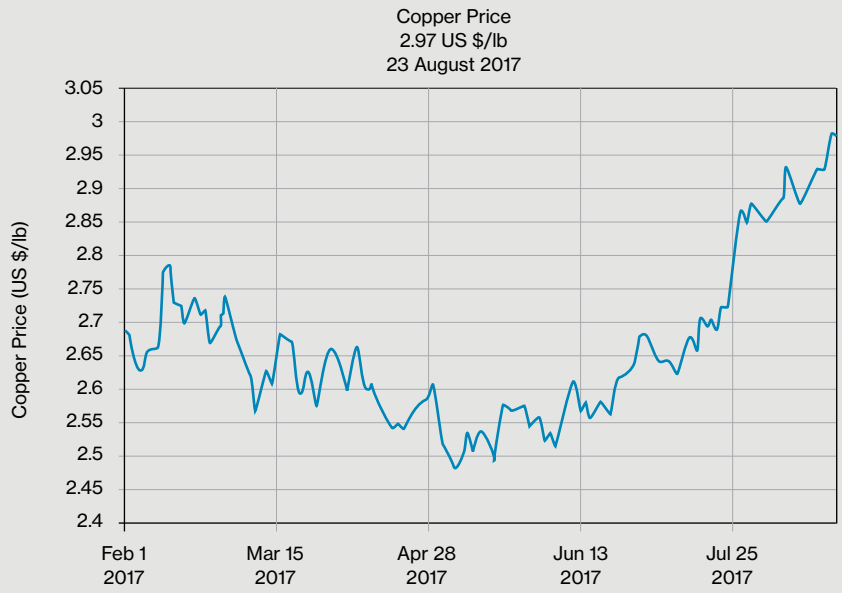
Introduction - a challenging business environment!

There can be little doubt that the mining industry is undergoing a period of transition that perhaps is unprecedented in its long history - at a time when the industry needs to present a positive, progressive image to an investor community that is increasingly focused on environmental concerns, particularly in the light of climate change as well as recent mining losses.

Following a time of significant expansion during 2008-11, we have witnessed:

- the slowdown in the global economy (as Chinese expansion has slowed)
- the geopolitical upheaval in certain countries rich in minerals
- the revolution in digital technology, the need to mine in increasingly remote locations
- the need to work more closely with both governments and local communities
- the need to ensure the right skills are in the right place

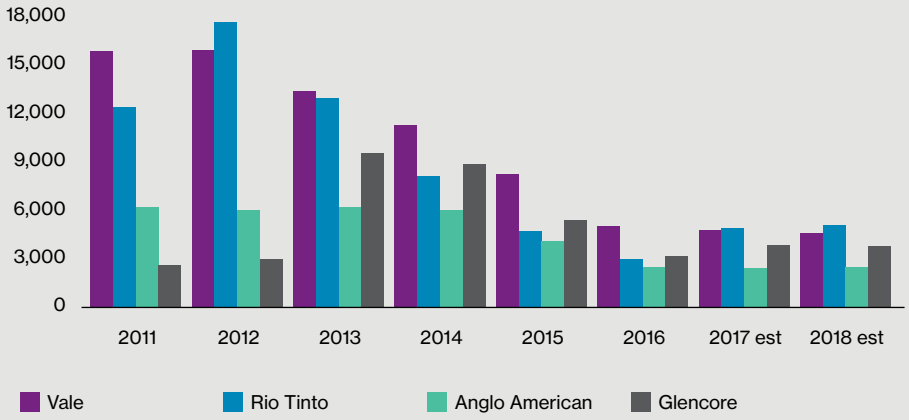
These developments have produced have produced new challenges for the industry, with a significant effect on its overall risk profile. No wonder managing both people and asset risk now presents miners with a much more formidable task than in the past.



Increased copper prices in 2017 have provided a welcome boost to the industry

Source: infomine.com

Select mining companies - capital expenditures (US$m)



Capital expenditure in the mining industry has reduced considerably in recent years

Note: est = Bloomberg estimate. Source: Bloomberg, BMI

Long lead times compound miner challenges

Although we are now at last seeing some signs of a recovery, with some commodity prices (notably copper) showing a pronounced recent upturn, the difficulties that the industry faces remain compounded by the long lead times between the commitment to a particular project and the mining of the first minerals. By the time minerals from a new project get to market, the industry can be in a very different place; this is certainly the case today, with projects that were commissioned ten years or so ago coming into production at a time when, as a result of the industry slowdown, miners' focus is on balance sheet repair, retrenchment and cost optimisation rather than on expansion.

The future has arrived!

For mining companies in 2017, there is no time to lose in evaluating the new industry landscape. The future of mining really is now – we are already in a new technological, legal regulatory and political environment. And that means new risks and challenges are making themselves known to mining companies that perhaps had no need to be considered in the past.

In this Review we therefore focus on four challenges that all mining companies should be addressing as we move further into the second part of this decade.

Key Review articles:

The Trump "Bump": how it's shaping the US mining industry's future – **Fred Smith IV**

North American surety: protecting your reclamation liability – **Tracy Tucker and Lois Innes**

Challenge one – operating within a volatile geopolitical landscape

Mining companies need to understand the driving forces behind recent geopolitical changes, as they will be crucial to future business development.

Resource nationalism a key issue

Firstly, as the mining industry expands further in to increasingly remote and unknown territories, the issue of resource nationalism is becoming an increasing concern to many mining companies. For example in South Africa, a new Mining Charter has been introduced to increase black ownership and revenue contribution requirements, while in March 2017 Tanzania imposed a ban on unprocessed ore exports, the latest regulatory measure that threatens the country's mining industry growth.

Terrorism threat increasing

At the same time, the terrorist threat in some key geographies remains constant, with mines continually under threat of attack, while the rise of protectionism in some of the major global economies threatens the viability of the global supply chains so characteristic of this industry.

Key Review articles:

What communities really want: rethinking local engagement – **Tom Holliday**

Addressing social disorder: is your strategy good enough? – **Tim Holt**

Challenge two – developing new stakeholder relationships

Closely allied to grasping the issue of geopolitical change is the need to develop and enhance overall stakeholder relationships, due to low prices and increasing government interference. Maintaining any current relationship impasses is no longer an option, either for the industry or for governments; indeed it seems clear that several countries are actively looking to bring the interests of divergent stakeholders into alignment.

Co-operating with governments, local communities and regulators

That may mean co-operating with governments to invest in the infrastructure required to sustain the industry and to re-establish goodwill with local populations. Of course, there will always be some areas where local hostility to the mining industry will never be completely erased; resolving these conflicts will require much more than simple investments in remote projects.

But it is surely in the industry's best interests to work together with other stakeholders to develop a shared vision for the region in question.

However, stakeholder pressures are not just coming from local communities. Regulators all over the world are expecting companies to comply with a whole range of environmental disclosures, while investors are becoming increasingly interested in environmental issues such as a mining company's carbon footprint and other related data sets.

Don't take your SLO for granted!

In short, no mining company can take its Social License to Operate (SLO) in a particular region for granted and new strategies may well have to be generated to ensure renewal in some key regions. Without a renewed stakeholder engagement strategy, some miners may find that their SLO is revoked; surely everything possible should be done to avoid this at all costs.

Challenge three – thriving in the new digital world

Towards more efficient and collaborative workforces

Technological change is now the new normal across the whole business landscape, and the mining industry is no exception. The future of mining is truly digital; moreover, it will support efficient and collaborative workforces, encourage centres of excellence in data management and allow miners a shared service mix of onshore, offshore and robotic workers.

Embracing new technologies

It is hardly surprising that miners are embracing new technology and deploying it wherever possible. Examples abound; driverless trucks, sensors and drones; real time modelling; geo-coding; and digital tagging of inventory critical to efficiency of just in time supply chain models. The final frontier may be the replacement of human shovel and drag line operators with a learning, intuitive machine.

Competition from tech firms

If only it was all good news for mining companies. Instead, they are now likely to face competition from the very same companies that have created all this digital expertise – the tech companies themselves. Now that "digital digging" is already becoming a reality, some tech companies now have their own in-house natural resources businesses. Examples include:

- Goldcorp has partnered with IBM for artificial intelligence capability, Microsoft for virtual reality technology and Accenture for big data analytics, none of which are traditional mine services firms.
- As of September 2016, BHP Billiton's relationship value as a customer with General Electric totalled US$43.5m.
- In 2016, top copper miner Codelco increased its 'innovation budget' by 25% year-on-year to US $75m and in December 2016 created the Codelco Tech unit to drive innovative efforts.
- In September 2016, top gold miner Barrick Gold partnered with Cisco to develop a flagship digital operation at the Cortez mine in Nevada which will inform the eventual global rollout.

(Source: BMI)

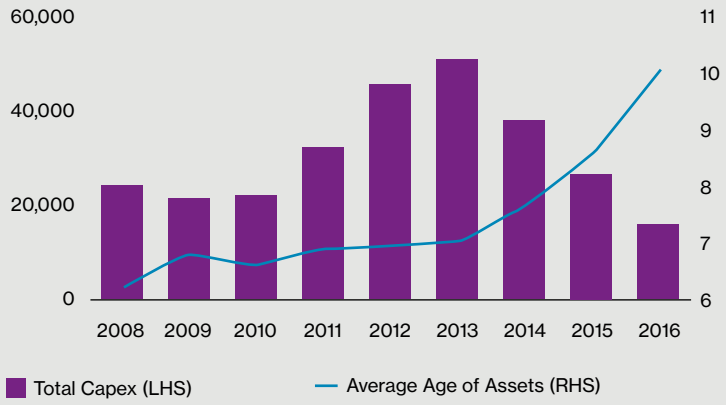
So now that tech firms can own the mechanical, financial and intellectual capital required, it may not be long before the current mining business landscape becomes significantly disrupted.

Key Review articles:

Digital digging – the future of work in the mining industry -
Ruchi Aurora and team

From technology to people: the new frontier in mining cyber risk -
Glyn Thoms

Technology to extend the value of each dollar
Select miners - total capital expenditure (US$m) & average age of assets (years)



Technology is extending the shelf life of mining assets as overall capex reduces

Note: Data based on Bloomberg Global Diversified Mining Peers. Source: Bloomberg, BMI

Automation may bring new risks

Moreover, the deployment of new technology in any industry always carries with it new risks – risks which by their very nature are difficult to identify and quantify. Mining companies are going to have to find new ways of resolving any technical faults if human labour forces are going to be stripped back in favour of automation. In the event of a major technological malfunction, what is the damage limitation plan? How might the mine be impacted? What will be the result? How will the fault be rectified? At what cost?

The cyber threat

In the meantime of course the risk of a cyber-attack clearly increases as rapidly as the mining industry develops its new digital infrastructure. With connectivity to the internet a prerequisite to modern industrial operations, the cyber threat is here to stay. Once again, because the risk is still in its infancy compared to traditional physical damage perils, it may not yet be clear as to how to quantify and deal with this risk. Can miners be sure that they have taken every possible step to mitigate the threat?

Challenge four – managing people risk in an age of turbulence

The skills gap

There is now a growing discrepancy between available and needed skills, especially in the new, often remote locations where miners have had to invest during the course of the last 10 years or so. Furthermore, the range of skillsets required by mining companies is changing, as digitalisation requires fewer workers at the front end of the operation and more deployed away from the mine site itself.

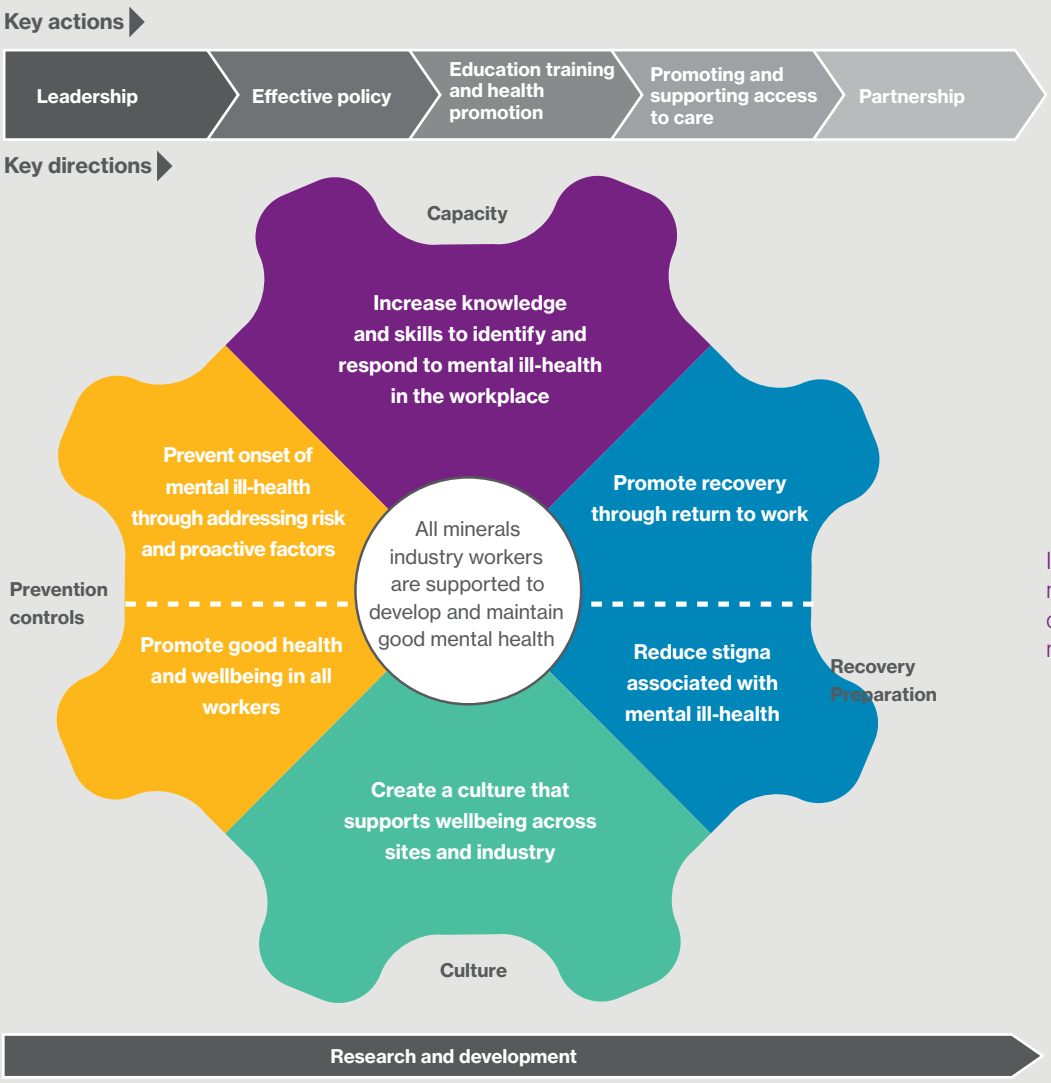
Key Review articles:

Mining their minds: optimizing the employee experience –
Michael Benoit and team

Black lung and compliance: the great divide -
Scott Kirkwood

Risk culture in the mining industry: why should it matter? –
Alasdair Wood

Total cost of lost time: a game-changing approach to managing employee absence –
Chris Wentland and team



In Australia there is now a renewed focus on mining industry mental health

Source: Minerals Council of Australia

Recruiting from wider talent pools

Mining companies are therefore going to have to compete with other industries to secure suitable workforces that have the right digital skillsets to match the industry's new requirements. But creating the right teams for the future means that they will have to recruit from much wider talent pools than the ones on which they have relied in the past. That means healthy and inclusive workforces that can adapt to the new era in a way that boosts productivity, both for the short and the long term.

Conclusion – an industry at the cross roads?

Within this Review, you will be able to read about some of these challenges that the mining industry is facing in more detail. In the aftermath of recent well documented mining accidents, we think it's reasonable to suggest that the industry stands at a crossroads. Smart miners will adapt to the new business environment and risk landscape in which they find themselves; those who continue to rely on outdated approaches to managing both their people and asset risk may find that there is not much of a future for them at all.

Robin Somerville *is Global Communications Director for Willis Towers Watson's Natural Resources Industry Group and editor of the Willis Towers Watson Mining Risk Review.*

Part one – four challenges for the mining industry

Challenge one – operating within a volatile geopolitical landscape

The Trump "bump": how it's shaping the US mining industry's future

Introduction – a brighter outlook for the US mining industry

What a difference a year can make. If we rewind the clock to the end of 2015, we see that the mining industry was still in a state of crisis and we seemed to have a global race to the bottom. Mining company valuations were at an all-time low, most commodities were still at rock bottom, many US coal companies were teetering on or in bankruptcy reorganization and the industry as a whole was searching for a path forward on shoestring operational budgets. However, as the first quarter of 2016 began, we were starting to see clear signs of a recovery.

Trump presidency a surprise to most

Throughout 2016 most commodities - whether bulk (coal and iron ore), precious or base metals - saw some level of recovery (albeit a bit bumpy) with coal and iron ore leading the way. Miners continued policies of operational excellence and capital discipline, repairing balance sheets through significant debt restructuring at the expense of new projects and expansion. However, as we approached the US presidential election in November 2016, the mood for US coal miners was particularly pessimistic; it was widely believed that Hillary Clinton would win the Presidential race and carry on with many of the anti-coal policies of the Obama administration. But as the Twittersphere began to buzz on the morning of November 9th, the US awoke to Donald Trump as our 45th president.

The Trump "bump"

Speculative trading began almost immediately, with volatility reaching new highs through the end of 2016 and early 2017. The "Trump bump" was alive and well in the US stock market and the US coal industry had signs of life. Capital markets soon opened back up to coal miners, allowing the financial health of the industry to vastly improve. Some coal producers have even returned to the public exchanges. However, fundamental supply and demand dynamics soon took over primacy in setting prices and the long term effects of actual policy change are yet to be determined.

Recent legislation

There is no question that the agenda of the Trump administration is pro-mining and many changes have been made already to positively impact US miners through regulatory relief, but there is still a great deal of uncertainty about the long term prospects in the US, most specifically for thermal coal producers. Let's look at the steps taken by the Trump administration to date.

Legislative actions through Congressional Review Act:

- ***Voided* the Steam Protection Rule:** this rule would have redefined "waterways" and increased the required buffer zones that had to be maintained around them, drastically reducing reserve life and increasing mining costs.
- ***Voided* the Resource Management Planning (2.0) Rule:** this rule impacted the Bureau of Land Management (BLM) which oversees 250 million acres of land in the West. The rule would have shifted control over land management to the federal government and lobbyists and away from local officials and communities.

Executive Orders:

- **Directs the Environmental Protection Agency (EPA) to rescind and rewrite the Clean Power Plan (CPP):** in April 2017 there was a halt on litigation and compliance with the CPP not required until it reaches final resolution. This provides the Trump EPA time to revoke or rewrite the plan. Under current terms of the Plan, coal fired power plant retirements would have accelerated.
- **Clean Water Act/Waters of the United States (WOTUS) Rule:** executive order issued to revoke the WOTUS. This rule would have shifted control away from states and given the EPA broad authority over regulating pollution of wetlands and tributaries, whether dry or wet.

Administrative Stays & Extensions:

- **EPA Financial Assurance:** decision delayed, but final resolution required by December 2017. A new *Federal* financial assurance requirement for US miners could see a US $7bn obligation need addressing, with cost estimates to miners as high as US $175m. Liabilities *in perpetuity* are being mentioned which has many mining companies and insurers alike on edge.
- **MSHA Metal/Non-metal Workplace Examinations:** compliance delayed until October 2017. This new set of standards and record keeping requirements would lead to an increase in cost to most miners.
- **MSHA Pattern of Violations (POV):** litigation settlement proposed
- **EPA Ozone NAAQS (National Ambient Air Quality Standards):** one year compliance extension
- **DOI Stream Protection Rule Biological Opinion**
- **Dept. of Interior (DOI) Coal Royalty Valuation**
- **EPA Power Plant ELGs (Effluent Limitations Guidelines)**

Presidential and Secretarial Memos:

- **Dept. of Energy (DOE) issues Review of US Electric Grid:** Energy Secretary Rick Perry orders the review to assess whether federal policies have hurt the grid's supply of base load power.
- **Streamline Permitting:** Interior secretary Ryan Zinke proposes a streamlined and accelerated permitting process of hard rock mining and federal coal leasing.
- **Expediting Environmental Reviews and Approvals**

Regulatory relief will have cost impact

That's quite a list for only six months. Some of these actions are aimed at the power sector and some directly at miners, but all have some bearing on the US mining industry, particularly coal companies. Other than the legislative actions, much of this is still pending final resolution. Certainly the regulatory relief is palpable and some coal miners estimate an ultimate reduction in cost of up to US $2/ ton, though that economic relief has yet to materialize.

Coal industry still faces challenges

Coal is going to be a major part of our energy mix for the next 10-15 years, and likely well beyond that, but despite President Trump's best intentions, the industry has other challenges, such as persistent low natural gas prices coupled with improved transportation, renewables continuing to gain social popularity and pressure from large corporations that have begun to wield their influence in states' power generation future. Non-governmental organizations continue to be organized and well-funded. Major utilities who fear a quick reversal of policy continue to shy away from new coal fired developments.

The volatile risk profile of the US mining industry – and its impact on its people

The long term impacts of President Trump's administration won't be known for some time, but it came at a crucial time for the mining industry which has taken a much needed deep breath. Anticipation of policy change that would have significant impacts to a mining company, whether positive or negative is vital to providing good advice. At Willis Towers Watson, our global team of mining specialists endeavors to help our clients stay ahead of a changing risk profile.

We meet with surety markets to understand their willingness to address possible new state and federal requirements for mine closure financial assurance in order to quantify what this means for mining companies from a credit availability and cashflow from standpoint.

Despite President Trump's best intentions, the industry has other challenges, such as persistent low natural gas prices coupled with improved transportation, renewables continuing to become more economical and pressure from large corporations that have begun to wield their influence in states' power generation future.

Opportunity for growth as the next generation emerges

With more stability on miners' balance sheets, improved prices and the possibility of fast tracked permit applications and environmental reviews, we see opportunity for growth once again in the US mining industry. Our colleagues specializing in health and benefits, as well as talent and rewards, ensure that our mining clients understand what motivates today's generation of employees and what makes a satisfied employee. We help them understand what the industry standards are so that they can benchmark their plans, and assist them in crafting a compelling package that attracts new talent as the industry positions for growth.

Safety and risk control team engagement

As mining company staff have been thinned, there is a larger need to leverage broker resources. Our safety and risk control teams are actively engaging with our mining clients. They work with their safety and engineering departments as an extension of their teams, rather than as an auditor, to create continual improvement programs and best practice processes and procedures. This ensures that they are prepared for changes such as the MSHA Metal/Non-metal workplace examinations and that we are able to drive cost out of their Workers Compensation programs by demonstrating industry leading safety cultures and practices, coupled with steadily improving loss rates.

Volatility is here to stay regardless of who is in the White House. Managing that volatility will be a key challenge for miners to address in the coming years. A broker that actively integrates into a client's operations, thinks creatively and a few steps ahead can help mining companies improve their outcomes.

Fred Smith IV *heads up Willis Towers Watson's Mining and Metals practice in the United States*

North American surety: protecting your reclamation liability

What are the key issues driving the demand for surety products?

Due in part to regulatory oversight, financial cycles and a growing awareness of environmental impacts, the call for third party financial assurances to assume the responsibility of remediation and reclamation has increased. As North American dependence on fossil fuels has decreased or fallen out of favor, regulatory authorities' concern for final reclamation and the funding of the costs have intersected commodity prices near the bottom of the cycle.

A regulatory pendulum over-swing?

Large US coal companies have reorganized their debt under bankruptcy codes as certain state regulators held little third party financial assurance for reclamation. Canadian provincial authorities have announced retiring from the natural resources industries altogether. This has been paired with the backdrop of non-governmental organizations' intervention and a growing social conscience towards non-renewable natural resources. The result was a regulatory pendulum that has perhaps swung too far.

The US coal industry has faced the requirements for reclamation since passage of a federal law in 1977. Surety providers have come to understand the reclamation process and the extinguishment of the financial obligation. As consolidation of US based coal operators occurred, their surety needs have been met. And as these operators' financial health improves, collateral requirements will be relaxed and pricing for the surety product will become more competitive.

No uniform reclamation process

Mineral and ore producers continue to face ever-increasing requirements for reclamation without a uniform administrative process for extinguishment of the reclamation obligation. The extraction methods coupled with the lack of consistent administrative rules for reclamation leaves surety providers with uncertainty. Providers will shy away when words such as "non-cancelable", "perpetuity", "unknown leachate" or "water treatment" appear in the framework of the reclamation obligation.

As commodity prices have improved, the costs of alternative energy sources have climbed. Since the change in the US administration, the issue has abated but the lesson remains: regulatory agencies are charged with enforcing reclamation and assuring the funding associated is secured. And Surety continues to be the major vehicle in meeting that need.

Why is this issue so challenging for mining companies?

Among the most difficult issues facing mining companies are financial assurance for reclamation, both at closure and post closure. Adequate financial assurance must be posted for remediation before a development permit is obtained and subsequent expansion approvals. This assurance is required by regulatory agencies to ensure that funds are available to complete reclamation regardless of the mine life cycle and the financial stability of the company.

Need for funding mechanism for reclamation obligations

Unlike insurance, where the purchaser is made whole in the event of a loss, the surety purchaser's benefit is compliance with regulatory requirements. This financial assurance is a latent guaranty that reclamation will be completed after the resource has been economically extracted; that is to say, after the revenue or turnover stops, the reclamation expense commences. In their annual financial presentations, mining companies routinely identify their asset retirement obligations; however, these may be unfunded liabilities. The growing regulatory requirement is that there should be a funding mechanism for the reclamation obligation.

Healthy appetite from surety providers

To make the surety risk palatable to the surety providers, the providers may require parental corporate guarantees, personal indemnification or collateral of cash or assets. This underwriting discipline has netted profitable results for the surety providers, to be point that there is currently a healthy appetite for reclamation obligations in the mining space. Competition among this line is greater than it has been in 10 years.

Balance needs to be struck

The surety underwriting discipline may be in conflict with other credit providers to mining companies, as the corporate guarantees may be perceived as additional indebtedness or collateral requirements as restrictions on otherwise unencumbered assets. While surety is generally unsecured or partially-secured, a balance has to be struck in order to satisfy the regulatory requirement or else – in extreme circumstances – mining may not be allowed to continue.

Obtaining a bond

Obtaining a bond for a new mine or existing operations requires a review of the operation and assets to include:

- Current financial assurance requirement
- Current estimated reclamation costs
- Estimated end of the mine life reclamation costs
- Estimated reserves and economic assumptions
- Annual production rates
- Review of cash costs and all in sustaining costs
- Review of transportation cost
- Overview of planned development costs
- Overview of life of mine plan based on current reserves
- Overview of environment issues, water treatment, tailings ponds, and control and monitoring of containments that have been/may be released into the environment
- Water license
- Details and duration of contracts related to mine operations
- Financial statements and lending agreements
- Site visit by the surety company's underwriter and engineer.

In their annual financial presentations, mining companies routinely identify their asset retirement obligations; however, these may be unfunded liabilities.

What are the key benefits to the mining community?

Noting that a growing component of the mining regulation is satisfying the financial assurance for reclamation, surety plays an instrumental role in executing the mining plan. Typical third-party financial assurances take the forms of cash, letters of credit or surety. Surety is often the least expensive in terms of cost and collateral and should always be in the mix of arsenal of options to address the financial assurance requirements. Whether surety is the sole source or part of a broader platform, the current surety appetite suggests that mining industry financial assurance programs should almost certainly be revisited.

Issues to consider

- **Anticipate the need to collateralize the bond.** The amount of the collateral the surety will seek varies on which stage the project stands. Poor financial results, challenged assets or new operators could be required to provide as much as 100% collateralization of the estimated future reclamation costs. Collateral demands can erode the operating capital of the project severely impacting the owners' ability to secure the permit.
- **Don't underestimate the value of a strong relationship with your broker and surety.** Make sure the surety understands your long term plan and craft the story around it. Keep the stream of updated information coming. Stop work orders, regulatory changes and reviews need to be communicated to your external partners.

In jurisdictions that have historically only accepted letters of credit or cash for financial assurance obligations, Willis Towers Watson has been actively working with those government agencies to have surety accepted as a financial assurance alternative.

In closing, the ever changing environmental landscape and the increasing environmental scrutiny from private groups and governmental agencies will lead to additional regulations and more financial assurance requirements.

Tracy Tucker *is currently Executive Vice President for Willis Towers Watson based in our Knoxville, Tennessee office, specializing in complex surety solutions for natural resource and energy clients.*

Lois Innes *is Senior Vice President and National Practice Leader for Willis Towers Watson Canada*

Challenge two – developing new stakeholder relationships

What communities really want: rethinking local engagement

Introduction

There is a saying that goes along the lines of 'everything we have, everything we use, is either grown or mined'. But unlike the reserves from where the resources come, our appetite for commodities seems endless. However, the ore bodies or deposits that provide us with these commodities are becoming more scarce, and over the years head-grades have been decreasing.

The reserves are slowly becoming more depleted, and we can make an assumption that the rate of discovery of new mineral 'behemoths' is also going to diminish. Mining companies will need to head into more remote locations to find the deposits needed to sustain reserves, resources and production levels. Increased capital expense will be needed to open a new mine, and getting the final product to market will also cost more.

The financial commitment of a mining company will be many months in advance of full scale operations. There will be scores of studies and financial models completed, with a pile of licenses needed in order to be able to start or continue operating. Most of these licenses will be physical documents stored in shelves of lever-arch folders, but perhaps the most important will have no formal documentation surrounding it, and it remains the ultimate 'green light' to any new project or existing operation – the Social License to Operate (SLO), more commonly included as part of a company's philosophy towards Corporate Social Responsibility (CSR).

Why is this important for miners?

Not unsurprisingly, in the major mining areas around the globe, the industry forms a significant part of the GDP in those countries. With such an impact to a given economy, mining companies have an increased responsibility for sustainable and inclusive development of their assets.

However, a company's CSR plan can't be formulated as a box-ticking exercise. It needs to dovetail with the business objectives of the company, and it needs to mirror and align with the company's own values and commitments.

Whilst in years gone by the general theme from communities may have been for increased local benefits and royalties, companies now are discussing and negotiating the impact an operation may have on a community and how such impact can be reduced. In many instances, the communication and interaction between a mining company and the community is regarding environmental concerns; water use, water pollution, air pollution, impact on local biodiversity and the removal of agricultural or arable land on which many farmers depend. It can also extend to working conditions, noise pollution, potential resettlement, and health and safety.

What are miners doing?

A lot, it would seem. Across the spectrum of commodities and organisations, social responsibility is high on the agenda. Mining

companies are increasingly more engaged with local communities and progress is regularly reported to the Board or associated committees. We spoke with Anglo American, Codelco and Hochschild to get an insight into managing local communities from a mining company's perspective.

No one size fits all strategy

Most mining groups, and certainly those we spoke to, have either a defining set of principles, policies or pillars on which their approach to CSR is based. But there is no 'one-size-fits-all' approach. Each company needs to design and implement its own CSR programme according to the needs of the community and the business objectives of the company. However, there are usually three main areas of focus; environmental, social (which this article will focus on) and economic, all of which need to take into account short and long-term concerns.

Need for long term planning

A good example of the need for longer term planning is at Quellaveco, the Anglo American copper project in Peru. We spoke with Norm Gridley, Manager of Sustainability at Quellaveco, who said 'very early in the project life-cycle, we established a Dialogue Table, comprising more than 30 representative institutions from government and the community. From that we generated 26 agreements which were made public, and which we still adhere to today". For reasons primarily relating to the volatility of copper prices and the global economy in recent years, the multi-billion dollar project is still a project and full notice to proceed is yet to be announced. Whilst the Dialogue Table reached its agreements in 2012, the committee formed to track the compliance of the Dialogue Table still meets monthly and the minutes are reported publicly.

Need for flexibility

Due to the long-term nature of such plans, they also need the flexibility to adapt as the project changes, as Hochschild discovered as the Inmaculada Project moved into operations. “We developed a Family Strategy independently from communities” explained Carmen Cuba, Community Relations Manager at Hochschild. “It’s not sufficient to just meet community needs; we needed to respond to what families want. In part due to the remoteness of the operation, families want to be able to send their children to bigger and better schools in Cuzco; to be able to promote them outside of their immediate environment. Building a school for the local community was not enough”.

Need for a long term roadmap

To highlight how far ahead such plans are made, Chilean copper producer Codelco recently established their ‘Sustainability Master Plan’ which sets out a 25-year roadmap, with milestones at 2020, 2030 and 2040. According to Ana Mena, Director of Community Relations at the company, “zero accidents and incidents affecting our communities is our number one short-term plan, but we are also investing in social risk analytics tools which will allow us to measure and validate our goals and standards”. This will be interesting, as the success of a social responsibility programme is difficult to quantify – it’s usually measured in terms of what doesn’t happen rather than what does.

Need for a holistic approach

Demonstrating the need for a holistic approach to sustainability, every month Anglo American evaluates every contract at Quellaveco to determine whether it is socially sensitive. “Moving a pylon, for example, won’t necessarily impact a community”, explained Gridley. “But shifting tonnes of earth over a 3 month period will, so each and every contract is carefully evaluated. If it is deemed to be socially sensitive, the contractor has to have a Social Management Plan, and we measure the performance of the contractor against that plan every month”.

Need to encompass the whole community

So whilst a CSR plan should extend to contractors, it should also encompass the entire local community and not just employees of the operation. “We found that training members of the local community in mining-related roles was inefficient” says Cuba. “Someone could return from 6-weeks training to learn a role doesn’t exist for them at Inmaculada. So we implemented a community-wide scholarship programme, whereby locals can train in whatever they wanted. So for example training to become an electrician meant they could find employment outside of the confines of a mining community”.

Need for early and regular dialogue

But learning how to improve comes from early and regular dialogue. “We are delivering on a social contract”, explained Mena. “Some of the more prominent points of friction with communities come from noise, air pollution, tailings concerns, etc. Our General Managers host community meetings every month where community leaders can share views and raise concerns, and the GM has the executive power to move or mitigate the risks or issues”.

What solutions can risk intermediaries bring?

Extension of Strikes, Riots or Civil Commotion cover

Whilst we would advocate the strongest and most robust Risk Management practices in order to mitigate against physical losses or business interruption, we are still

able to bring our clients risk transfer solutions for when it goes wrong. Similarly, we have recognized that sometimes social and community relations can sour, and as such we have a suite of risk transfer solutions designed to extend the standard Strikes, Riots or Civil Commotion cover.

Whether it's through unions or workforce activity, the main tool at the disposal of local communities or workers is industrial action – striking, blocking roads or otherwise inhibiting access to operating premises. These can be peaceful or disorderly, but can also extend to violent clashes as was seen at Lonmin's Marikana operations in South Africa in August 2012 and at Grupo Mexico's Tia Maria project in May 2015. Newmont's US $4.8bn Conga project was derailed by strikes in November 2011 and is still suspended, whereas MMG's Las Bambas operation eventually got going after 36 days of strikes in October 2015 in which 3 people died.

Impairment of access

An important trigger under a standard All Risks Property policy is that physical damage has to occur. But in the case of peaceful or non-peaceful demonstrations, it can often be the case that no damage is suffered to insured property and therefore there is no policy coverage. With no risk transfer solution to fall back on, operations can be down for days or weeks; strikes at Escondida in February 2017 halted operations at the world's biggest copper mine for 43 days.

Developed originally for some of our fracking clients, Willis Towers Watson has designed a policy specifically for impairment of access which doesn't require a physical property damage trigger. In other words, if access is blocked, restricted or impaired, and even if the demonstration is peaceful, any impact to business such as loss of gross profit or fixed costs is covered - even if there is no physical damage.

Like any insurance policy, this is not designed to replace good risk management or good community relations. But when thinking the unthinkable, risk transfer solutions exist to ensure your company is as resilient as possible.

Tom Holliday *heads up Willis Towers Watson's Mining and Metals practice in Latin America*

Addressing social disorder: is your strategy good enough?

Introduction – social disorder risk for miners is global

One of the greatest risks to the mining industry in 2017 remains that of civil disorder, including political violence and project specific protest. From Peru to Papua New Guinea, the mining industry continues to experience antipathy extending to business interruption and violence, driven by myriad grievances founded in issues such as environmental impact, employment and hiring policies, wealth distribution, perceived association with corrupt elites and criminals, forced resettlement and skewed local economies.

Miners sucked into local tensions

The root causes of many of these may initially be extraneous to a mining company's presence and activities. However, in the preparatory stages and once established, a mine may bring its own drivers of tension or exacerbate those already present in the context within which it employs staff and then extracts, transports and sells resources. Furthermore, local and national political entrepreneurs may harness criticism of mining activities to their political cause, resulting in proximate causes of protest or violence targeted at a mine's assets, people and reputation on the ground or in the social media.

Company responses lack strategic coherence

Special Contingency Risk's (SCR's) research and advisory consultancy with the mining industry indicates that the corporate response to such frictions is often to engage in protective and deterrent measures, accompanied by sometimes reactive 'community engagement'.

Many of these responses have been based historically on military or law enforcement tactics with little strategic overview or coherence. While valid in certain circumstances, such responses may serve to exacerbate tensions to the point of mines becoming fortresses. This is not surprising given the saturation of the security industry by ex-military personnel, many of whom show brilliance in understanding the importance of context but are themselves often limited by their own or corporate expectations of what security teams 'should do' and with whom they should be engaging.

An integrated approach is essential

This article does not seek to criticise these approaches but to complement what is already practised with an integrated approach that may involve managers, security advisors, social responsibility teams and the vital communications strategies of community engagement groups. Its purpose is to introduce a number of approaches to contextual understanding that lead to pragmatic and practical action from project inception to closure.

These are drawn from experience and include those borrowed from development agencies. Many of these agencies have come to realise that their well-intended interventions are:

- inevitably political
- have social and economic consequences among and beyond their target beneficiaries
- may do harm by exacerbating conflict (unless the impact of programming upon the factors that divide and connect societies are taken into consideration during the design and implementation of the project)

The business costs of conflict

Conflict has many definitions and is often used synonymously with violence. This is the tip of the iceberg, as conflict generally occurs as a result of friction when two or more parties believe their interests are incompatible and then express hostile attitudes or take actions that damage the other's ability to pursue its interests. Unless resolved through dialogue, these tensions may result in violence. All conflicts vary but some examples of costs to companies are shown in the table below:

COSTS OF CONFLICT TO COMPANIES	
Direct Costs	**Example**
Security	Higher payments to state/private security firms; staff time spent on security management
Risk management	Insurance, loss of coverage, specialist training for staff, reduced mobility and higher transport costs
Material	Destruction of property or infrastructure
Opportunity	Disruption of production, delays on imports
Capital	Increased cost of raising capital
Personnel	Kidnapping, killing and injury; stress; recruitment difficulties; higher wages to offset risk; cost of management time spent protecting staff
Reputation	Consumer campaigns, risk-rating, share price, competitive loss
Litigation	Expensive and damaging law suits
Indirect costs	**Example**
Human	Loss of life, health, intellectual and physical capital
Social	Weakening of social capital and cohesion
Economic	Damage to financial and physical infrastructure; loss of markets
Environment	Pollution, degradation, resource depletion
Political	Weakening of institutions, rule of law, governance

Source: International Alert, Conflict-Sensitive Business Practice: Guidance for Extractive Industries, March 2005

Given these potential costs, it is sensible to devise both strategic and local strategies in order to identify, monitor and manage conflicts before they become violent, while ensuring that the company minimises any contribution that it may itself be making to these conflicts.

The SCR approach

There is no fixed method to the introduction of conflict sensitivity to project planning and implementation, although some generic processes are described below. Experience indicates that the benefits of conflict analysis are greater when the approaches are integrated throughout the project cycle as opposed to being introduced only when conflict surfaces mid-flow.

PHASE	WHAT'S INVOLVED
Rapid Screening Assessment	A rapid assessment to identify key conflict issues early in the pre-investment phase. The Screening Tool provides an initial analysis of the country and its conflict dynamics, flags key issues of concern and identifies the level of risk, as well as potential 'showstoppers'.
Macro-level Conflict Risk and Impact Assessment	An expert-led national and regional level context analysis. This further explores issues of concern raised in the screening and identifies potential interactions of the project with these issues.
Project-level Conflict Risk and Impact Assessment	Building on the understanding of conflict generated thus far, make an analysis of the potential interactions between the project and its context to a deeper level.

It is vital that the state of community opinion, politics and the security situation are monitored and responded to – both at project and country level.

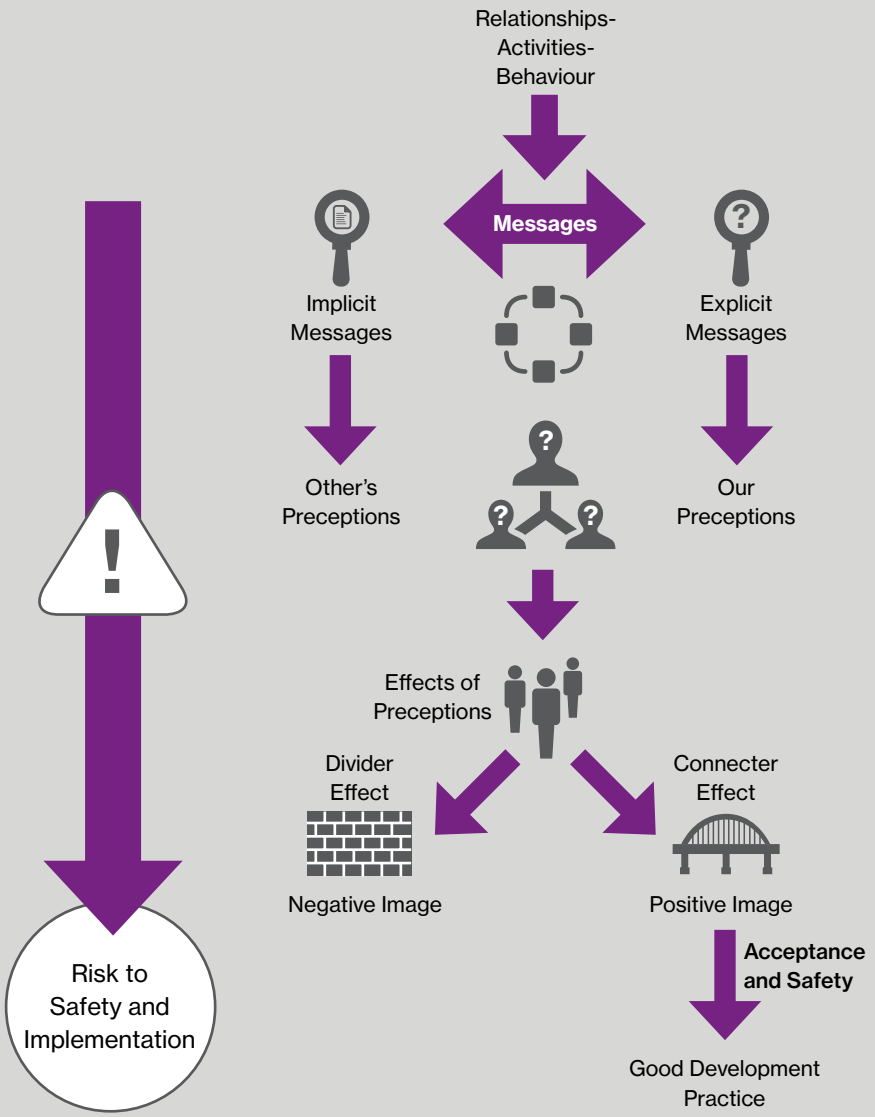
At each stage, but most importantly the Project Level Conflict Risk and Impact Assessment, a mapping of stakeholders in the political economy would take place in order to identify specific tensions that currently cause or may produce friction.

However, the process does not end here – projects change and so do countries and communities. It is therefore vital that the state of community opinion, politics and the security situation are monitored and responded to – both at project and country level. This will demonstrate a continued interest in and willingness to adapt to the circumstances of the host communities, thereby increasing levels of acceptance and trust whilst mining continues and ultimately informing a sustainable withdrawal.

The importance of image and acceptance

Throughout the project lifecycle good security is based on three strategic pillars: Acceptance, Protection and Deterrence. It is interesting to note that most conventional security operations focus on the last two, whereas security professionals in development programmes focus on acceptance, deploying protection or seeking to deter only where the level of threat becomes unmanageable through dialogue.

Gaining a degree of acceptance is often viewed as the responsibility of community engagement or similar departments, many of whom fail to engage intimately with security teams as the strategy demands. This can result in mixed messaging, which erodes the credibility of the company and can foster mistrust.



A professional approach to conflict management involves a more sophisticated methodology and results in more effective risk management and better business practice

Source: DFID/GTZ-Risk Management Office (RMO), A guidebook to safe and effective development in conflict. A tool for analysis. Mera Publications: Kathmandu, 2005

The diagram above demonstrates how negative feeling and division can increase when the explicit – usually positive – messages put out by a project conflict with the implicit messages perceived by others through its activities and behaviours.

This can, in turn, lead to risks both to safety of staff and the implementation of the project. In one project where we assisted, mining staff had been shot at after issues of 'broken promises' over schooling, housing and employment (as well as doubts about the distribution of benefits under the current government) had been harnessed by political entrepreneurs. This was partly due to a drop-off in community engagement and the lack of an information gathering and monitoring network at national, regional and local levels.

"We were happy, as people told us we would be rich, but now, this has turned into a nightmare and the black gold has become a black snake that is displacing us from our ancestral land.[1]"

Mehmood Halepoto, villager, Thar desert, Pakistan

Conclusion – are you confident in your own operations?

To conclude with a few questions:

- How closely do your security specialists collaborate with your environmental specialists, community outreach, communications staff and general management?
- Could they list the dividers and connectors in their project area and how their project increases or decreases them?
- Do they monitor the space and identify contradictions between what your marketing and communications team are saying, your imported and local staff behaves and how local stakeholders perceive the impact of the project?

If they do you are most likely on the path to a secure and sustainable project. If not, it may be time to take advice and ask a few questions yourself.

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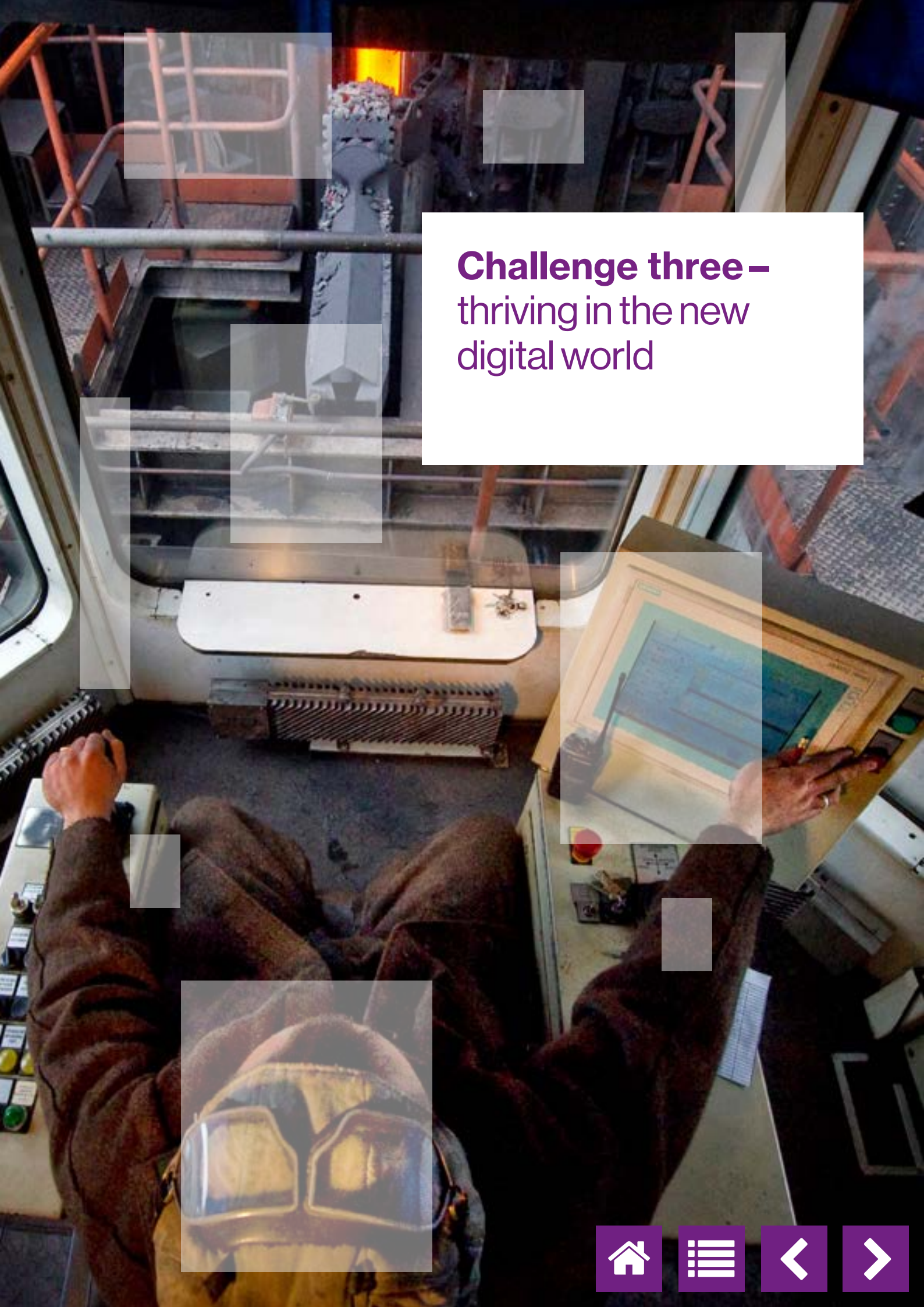
[1] http://www.eco-business.com/news/pakistans-coal-expansion-brings-misery-to-villagers-in-thar-desert/



Challenge three – thriving in the new digital world

Digital digging – the future of work in the mining industry

Introduction – the future of work is now!

Daimler's first self-driving truck hit the road in 2015[2], driverless cars are being tested by car manufacturers and tech giants alike and the first autonomous ship is planned to set sail in Norway in 2018[3]. Kiva robots speed around Amazon warehouses and the company's check-out free grocery store made headlines earlier this year. IBM's Watson currently offers 15 cognitive services such as virtual agents, language and visual recognition, personality characteristics prediction and advanced data analytics[4].

Welcome to the Fourth Industrial Revolution

The World Economic Forum's Global Risk Report 2017 refers to this advancement of technology as the Fourth Industrial Revolution and identifies 12 key emerging technologies and their impact on the global risk landscape[5]. It is accepted by all commentators that technology will change the future and with the pace of technology ever increasing, balancing the benefits of such technology against the risks will determine success.

Five forces impacting the future of work

HR leaders have recognized that this Fourth Industrial Revolution is fundamentally different from the previous three as the pace of change and its impact being much further reaching. CHREATE[6], a consortium of more than 30 CHROs and other HR leaders, identified five forces of change that affect the future of talent management and HR:

1. **Exponential technology change.** The rapid developments in artificial intelligence and automation impact the workforce and skills required, making many skills obsolete and/or creating new ones. Jobs are changing more quickly, and workers must be able to adapt to these business changes.
2. **A truly connected world.** As the ability to connect with almost anyone, anywhere, at any time increases, the nature of work also shifts, impacting how work gets done and the nature of the employee/employer relationship.
3. **Human-automation collaboration.** Jobs and tasks previously performed by humans are being replaced by automation, or require a human-automation interface. Businesses will require workers to adapt to this change to optimize work.
4. **All inclusive, global talent market.** The potential workforce is growing, with increasing diversity and longevity of workers. As the nature of work changes, the potential talent market will expand with more flexible work relationships, ways of working, policies etc. to suit different talent needs.
5. **Social and organizational reconfiguration:** The democratization of work is changing the nature of the employee/employer relationship. As work and work relationships become more flexible, traditional hierarchies and contracts are being replaced with collaboration and collective leadership.

[2] http://media.daimler.com/marsMediaSite/en/instance/ko/World-premiere-on-US-highway-Daimler-Trucks-drives-first-autonomous-truck-on-public-roads.xhtml?oid=9919773

[3] http://yara.com/media/press_releases/2103105/press_release/201705/yara-and-kongsberg-enter-into-partnership-to-build-worlds-first-autonomous-and-zero-emissions-ship/

[4] https://www.ibm.com/watson/products-services/

[5] http://reports.weforum.org/global-risks-2017/part-3-emerging-technologies/3-1-understanding-the-risk-landscape/

[6] http://chreate.net/

Table 1: How technology transforms the extraction process

PHASE	WHAT'S CHANGING?	CASE STUDIES[7]
Exploration	The processes of exploration is being modernised through the use of sensors, wireless communication and computers.	▪ A major mining company uses drones to more closely monitor and evaluate the rock face at mines in real time when blasting away rock to build mine slopes.
Operation	Extractive operations can be performed by computer operators who are hundreds or thousands of miles away, requiring a new set of skills to monitor and execute operations.	▪ A global mining company has introduced automated drilling in Africa, with good acceptance by workers. ▪ A gold miner is using smart sensors to ensure the safety and efficiency of workers and equipment. ▪ Mining companies in Australia are providing field workers with smart baseball caps (known as SmartCaps) that monitor their brainwaves to measure fatigue. ▪ In 2013, a global mining company opened an Integrated Remote Operations Centre (IROC) in Perth. The IROC provides the company with a real-time view of its entire Western Australia iron ore supply chain. ▪ A global specialist energy management company's Integrated Planning and Optimization Solution is designed to optimize supply chain efficiency for mining companies.
Processing	Processing can employ technology that increases the efficiency and quality of the operations improving the refining process and quality of the material.	▪ A world leading mining company deploys visual and heat sensors to scan the surface of molten metal in order to quickly assess steel quality, and automatically identify process adjustments to improve product quality.

New work in the mining industry

This revolution won't pass by the natural resources and mining industries. Whilst change and innovation in the mining sector has been generally incremental in nature, a surge of cost pressures as a result of declining commodity prices and margins has demanded greater operational excellence, radically new approaches to work and continuous improvement through the introduction of new technologies.

Traditionally mining is a capital and labour intensive industry, however technology and innovation are transforming the world of work across all phases of the extraction process (see Table 1 above).

[7] http://reports.weforum.org/digital-transformation/wp-content/blogs.dir/94/mp/files/pages/files/wef-dti-mining-and-metals-white-paper.pdf

Strategic implications for the mining industry

An analysis by the World Economic Forum revealed that digitalization could bring[8]:

- More than **US$425 billion of value** (equalling 3-4% of industry revenue) for the mining & metals industry, customers, society and environment over the next 10 years (to 2025)
- A reduction of **610 million tonnes** of CO2 emissions, with an estimated value to society and environment of US$30 billion
- Improved safety, with around **1,000 lives saved and 44,000 injuries avoided**
- A potential loss of about **330,000 jobs**, or nearly 5% of workforce, over the next decade

Faced with these economic and environmental challenges the industry has shown that it is able to think out of the box to redefine strategy and invent new business models:

- **Collaborating and connecting** – New partnerships within and across industry as well as with research institutions and the public sector produce innovative opportunities for increased productivity and growth. Mining companies have also become more flexible by building networks of suppliers, partners and customers. Customer centricity is being adopted, for example through collaboration on developing advanced materials.

[8] http://reports.weforum.org/digital-transformation/mining-and-metals-digital-transformation-and-the-industrys-new-normal/

- **Operational excellence** – mining companies optimize operations in terms of efficiency and quality, e.g. by using technology to operate less location-dependent operations and collaborate more across functions. Predictive data analytics help identify and monitor key performance indicators. Focus on safety, environmental concern and sustainable development actually create new business value and bring benefits for business and society. New technologies, such as collision detection and cybersecurity measures improve safety and security. Big data helps monitor environmental impacts and sustainability goal achievement.
- **Employee Value Proposition** – CSR reduces energy and regulatory costs and enhances company and employer image. Even remote operations offer benefits in that vein: talent can be located where they want to live and where its best for them to share knowledge and it becomes easier for leadership to lead and oversee staff. Enabled by technology, employees and managers can make better informed decisions and find better solutions through broader collaboration.

How can HR contribute?

1. **Start at the top: work strategy and culture are pivotal**
   First of all, work strategy and culture guidelines need to be aligned with the new strategic direction. Many mining organizations have a people strategy that needs to be transformed into a work strategy that includes AI, robotics and alternative forms of labour. Collaboration across these work options can only be fostered in a company environment that supports open, seamless communication and mobility.
2. **Rethink how works gets done: assess the potential for automation of tasks and its consequences for the organization**
   Secondly, HR has to rethink how work gets done, how work is structured and what organisational structure best supports new ways of work. As jobs become more fluid in the mining sector, take the work to be done as the unit to be analysed instead of the job role. Deconstruct the work into discrete elements, and then decide which tasks are best done by whom and in what type of work setting.

3. **Decouple work from the organisation**
   In addition, think about who can best do a task – does it need to be a traditional employee or would a contingent worker offer benefits, e.g. in terms of flexibility of employment or specific expertise. Online talent platforms may make it easier to find and access freelancers/contractors. Companies can even start building internal talent markets to deploy talent inn a more flexible and efficient manner across the organisation.
4. **Identify the skills of the future – and structurally start building them**
   New ways of working in the evolving and changing mining world require new skills or even different types of traits and attitudes. Most important will be for every worker to be adaptable, flexible, and willing to continuously learn, upskill or even reskill. Being able to realise the full potential of new technologies will be pivotal.

Conclusion - How to prepare for the future of work

As we are seeing, technology is significantly changing the way mining companies work and will need to operate, the introduction of AI will undoubtedly impact how HR programmes are designed and implemented. Our view is that companies who embrace this change and effectively organise their HR, Talent and Reward practices will have a competitive advantage in the Forth Industrial Revolution.

Starting from a strategic perspective, our consultants can help you to translate business strategy into work strategy, to define a compelling work value proposition and set up the organisation for future needs. We help you to carefully redesign your people programmes and define governance as well as technology for seamless execution and agility, allowing them to easily adapt to changes. Because as Heraclitus recognized: "The only thing that is constant is change".

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Anne-Marie Jentsch *is a Senior Consultant at Willis Towers Watson's Amsterdam office*

John Pymm *heads the Natural Resources sector group for Talent and Reward at Willis Towers Watson*

Ravin Jesuthasan, *CFA, is a Managing Director of Willis Towers Watson based in the firm's Chicago Office*

Our view is that companies who embrace this change and effectively organise their HR, Talent and Reward practices will have a competitive advantage in the Forth Industrial Revolution.

From technology to people: the new frontier in mining cyber risk

No immunities, no boundaries – the risk is systemic...

Cyber security represents a fundamental challenge for organisations and is seen as a top priority for boards. Malicious hacking, ransomware attacks, data leaks and electronic fraud are occurring on a global basis, where the motives vary from financial, political or merely to cause disruption. The recent global ransomware incidents WannaCry and NotPetya have shown us that:

- **No one is immune.** Attacks do not need to be targeted at a specific company or industry sector.
- **Cyber-attacks lack a geographical boundary.** Rogue actors are easily able to bridge the geographical boundaries of an organisation's operation that do not exist in the globally connected world.
- The potential **systemic risk** which can arise from a cyber-attack **is far from theoretical.**

Mining industry particularly vulnerable

Within the mining sector, the convergence of IT and operational technology (OT) through industrial automation, the uptake of smart devices for real-time operations management and remote operations, and the adoption of cloud services are driving significant change to a mining company's operational model. The modern mining company is a transnational corporation, running highly coordinated production operations across multiple sites in multiple countries with varied geopolitical climates, all the while responding to the supply and demand needs of a market-driven economy.

Transformation of working practices

Technology has transformed working practices leading to increasing productivity and driving operational efficiency and innovation. However, this increased adoption and reliance on technology does not come without increased risk and as devices become more connected and processes more digitised, mining companies will need to contend with an increased number of network born security threats. Never has industry been more susceptible to operational derailment and ultimate financial loss due to a cyber-attack.

Connected mining sites and their supply chain require an ongoing programme of investment and monitoring to ensure security and availability are maintained across the entire IT & OT estate to prevent business disruption.

It's not just a technology issue!

In our recent 2017 Cyber Risk Employer Survey 76% of companies reported that they have improved their technology systems and infrastructure over the last three years. While this shows that companies around the world are focusing their time, resources and budget on technology solutions, most companies still perceive themselves vulnerable to cyber incidents.

While critical to protecting the enterprise, technology is only one piece of the solution. This is again evident from our survey, which shows almost 75% of organisations report that in the next three years, they intend to allocate more capital to human capital solutions (such as comprehensive training programmes for employees) and business processes.

Never has industry been more susceptible to operational derailment and ultimate financial loss due to a cyber-attack.

Human Resources and CISO personnel now playing key roles

Although IT departments – and to some degree, risk managers – are seen as responsible for cyber risk management strategies, other functions such as Human Resources and Chief Information Security Officers (CISOs) are increasingly playing an integral role in protecting the enterprise and creating a cyber-savvy workforce.

The majority of cyber incidents are ultimately sparked by employee behavior (whether through negligence, accidents or intentional acts). Our cyber insurance claims data shows two-thirds of incidents are the direct result of employee behavior – for example, negligence leading to lost devices and malicious and disgruntled insiders seeking to profit from corporate espionage. When analyzing the other 33% of incidents, a large portion can ultimately be traced back to additional human errors that can be linked to issues such as talent shortage, skill deficits and employee engagement.

The value of information is rising

The theft of individuals' personal information and personal financial information has long been a motive behind a number of highly publicized cyber incidents. While this continues to be an area of focus, cyber criminals increasingly understand the value of a much wider range of sensitive data, whether in terms of an opportunity for direct monetary gain or in manipulating business dynamics.

Examples such as theft of intellectual property around production methods or theft of pricing data for metals and minerals by competitors to hijack sales, could all be potential motives. In a competitive market, the importance and value of this information cannot be overlooked. Having a robust information security programme should not be viewed as a cost but rather an essential investment and an opportunity to gain competitive advantage, generating increased confidence with customers and investors seeking to protect the value of their investment.

Regulation continues to tighten

Regulation relating to cyber and information security has historically been focused around data privacy and data protection issues; however, regulatory scope is expanding to encompass infrastructure and providers/operators of essential services. This is a trend which will continue, particularly with the increasingly connected nature of systems, data and services providers. As with any regulation, this will drive the behaviour of organisations to achieve compliance, as the potential financial and reputational consequences of not doing so can be significant.

Managing the consequences of an incident

The cascade of events and disruption following a cyber-incident can be far reaching; for example, the financial impact on some of the companies impacted by the NotPetya ransomware outbreak is estimated to be in the hundreds of millions of dollars. The insurance market in this area has continued to evolve, particularly for those sectors where both IT & OT exposures exist.

Risk Transfer solutions

From a coverage perspective the insurance market draws a distinction between:

- Cyber-attacks leading to **physical outcomes** (e.g. property damage, bodily injury etc.). In this context, the insurance approach can vary from coverage being specifically excluded, specifically included or silent (i.e. neither specifically included or excluded).
- Cyber-attacks leading to **non-physical outcomes** (e.g. loss of data, network outages, extortion demands). The insurance market has developed broad stand-alone product offerings for these exposures some of which can include added access to added value services around incident response to support recovery post event.

Our 2017 Cyber Risk Employer Survey shows that nearly nine in ten companies have reviewed or will review their cyber insurance arrangements within the next two years, with a view to identifying gaps in existing insurance coverage. In addition 71% of respondents advised that they expect to enhance their insurance coverage within the next two years. The insurance market continues to develop its understanding of the cyber risk environment through the collection (and modelling) of more consistent data and this is driving a willingness to develop new products and services to keep pace with this evolving exposure.

What should organisations do?

To manage cyber risk effectively across the enterprise and ensure resiliency, organisations need a fully integrated, comprehensive plan that emphasizes people, capital and technology protections. Understanding the risk exposure across both IT and OT and investing in the appropriate security is vital to remain ahead of the curve and present financial, reputational and intellectual property risk. In particular mining companies should remember;

- **IT solutions can't be adopted and implemented in a vacuum.** People and technology need to have a symbiotic relationship to ensure Cyber security is connected to the business and not simply a superficial wall surrounding an organisation. Cyber risk is complicated; as such, the constantly evolving and dynamic environment demands agile solutions to combat new threats that many organisations may not be tracking.
- **People risks are the next frontier in cyber risk management.** Understanding that technology solutions are only as effective as the people operating and managing those solutions is critical. Organisations need to engage with their IT department and uncover skills deficits and talent shortages in critical roles to ensure that talent strategies align with overall cyber-security objectives. By taking these steps, you can ultimately help improve your employees' "Cyber IQ", create a cyber-savvy workforce and ensure cyber resiliency across all levels of your organisation.
- **Assume it's going to happen.** The notion that *'it won't happen to us'* continues to be disproved therefore preparation is key. When a cyber incident occurs, having a well-developed and well-rehearsed cyber incident response plan will be critical to ensuring a quick recovery, thereby mitigating the longer term financial, regulatory and reputational damage.
- **Transfer the risks you can't remove.** A robust cyber risk management programme will reduce the probability of an event occurring, but you can never fully eliminate the risk. Cyber insurance risk transfer solutions exist to mitigate the financial impact when things go wrong. As a starting point, check your existing insurance coverage; understand what cover you've got and what options are available.

Glynn Thoms *is Executive Director Cyber & TMT at Willis Towers Watson London*

Challenge four – managing people risk in an age of turbulence

Mining their minds: optimizing the employee experience

Introduction – the value of an optimum employee work experience

Managing talent in the mining industry has its challenges. When stagnant demand, diminishing budgets and cost orientation is the order of the day, how does one create an outstanding employee experience to help drive both organizational performance and financial results? To answer this question, Willis Towers Watson has conducted research at both macro and micro levels of the mining industry, leveraging the world's most comprehensive database of employee opinions. The results provide consistent and comprehensive insights into the overall employee experience that mining companies will need to create to secure their future success.

This research, drawing on our unparalleled database of employee opinion, analyses a) how the mining industry benchmarks against the world's leading companies; b) sector specific drivers of employee engagement and c) a research study from a leading global mining giant, that has determined the direct impact of employee engagement upon key operational and people performance indicators related to productivity, safety and staff turnover.

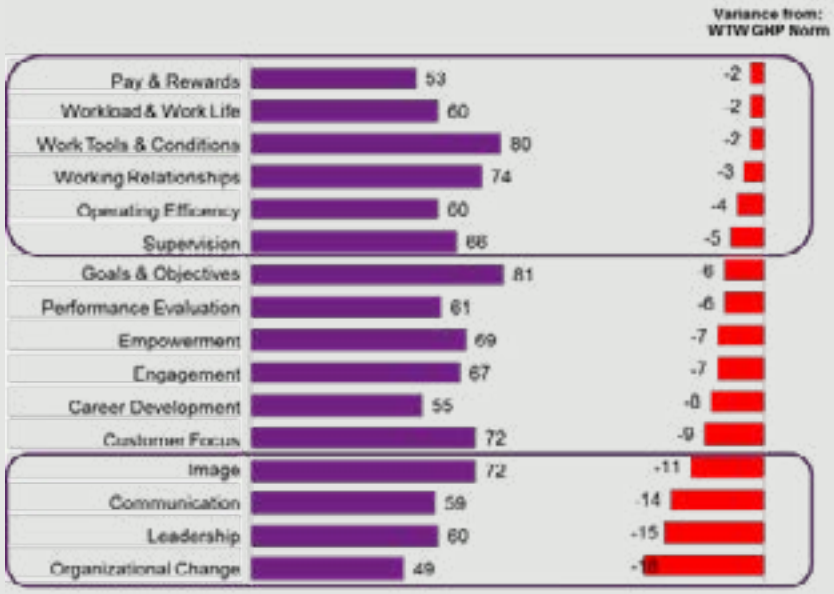
A key outcome of this broad and deep research is that we can share a clear set of criteria for human capital success in the mining industry. Our conclusions point to the design of an employee experience which combines i) visionary leadership with a human touch, ii) employee pride in the purpose and external image of the organization, iii) empowered operations associated with a safe, team oriented culture iv) a fair total rewards package.

How does the natural resources sector compare to the world's best companies?

On the macro level, we leveraged insights from the Willis Towers Watson global database of employee opinion, comparing our cross-industry high performance companies group with our natural resources industry group.

The results provide consistent and comprehensive insights into the overall employee experience that mining companies will need to create to secure their future success.

Figure 1 - 2016 Global Natural Resources Companies Norm comparison to Global High Performance Norm



Source: Willis Towers Watson Normative Benchmark Databases

The Global Natural Resources Norm is comprised of a weighted average of employee survey results from a cross-section of natural resource companies. The data are derived from recent client studies conducted by Willis Towers Watson and are updated annually. The norm includes the opinions of more than 150,000 natural resources industry employees.

Figure 1 above illustrates the proportion of natural resource sector based employees responding favorably to a variety of employee opinion survey topics (purple bars) and the percent point difference from the Willis Towers Watson high-performance companies norm (red bars). The topics are ranked by the difference to the high performance companies group. This illustrates clearly some organizational level competencies that the natural resource sector lacks.

Problem one: lack of leadership effectiveness

Natural resources organizations are fifteen percentage points behind the Willis Towers Watson high performance companies group on leadership effectiveness. Leaders in high performance companies communicate a strong vision and drive the operational business agenda, while at the same time demonstrating a genuine concern for the well-being of employees, striking the right balance between professional (expertise, analytical and problem solving capability), pioneering (seizing commercial opportunities, driving imaginative solutions and setting the long-term vision) and people-related behaviors. High performance organizations also communicate a far stronger vision, creating a sense of two-way dialogue with employees, demonstrating authentic interest in their opinions and well-being.

Problem two: brand and footprint do not inspire confidence

The world's high performance organizations create a more positive brand and footprint in society, creating real confidence among employees in the image of the organization. The topic of organizational image (which by and large is driven by both internal and external images and perception of corporate social and environmental responsibility) is a challenge, given the nature of the mining industry. However, some successful mining companies have found ways of demonstrating authentic environmental concern, giving back to society, as well as noting the benefits achieved from the end products of exploration. Other Willis Towers Watson research shows how a positive organizational image has a direct impact upon employee retention rates.

Compared to those working in the natural resources sector, employees in high performance organizations are more likely to believe not only in the company's overall success, but that they can themselves prosper and grow their careers within the organization.

It is notable that the natural resources industry hold up well against the high performance group with regard to local level functioning, including employee access to work tools, teamwork and quality of supervision – all proven prerequisites of a culture focused on local empowerment and safety.

Engagement drives the bottom line – but are mining companies extracting full value?

Willis Towers Watson research has shown that companies with high engagement outperform their sector in terms of earnings growth by an average of 18%. Furthermore, the high engagement companies outperform their sector in terms of growth in gross profit by 5% and growth in total assets by 7%.

Low engagement across natural resources industries

Our findings from a study of 29 organizations in the natural resources industries show that levels of employee engagement are low across the sector. Specifically, findings indicate that only 22% of employees in the natural resource sector are highly engaged, compared to 40% globally. In addition, 34% are completely disengaged, compared to 24% globally.

With this grim outlook, the next question becomes: what are the key aspects of the employee experience in mining which will most significantly positively impact engagement levels?

The five key drivers of engagement

Via multiple regression analysis, the Willis Towers Watson research team derived the top five predictors of employee engagement in the mining sector. Note how similar the following drivers are to the characteristics of high-performance companies outlined above. The top two drivers of employee engagement in natural resources companies have a top-down focus driven primarily through senior leadership behaviors:

1. **Company image.** This is an organizations' ability to create a favorable reputation, especially externally to stakeholders and the general public. As noted earlier, environmental and social forms of corporate responsibility are vital to public perception, and companies that are more successful in crafting a positive image in the eyes of their people have more engaged employees.
2. **Leadership.** Leadership must have the ability to motivate and support employees by delivering a bold vision for what the organization stands for, building confidence in them, acting with integrity and authenticity, and expressing genuine concern for employee well-being.

Largely supervisor-driven, local level functioning fills the remainder of the top five factors predicting higher rates of employee engagement in mining:

3. **Empowerment.** Employee involvement, voice and authority on the job, reflecting how well employees are able to influence the work environment through their direct actions.
4. **Performance evaluation.** The fairness of annual review processes and company's effectiveness in using nonmaterial recognition to encourage excellence.
5. **Safety.** Organizational effectiveness in addressing unsafe work conditions, observing safety rules continually and ensuring a generally safe workplace.

Collectively, this list of engagement drivers provides a set of marching orders, both for efforts required at the senior leadership level and important competencies needed for local managers. Notably, it matches many of the leading indicators of high performance organizations.

Rock solid proof: the impact of engagement upon company-level KPIs

Willis Towers Watson frequently conducts client specific studies, statistically connecting employee opinion data to financial and operational data, determining the strength of connection between employee engagement and company performance. One such study illustrates statistically significant connections between employee engagement and operations and safety KPIs across a number of mines.

KPI linkage study in a global mining giant

The study of a leading global mining company looked at the relationship between the overall employee experience at site level (as measured in the annual employee survey) and KPIs related to people (e.g. turnover), safety (e.g. injury frequency rate) and operations (e.g. production vs plan, work delivered to schedule). The data includes the opinions of tens of thousands of employees, linked with KPI data from dozens of sites.

Figure 2 - connections between employee engagement and KPIs

	HR KPIs		SAFETY KPIs			OPERATIONAL KPIs	
	Employee Initiated Turnover	Employer Initiated Turnover	Injury frequency	Lost time through injury	Potential injury	Work delivered to schedule	Schedule compliance
ENGAGEMENT INDEX							
I believe in what the organisation stands for							
I have a clear understanding of the goals and objectives of the company as a whole							
I would recommend my business as a great place to work							
I work beyond what is required to help my part of the business succeed							

Figure 2 above shows how key performance indicators related to HR, safety and operations are connected with employee engagement. Engagement is represented both with an overall index and the specific questions that make up that index. The colored cells highlight KPIs that were proven to be positively impacted by employee opinion related to engagement (based on a Pearson correlation coefficient significant at 95% or 99% level of confidence).

The significant connections observed between employee engagement levels and safety and operations metrics in this mining company provide further supporting evidence for following the high-performance company blueprint and driving up performance on the sector specific key drivers of engagement, including leadership effectiveness, company image, total reward and an empowering, team – oriented culture.

The importance of strong leadership, communications and positive corporate image is underlined in this linkage study, where sites scoring higher on these big picture components performed notably better – for example, in terms of scheduled work delivery rate. The more positive views of supervisory effectiveness, associated with significantly lower employee initiated turnover, suggests the sector can retain its talent if it maintains this relative strength.

Conclusion: A better employee experience in the mining industry

The research outlined in this article demonstrates that both macro and micro research findings lead to the same conclusion: better organizational performance is associated with leaders that create an employee experience which outperforms the competition in some fundamental areas. In brief, mining organizations will be more successful if they:

- **Foster employee belief** in the vision, purpose and image of the organization at the overall level.
- **Connect at the personal level.** While the mining industry is leading the way in terms of co-worker relations that foster empowering, safe work, there remains a significant gap to close with regard to leadership effectiveness, in particular supporting connections between both the practical and emotional aspects of work.
- Provide employees with a total rewards package which **couples fair remuneration with the opportunity for long-term career growth.**

The analysis also proves how improvement in these areas will directly impact the bottom line of mining organizations. Employee engagement has been found to drive financial outcomes such as earnings growth and gross profits, as well as KPIs related to productivity and safety.

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Black lung and compliance: the great divide

"The first priority and concern of all in the coal mining industry must be the health and safety of its most precious resource – the miner."

Section 2(a), Federal Coal Mine Safety and Health Act of 1969. USA

Introduction

Black lung, or Coal Workers' Pneumoconiosis (CWP) to use its formal name, is most often found in the coal mining industry or where graphite or man-made carbon products are manufactured. The disease is commonly known as "Black lung" because those diagnosed with it typically have lungs which look black instead of the pink associated with healthy individuals.

The "Black lung, white lies" report

CWP was the subject of a report tabled in the Queensland parliament in May 2017 after 27 public hearings, conducted from October 2016 to March 2017. The government pulled no punches in the *'Black lung, white lies'* report, saying the illness has not "re-emerged", describing the re-identification of the disease as a "catastrophic failing" of public administration in the state.

With at least 22 cases confirmed in Queensland in the past two years, and more diagnoses expected to come, the government acted swiftly to determine how the regulatory environment and health and safety systems had failed, and how to better protect workers exposed to coal dust in the workplace.

The failure of the regulatory system in Queensland

While all mining companies look to protect the health and safety of their workers, ultimately this crisis has revealed the "great divide" between what is considered to be compliance with health and safety obligations and effective workplace protection. The parliamentary report was scathing, finding "a catastrophic failure, at almost every level of the regulatory system, intended to protect the health and safety of coal workers in Queensland".

As the human tragedy of this plays out, there are implications for the mining industry, the way its workplace health and safety is audited and, of course, risk management, mitigation and transfer – particularly when it comes to Workers' Compensation coverage and Directors' and Officers' liability.

Court filings inevitable

A key finding of the situation in Queensland is that no person or entity has ever been prosecuted for failing to meet a health and safety obligation in relation to respirable dust in this state. Court filings, whether for individual cases or a class action, are therefore only a matter of time.

What about the medical fraternity?

The 'Black lung, white lies' report was also highly critical of Queensland medical professionals. Chair Jo-Ann Miller was quoted as saying the systemic failure also applied to doctors and radiologists:

"There have been 30 years whereby the doctors have been asked to look after the coal miners' health and they have failed catastrophically as well as the Department (of Health). The failure in relation to the health scheme is something that every single officer of that department should be ashamed of."

So you're compliant – but are you effective?

The lesson to be learned here for all mining jurisdictions is simple. There needs to be a renewed focus on the effectiveness of Health and Safety protocols in the workplace, rather than merely checking with and adhering to compliance.

Clear lack of protocols

A report prepared for the Queensland Department of Natural Resources and Mines, by the Monash Centre for Occupational and Environmental Health and the University of Illinois School of Public Health had an equally blunt assessment. The Coal Mine Workers' Health Scheme "revealed major system failures at virtually all levels of the design and operation" when it came to respiratory health, including a lack of clear protocols to report cases of Coal Mine Dust Lung Disease (CMDLD) to the department.

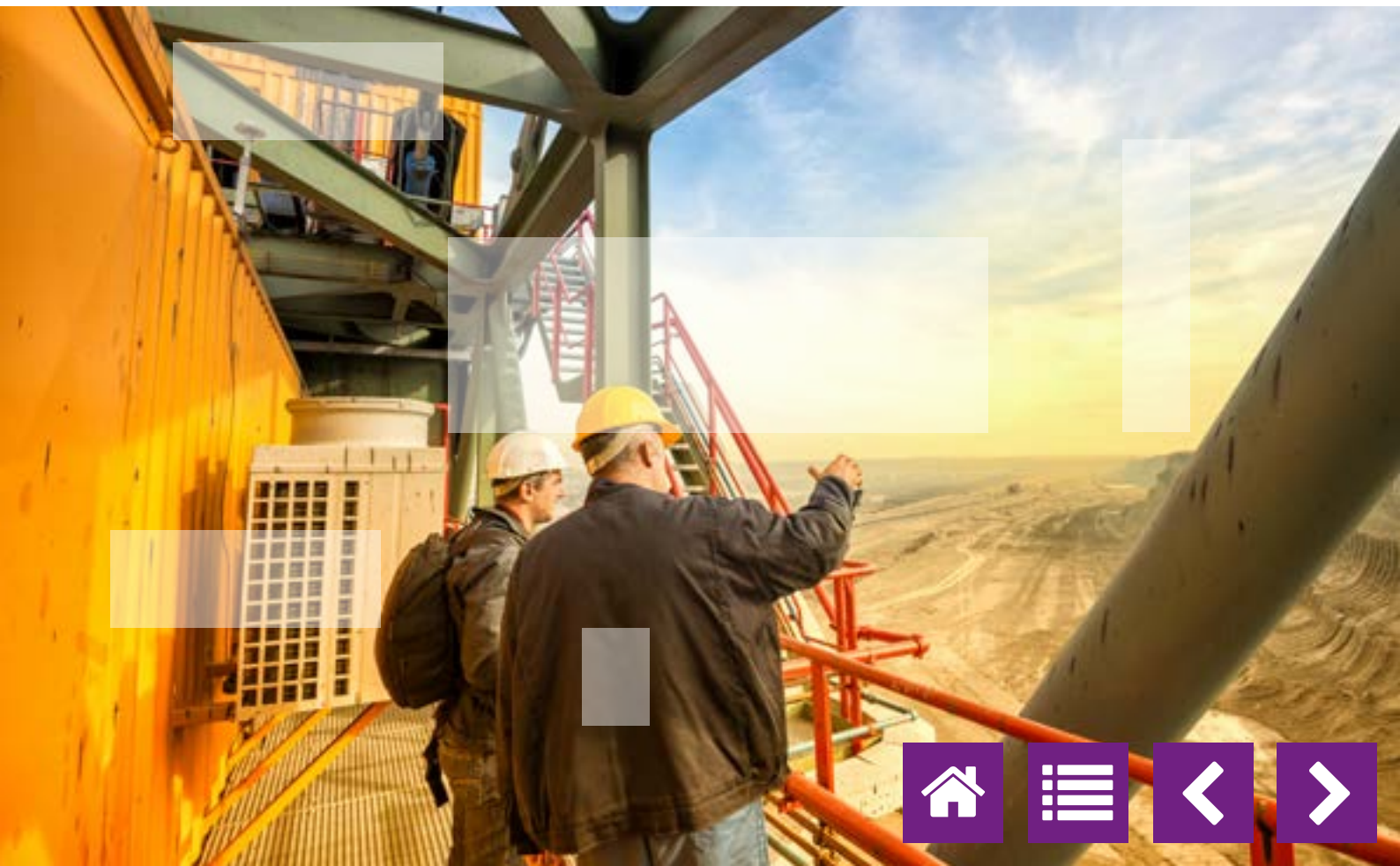
Too much focus on catastrophe scenarios?

One of the issues in Queensland and Western Australia, unlike other Australian states and territories, is that specific mining safety regulations exist outside the main workplace Health and Safety laws. These regulations could have been construed as being more focused on the 'big bang' that is, avoiding scenarios that could lead to explosion, mine collapse or other major disasters. The Queensland government has now clearly signalled that CWP is no less a catastrophe.

All mine operators have a responsibility to implement suitable dust suppression. Clearly, in many cases, that hasn't worked.

2017 changes

In Queensland at least, legislation to reform the regulatory framework



for coal mining has been introduced and made effective as of 1 January 2017. Employers in the industry are on notice to ensure the health surveillance of their workers is carried out by a medical practitioner with the requisite expertise to diagnose CWP.

What about the US?

In the US, Black Lung has continued to be cited as a cause of death on former coal workers' death certificates. US expert Dr Robert Cohen, the principal investigator at the University of Illinois at Chicago's Black Lung Centre of Excellence, gave evidence at the Queensland parliamentary inquiry. In response to a question from the inquiry's deputy chair Lawrence Springborg MP on whether as many as 70,000 US workers had CWP listed as contributing to their death, he said that was a "significant underestimate".

Fully independent compliance auditing?

A major part of the problem is the auditing of compliance. The Queensland report called for a "truly independent" Mine Safety and Health Authority that would report to a parliamentary committee, have an expert medical advisory panel (with US expert Dr Robert Cohen as a consultant) and a full-time expert medical director.

But what happens on the ground needs to change. In the wider health and safety process we see inspectors come from many sources – some from the industry, others from law enforcement. If we look at Queensland's Mines Inspectorate, inspectors are almost invariably ex-miners. While there's no doubt they have specialist knowledge, they have never seen safety from any other point of view.

Ultimately, it is the employer who must be held to account and what we have seen in the Queensland parliamentary report is a willingness to strengthen laws to ensure an 'eradicated' disease stays that way.

The risk management implications

So we're seeing something of a "Brave New World" here – the very real likelihood that a number of Workers' Compensation claims may be revisited and the need to re-assess whether these workers are entitled to access benefits.

Workers' Compensation scheme failings

The Queensland report found significant failings in the Workers' Compensation scheme affecting coal mine workers diagnosed with, or concerned about CWP. Among them was no mechanism for workers with CWP to access lump sum payments if there is no permanent impairment and no capacity to re-open claims if impairment progresses. It made a number of recommendations that will also no doubt be looked at by other states, should cases of CWP come to light in their mines:

- Transitional one-off medical assessments at no cost for retired or former coal workers (six months' exposure to coal dust in Queensland)
- Provision to reopen a claim if the disease progresses
- Lump sum compensation payment awarded even if there is no permanent impairment
- Enhanced rehabilitation (including pulmonary) and retraining
- CWP and Coal Mine Dust Lung Disease (CMDLD) to be 'Notifiable' diseases under the *Public Health Act 2005*
- Qld Chief Health Officer to report to Parliamentary Committee annually on CWP and CMDLD
- Permanent Parliamentary Committee on Public Administration

Queensland's Office of Industrial Relations was moved to issue advice for workers diagnosed with CWP, outlining workers' compensation for a successful claim. It stated that workers will be entitled to weekly compensation for lost wages, among other benefits, but this does not insure the worker against a drop in income if they are redeployed to a lower grade or where additional loadings are paid for specific tasks.

Entitlements relate level of worker's incapacity

WorkCover has also issued advice that, after a successful claim, entitlements relate to the level of the worker's incapacity and how this might be reassessed over time/progression of the disease. It does outline that cases of permanent impairment could be eligible for statutory lump-sum payments of up to A $314,920. If the degree of permanent impairment is 30% or more, there could be additional lump-sums of up to that amount, plus other possible allowances.

WorkCover's advice notes that workers diagnosed with CWP may have the right to sue their employer, or former employer under common law and suggests contacting their union or a solicitor. While Australian plaintiff lawyers have not yet filed any class action suits with regard to CWP, the volume of cases suggests this may not be far off.

The need to audit

Ultimately, to ensure compliance and minimise risk, the auditing regime in mining and other industries where dust suppression is required, must be robust and timely. Under Australian standards there are 100 elements to an audit process in mining and these must all be captured within an optimal timeframe. Healthy companies look to do four or five audits within an 18-month period to capture all the elements that are required. Other companies may take appreciably longer.

We believe mining, like many other industries, needs appropriately qualified and certified auditors. A degree in safety or a related discipline should be a minimum, but it's important for the mining industry, in the light of what has happened with CWP, to attract auditors with the widest possible experience base. Companies need to satisfy themselves that they have the right people auditing their practices. The health of their employees, and their businesses, depends on it.

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Graham Kenafacke *is national WHS manager at Willis Towers Watson Australia*

Risk culture in the mining industry: why should it matter?

The concept of business risk has evolved to encompass all day-to-day issues, driven by the realisation that often success or failure is dependent on the behaviour of an organisation's people – either individually or in groups.

In an increasingly complex corporate world, managing risks related to an organisation's 'human capital' is critical. Given the new developments in the mining industry outlined elsewhere in this Review, this is especially the case for the mining industry.

The management of these risks is often perceived as challenging because it's thought within the mining industry that people-related risks can't be quantified. However, it is precisely the intangibles and uncertainties inherent in this 'human capital' asset that are critical to today's evolving corporate risk and safety management strategies.

A good, balanced risk culture helps miners identify and take advantage of the right opportunities, to gain competitive advantage and reduce the total cost of risk.

Setting the right risk culture

Taking an overly cautious approach to behavioural risk can lead a mining company to achieve below-potential growth, while a risk culture that is high on the risk spectrum (without suitable frameworks in place) can lead to extreme losses. Additionally, pressure from shareholders to achieve quarterly performance results forces longer-term risk management to take a back seat to short-term targets.

Establishing a consistent and enterprise-wide risk management framework, that is supported by a strong risk culture, supports business resilience while minimising risks and potential losses. This forward-looking approach, founded on a clear understanding of the organisation's risk culture and its influences, gives leaders the power to shape strategy to match desired outcomes.

What is risk culture?

Risk culture is the sum of the organisation's "shared values, beliefs, knowledge, attitudes and understanding about risk" (Institute of Risk Management). It is built, shaped and reinforced by individuals, groups and leaders within organisations. For example, rogue traders have caused millions of pounds of losses for investment banks and nearly all industrial accidents can be traced back to flaws in risk behaviour.

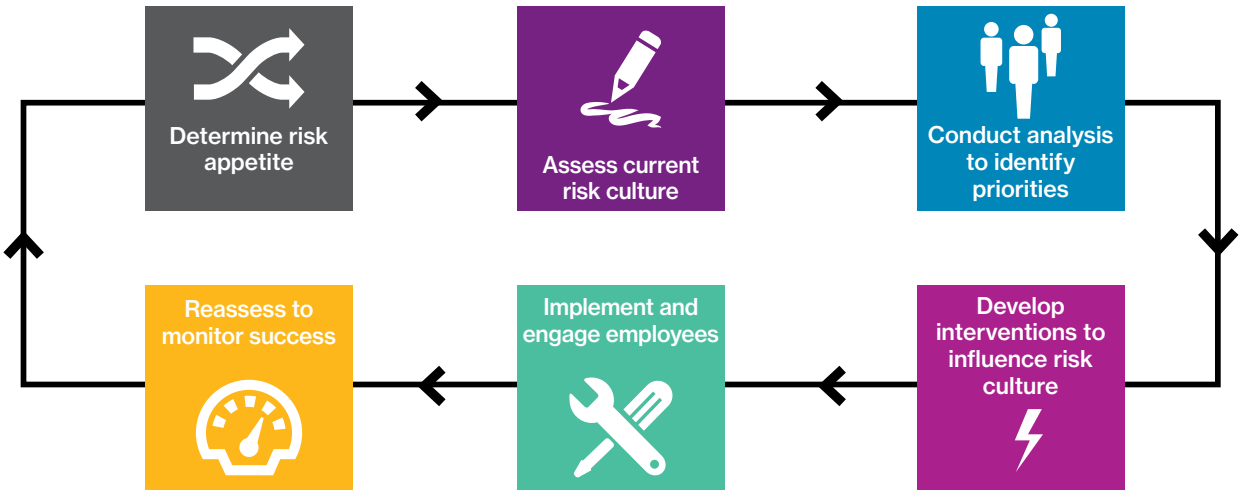
The role of leaders

The role of boards and chief risk officers, as well as other risk specialists, is to clearly articulate a balanced and business orientated view of risk. It is crucial that this is used as the basis for educating and advising the rest of the organisation.

Risk and safety cultures develop over time and leaders play a crucial role in helping culture to mature. Business leaders need the knowledge and skills to take an organisation towards an incident-free environment. As well as knowledge and skills, leaders need to reinforce the right messages, as well as role model behaviours required of employees. If leaders say one thing and do another, or worse, spread contrasting messages, employees will either disregard corporate messages about risk, or imitate the behaviour of management.

Aligning risk appetite to risk culture

Understanding risk appetite informs effective assessment of current, baseline risk culture. The subsequent assessment findings help identify areas to address and suitable interventions that, combined with ongoing monitoring, enables organisations to effectively manage risk culture.



A focus on risk culture

To influence and improve risk culture, an organisation must understand both a top-down and bottom-up perspective. This understanding highlights risky behaviours which, if eliminated, will lead to a reduction in incidents, accidents, fines and claims, reducing the total cost of risk.

An organisation can look to improve risk culture holistically and/or by focusing on specific businesses or functions via an operationally focused approach.

Corporate risk culture – the board's duty

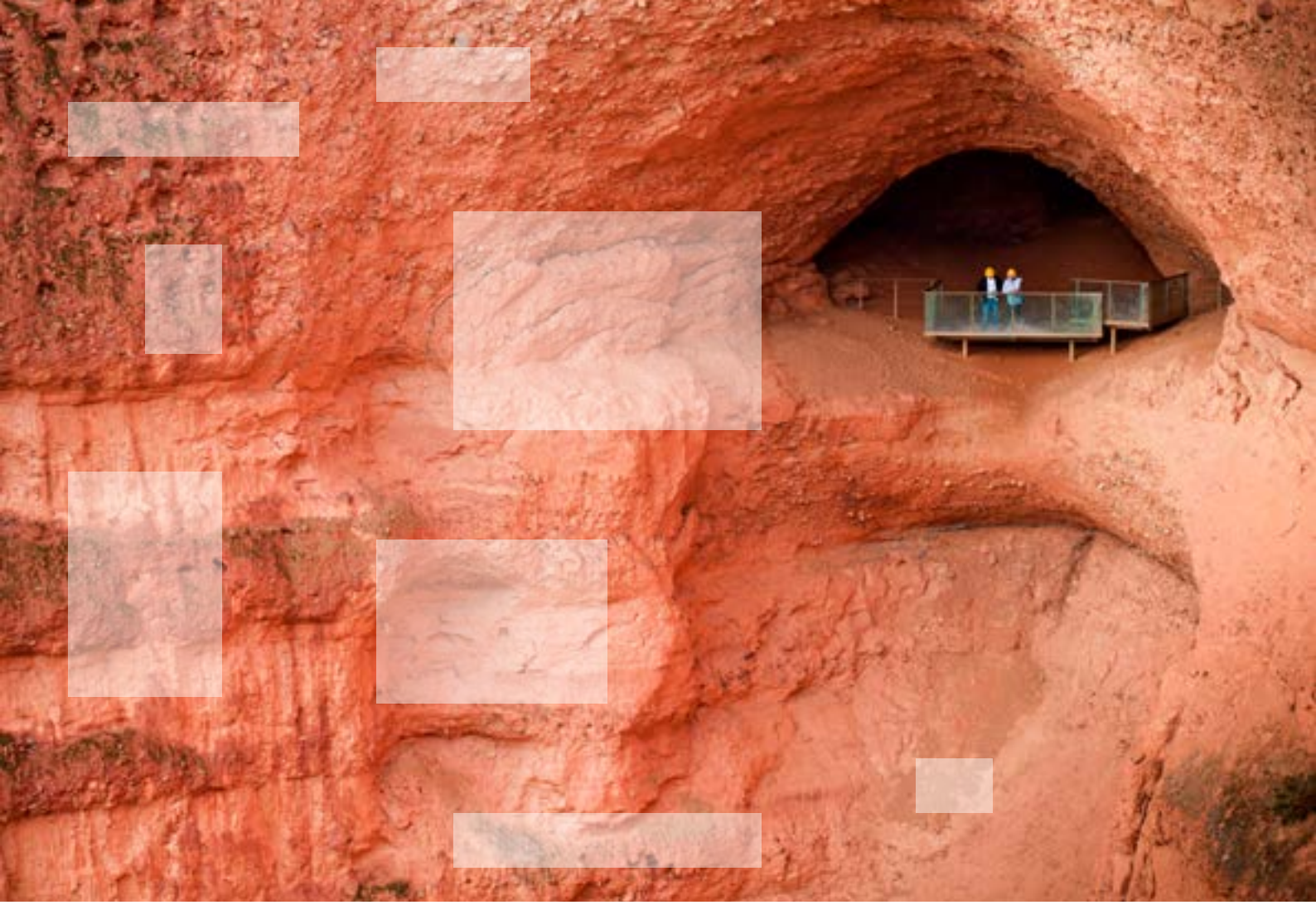
A well-managed risk culture supports business objectives and reduces the total cost of risk. Responsibility for risk culture is also one of the board's duties.

The Financial Reporting Council's (FRC) Corporate Governance Code states responsibilities and offers guidance for boards of listed companies and standards for auditors. It directs that each board member must be 'risk aware' and that the board should establish a company's culture, values and ethics.

The Code demands that risk management and internal controls are incorporated within day-to-day management and governance processes, and not treated as a separate compliance exercise. Each company must report on how they have applied the Code.

The Code also specifies that risk considerations are embedded into reward systems, asking the board to consider how its human resource and reward policies support business objectives and risk management.

A holistic approach to corporate risk culture, starting at board level, will ensure all activities from strategy to communications are correctly aligned to influence employee attitudes and behaviours. To influence and improve an organisation's risk culture, corrective strategies need to be embedded throughout.



Operational risk culture – target specific functions

Risk culture can be applied to units or operations within an organisation; vehicle or fleet risk management is a good example, especially for the mining industry. Whether fleet is the primary business or not, addressing risk culture in relation to drivers can influence areas such as recruitment, retention and training, while reducing claims and the total cost of risk.

By undertaking a screening assessment and a survey of drivers, fleet operators can identify links between drivers' attitudes, beliefs and behavioural tendencies, and the frequency and severity of incidents. For example, there is a strong correlation between engagement in the work place and the frequency and severity of incidents across industries.

The combination of a driver survey, identifying issues from the perspective of drivers that management may not otherwise be aware of, and individual driver assessments, enables organisations to target elements of the driver experience that are most likely to have a positive impact on the number of incidents and subsequently claims.

The financial benefits for an organisation are clear – a robust mitigation approach and fewer claims will have an impact on insurance premiums and retained costs. In addition, this approach to managing risk will significantly reduce the threat to brand and reputation by the potential for fewer incidents and more impactful communication.

A targeted risk culture approach can be applied to any part of an organisation.

Measuring risk culture – the importance of quantification

Measuring risk culture is important for internal assessment and risk culture management, and will help companies meet the requirements of the Corporate Governance Code. Much of an organisation's risk culture lies 'beneath the surface'. Important cultural characteristics may not be immediately apparent but they can be identified, measured and understood using two key assessments.

1. Psychometric assessment

Applying a well proven psychometric assessment to employee groups that manage risk or represent material risk exposure can help organisations understand their combined risk profile. For example, assessing leadership can help organisations measure their senior management group's propensity for unduly risky or risk-averse behaviour, and whether the tone set from the top matches the desired risk profile.

2. Employee risk survey

A risk survey uncovers the collective impact of employee views and behaviours. A survey enables measurement of key aspects of risk culture and an assessment of findings, in the context of external norms, to identify the drivers of employee risk attitudes, highlight potential risk 'hotspots' and answer core questions such as:

- How safe do employees feel it is to speak up?
- How do employees view the example set by leaders?
- Do employees feel a sense of personal responsibility for managing risks in the business and do they feel it is necessary to adhere to risk controls?
- Do performance management or bonus metrics make employees more prone to risky behaviour?

Analysis and reporting tools in these two areas not only provide key insights for senior management but are also suited to engaging and involving line managers in the local risk culture of their own areas of control.

Setting priorities

The outcomes of both assessments can help risk and HR functions identify key interventions that will improve risk culture. In combination with HR data, claims statistics and risk exposure data (for example, telematics data in the case of drivers), the outcomes of the two assessments become more powerful, helping shape targeted interventions that lead to improved risk management and stronger risk cultures. Armed with a better understanding of current risk culture and how it links to key risk factors, leaders and managers can utilise a range of tools to shape their organisation's risk culture going forward.

Tools to influence risk culture

Integrated risk management is achieved through a structured and coordinated approach that identifies, assesses and manages relevant business, asset and people risks.

Willis Towers Watson works with organisations to transform risk culture and ensure a successful implementation of new integrated risk frameworks.

Armed with a better understanding of current risk culture and how it links to key risk factors, leaders and managers can utilise a range of tools to shape their organisation's risk culture going forward.

A unique perspective highlights the critical intersections between talent, assets and ideas, the dynamic formula that drives business performance, through:

- **HR interventions -** aligning HR and risk policies to design and implement more effective processes. Typical interventions include review, redesign and implementation of compensation and incentives, manager selection and development, and performance management.
- **Risk management** - independent review of policies, procedures and documentation to influence an organisation's risk culture. Assessment of existing risk management frameworks enable an organisation to understand its strengths and identify where processes require enhancements, measured against market best practice.
- **Organisational effectiveness – governance, compliance and controls** - review of an organisation's structures and processes to ensure optimal outcomes, such as effective decision-making, regulatory reporting and role accountability, against market best practice. An employee perspective of these measures often identifies unforeseen incentives not to follow procedure, incentivising risky behaviour.

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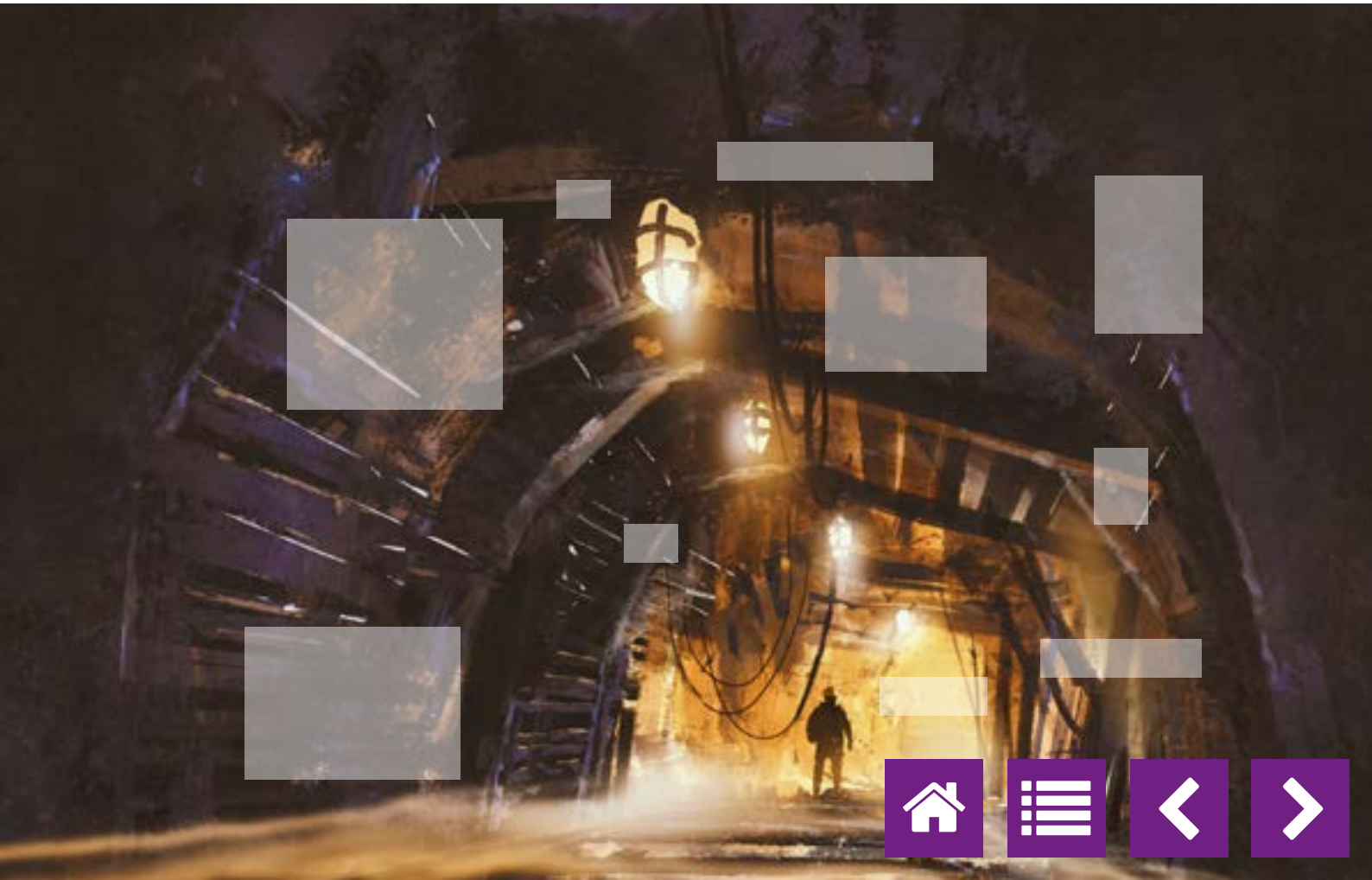


Total cost of lost time: a game-changing approach to managing employee absence

Introduction

In the year since the merger of Willis and Towers Watson, the "business proximity" of our Risk Management and Human Capital consultants - traditionally separated up until now - has already generated many successful connections between these two domains, undoubtedly to our clients' benefit.

The Willis Towers Watson Natural Resources Risk Index, published last year, analysed the severity of impact and ease of management of the top 50 risks facing the industry. One of the five megatrends identified was Workforce Management and Talent Optimization. Many companies in the mining industry face the challenge of doing more with less, as a shortage of industry-specific skills, less experience due to recent layoffs, lack of international mobility, global competition for talent, the requirement for new skillsets and a volatile industry combine to make talent attraction, retention and engagement a key risk for any company working in this business.

The mining sector saw a huge decline in activity up until 2016 when things began to show improvement and by 2017 had recovered quite a bit of lost ground. Those bad years led to mine closures, projects being shelved and having to optimize an operation to do more with less due to major cost control efforts.

The total cost of lost time consists of the economic (implicit and explicit) costs of worker injury, sickness and presenteeism[9]. Explicit costs are readily identifiable, such as workers compensation and health care claims and increased premiums. Implicit costs are considered opportunity costs and include loss of production, costs associated with replacing that lost production and possible equipment damage.

The attempt to mitigate the causes and monetary impact of the total cost of lost time has historically been managed by two distinct and separate operations – the Risk Management and Human Resources departments. However, we believe that energy companies should now consider a more holistic approach that removes this historical divide to create an enterprise wide solution.

According to the Willis Towers Watson's 2015/2016 Staying @ Work survey, produced in the US, an unhealthy workforce is an expensive workforce, as evidenced in a summary chart of its key findings overleaf:

[9] Presenteeism is the concept of working while sick or injured and its consequences are productivity loss, exhaustion leading to exacerbated sick time off, decreased engagement and workplace epidemics like workplace infections

Workforce risks	Impact on Risk and Health
~50% of Americans have at least one chronic health condition	**Workers Compensation severity** impact **(85%** of claims can be **attributed to lifestyle and chronic conditions),** absenteeism, STD, LTD and medical benefits
~67% of US adults are obese	Lead to **higher healthcare** costs and contribute to **WC incidence and severity**
The workforce is aging: Mean age is **41** and is expected to increase in the near term	Lead to **higher healthcare costs** and contribute to **WC incidence and severity**
Compliance requirements are increasing; ADAAA and Wellness regulations through ACA	**Impact on wellness programs** and **WC accommodation**; non-occupation and occupational medical event exposure equalizes

The situation is of course similar in many other areas of the world and is a familiar one to the energy industry. So how can mining companies respond?

Analytics that encompass a broader enterprise view

Today's more sophisticated analytic frameworks use a broader enterprise view to allow a company to identify and design targeted solutions to reduce lost time and improve productivity. Often times the framework starts with a more foundational view – examining performance data to create baseline benchmarks. Additional sophistication is added so that the company's workforce performance relative to external benchmarks and trends over time can be assessed to manage risk. Finally, modern tools and techniques afford us the opportunity to accurately predict risk and by doing so design optimal programs to manage the total cost of loss time across a broad spectrum.

Start with a high quality business hypothesis

Creating and working with sophisticated analytical models is much more than applying algorithms to data. Effective models start with a high quality business hypothesis such as:

"We have a higher than expected claims and a longer cost-tail on some workers compensation claims versus others."

An effective analytical partner would then work with the business to identify the broad range of data sources that are most relevant to the issue at hand. Examples of this include medical, pharmaceutical, disability, and workers compensation claims. A more comprehensive view would include PTO, safety and incidence reports, health risk factors and employee census.

Bringing order to the data

Of course it is likely that some data collected would be valuable whereas other data would not. For example, the model would test if the longevity of cost is due to the type of injury or efficacy of care. With this in mind, the analytical process, in partnership with the business team, brings order to the data. This allows companies to understand what drives the underlying business problem.

The solution should engage leaders in the results and include implications for action. In this example a population of employees that have a higher incidence of claims, more missed days and lower performance might also have opioid prescriptions from several providers that could lead to abuse issues. The goal would be to separate out these issues so that an appropriate mitigation program can be implemented.

A case study – Workers Compensation losses

Consider the following case study. A model was built to study the underlying risk drivers for Workers Compensation losses for a specific company that had some 11,000 employees. The objective was to identify the relative Workers Compensation risk of each employee for the year ahead so that the risk could be identified and managed more effectively.

In measuring the risk, we were looking to determine two things:

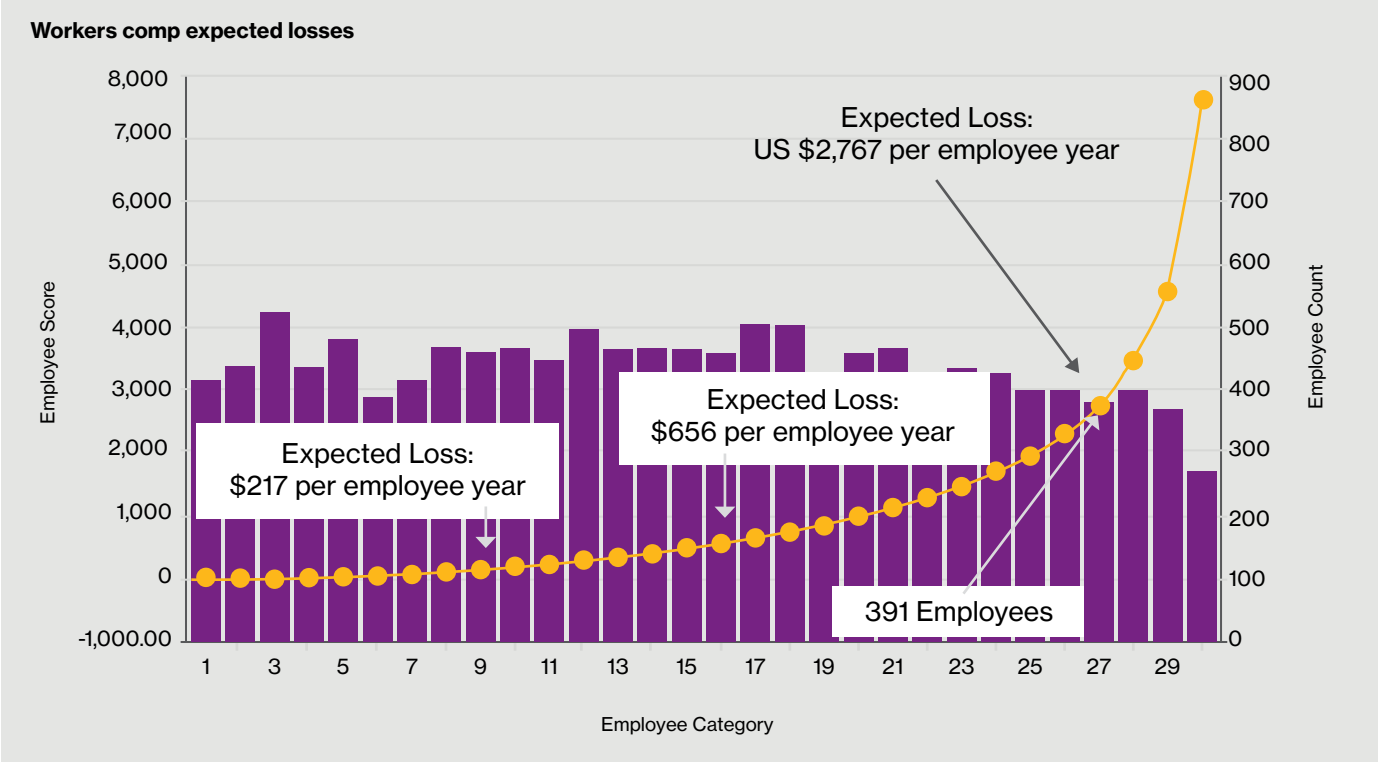
1. the probability of someone getting into an accident; but also:
2. if they got into an accident, what the size of that accident would be.

The combination of these two measures is particularly useful for the employer.

Willis Towers Watson collected a significant amount of data on these 11,000 employees, from which perhaps some 30 pieces of information were predictive in nature and could therefore be modelled effectively.

Of these 20-30 pieces of information, there was some information that the employer could do nothing about – an employee having children or getting married, for example. But there was also a significant amount of information that the employer could indeed have some control over, such as whether they had received training or whether they had had bio-screening. So out of the original pieces of information, we identified 10 over which the employer did have control.

The model was applied to the active workforce and the following exhibit overleaf was produced.



In the model above, the last four employee categories produced by far the most significant expected losses, allowing the company to identify where their real WC exposure lay

The chart above reflects the output of the modelling process. Instead of 11,000 different results, we grouped the employees into 30 categories of risk so we could manage the results effectively. Each of these 30 employee categories had roughly the same number of employees in them and are reflected in the horizontal axis of the chart.

We then created the two vertical axes which were:

- On the left, the expected loss in dollar terms for each employee (by category)
- On the right, the number of employees in each category

If we plot the expected annual loss from each employee per category on this chart as calculated by the model, we can identify where the real risk lies. For example, the category 10 employees represent only an average risk – these 450 employees are forecast to cost the company on average some $217 each per year (i.e. $97,650 in total). However, further up the scale in Category 27, these 391 employees are each going to cost the company on average $2,767 each year (i.e. $1,081,897). Indeed, the last four categories make up by far the largest part of the overall risk.

Actions taken from knowledge gained from the model

So far we have discussed the output of the model. The next step is to apply the model in a business as usual setting. The model also told us that, all things being equal, if employees receive proper training the company could expect a 15% reduction in risk. If employees received the bio-screening, the company could expect a 2% drop in risk.

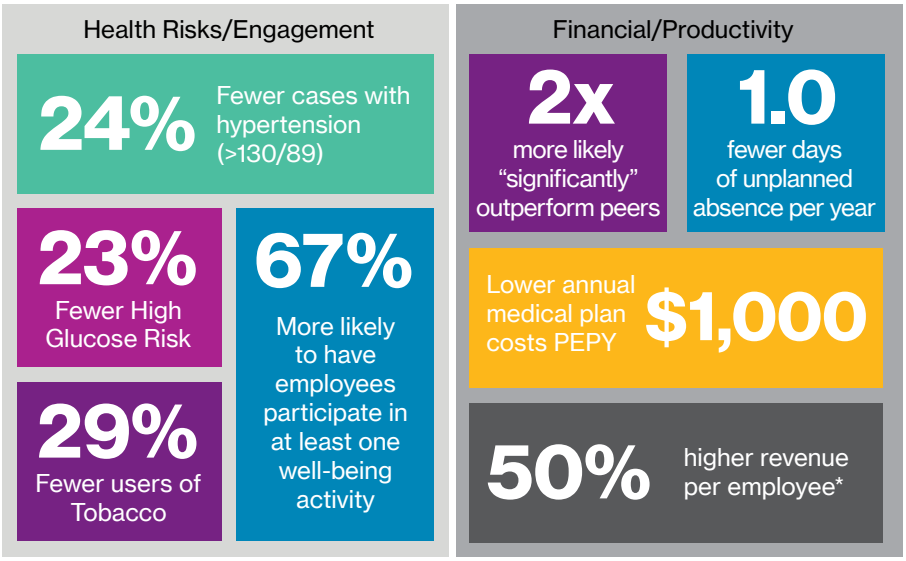
Instead of blanketing these programs across the entire population of employees, we can now surgically target which employees would benefit the most and as such optimize our investment. In this case it was identified that investing $35,170 in

these two programs (training and bio-screening) for this population of employees would lower workers compensation losses by $86,169 – a 145% ROI. While seemingly a small amount in absolute dollars, keep in mind that this was only 3% of the workforce for a single risk type.

Expanding this model to multiple risk types across broader employee populations will expand the monetary returns exponentially.

Why does it matter?

All our research to date suggests that companies with the most effective health and productivity programs have a financial advantage, summed up in the chart below:



Source: Willis Towers Watson 2015/2016 Global Staying@Work Survey, United States.

We've shown that that a sophisticated actuarial analysis of a company's Workers Compensation risk profile can do much to lower overall risks costs – a clear example of the value to be gained when risk managers and HR professionals combine and work together to identify and mitigate a company's people risk.

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Part two – mining risk mitigation and transfer issues

Hot work, hidden dangers: what can be done?

What is hot work and why does it matter?

The term hot work is used in industry to denote work involving equipment which causes a significant rise in temperature, sufficient to cause ignition. The ignition might be of materials, resulting in smouldering or flaming combustion, or of flammable gases, resulting in explosion.

Hot work can be lethal...

Fires and explosions resulting from Hot Work activities in the mining industry have consistently been a significant contributor to insurance claims over the years; indeed, during the last two years we have witnessed as many as 10 separate hot works losses that have significantly impacted the insurance market, with some insurers walking away from affected programmes (see our market round-up article later in this Review). Mining is characterised by some home grown issues which give rise to serious hazards; this means hot work activities need to be constantly managed with consistency and diligence. With a better awareness of the mining context and how it might erode our efforts to control the risk, the industry can move forward in achieving ever safer and more effective systems to carry out this necessary activity.

Where do the key operational risks lie?

Mines and mining sites are exposed to hot work risks in three key areas:

- Underground mining – driven by ventilation, methane, immobile equipment and escape routes
- Surface mining – from the fluid contents of large and complex machinery
- Surface treatment plants – through the extensive use of rubber-lining

In each of these there are specific hazard characteristics that highlight the need for increasingly effective controls for the hot work activity.

Underground mining

For hot work activities, the underground environment presents four main challenges:

- the role of mine ventilation in the spread of fire
- access and escape for personnel and fire-fighting equipment in case of fire
- location of immobile equipment away from designated hot work areas
- the presence of methane

Mine ventilation

Ventilating the underground workings results in large quantities of air flowing at speed along tunnels to maintain safe working conditions (temperature and air quality) for workers at the production faces. Some mines have faces located several kilometres from the shaft.

Any uncontrolled ignition in, say, a conveyor belt after hot work repairs, is likely to spread quickly along the belt, fanned by the air flow. Typically, the air can travel at speeds of up to five metres per second (11mph) in conveyor haulages; not only will the fire be driven along the belt, but the smoke will be transported through the particular district.

Access and escape

It is easy to see that smoke and fire damage could be extensive as equipment, infrastructure and possibly workers are caught in the in the path of the advancing fumes and fire. It is worth noting here that the provision of belt-mounted portable breathing apparatus and underground refuge bays (safe havens) within a short distance of working places has been widely accepted within the industry and made a legal requirement in many countries.

Location of immobile equipment

Hot work is also necessary to maintain and repair equipment that cannot realistically be removed to a safe area, such as transfer chutes in conveyor systems or heavy mining machinery. Stationery equipment can be located anywhere along the main haulage tunnels, where products of combustion from fire or explosion can quickly be borne through the mine.

Presence of methane

In some cases, primarily coal mines, the presence of methane, a naturally arising flammable gas adds an extra level of risk that prohibits the use of hot work underground in all but exceptionally well controlled designated safe areas. Ignition of methane has the added hazard of generating a self-propagating coal dust explosion, a potentially catastrophic event for a mine.

It remains that whatever the source of fire underground, the unique environment adds a level of risk that makes control of hot work absolutely vital.

Surface mines

For surface mines, hot work often entails repair and maintenance on large earthmoving machinery, which are high value, complex units containing large quantities of combustible fluids. Lengthy lead times for major replacement parts or machines themselves are common in these instances, leading to production loss with potential impacts on the business.

With large mining machinery, because of the complex systems and potential for general fire hazards from a number of sources, each machine constitutes a hot work risk situation, requiring a proper procedure.

Surface plants

Apart from the generic fire risk on any large plant where a number of sub processes exist, in mining plants one area of note is the use of rubber-lined equipment. Because of the sometimes abrasive characteristic of the ore it is necessary to use rubber-lined process equipment. Rubber lining is used in pipes, pumps, mixing and storage tanks, cyclones and other associated equipment and can be present extensively throughout the plant. Because the lining is often out of sight, inadvertent ignition is a risk with potentially large consequences. Clear labelling of all such equipment is good practice.

It remains that whatever the source of fire underground, the unique environment adds a level of risk that makes control of hot work absolutely vital.

What are the main hot work challenges for miners?

In countries with established industrial and mining legal frameworks, safe work requirements demand the use of hot work procedures as binding requirements. However, this is not always the case and, where absent, should be introduced as a minimum requirement and as good management practice.

The principal practical elements are:

- awareness of the risks
- preventative measures taken
- immediate contingency measures in case of an incident
- post-hot work fire watch

The risk has been successfully mitigated only when the management and control measures, i.e. proper authorisation, supervisory checks prior to, during and after the work and final sign off to recognise successful completion, are effective.

What about people risks?

Given the industry's deep focus on safety and workforce welfare, why do hot works incidents continue to occur? Our experience with clients and insurers points to a set of four people-related risks:

- **Proper preparation prior to the work.** If a fire or explosion is a consequence of the hot work, it is probably because the worker was not aware of the risk before starting the job.
- **Checks that ignition cannot take place from smouldering material or embers after the work is completed.** Some fires are the result of post work ignition. An undetected smouldering becomes an ignition and the fire takes hold, sometime after the worker has left the job. This occurrence is not uncommon, but should be detectable.
- **Proper management and supervision of the hot work policy across the business.** Human behaviour will naturally govern whether a procedure remains sustainable or whether it deteriorates over time because it is seen to be 'just another set of rules'. The challenge here is twofold: a) to maintain the effectiveness and relevance of the procedure in the face of change and b) to motivate users to understand and utilise the hot work procedure as an essential enabler for their continued safety and the well-being of the business.
- **The use of contractor staff:** The increasing use of contractors in the mining industry over the years has been a significant feature in the mines' ongoing drive for productivity. However the varying level of training and skills amongst contract workers sometimes increases the risk of an ignition when hot work has to be carried out.

How should miners respond?

The physical realities of mining make it all but impossible to eliminate hot work scenarios. We think miners must do better at preparing their workforce to effectively assimilate, gauge and prepare for the risks involved in working in hot work areas. Four actions are critical:

1. **Encourage relentless adherence to process.** It's no accident that the formal hot work procedure continues to be the primary tool for preventing fires and explosions when working with welding and cutting gear. The difficulty comes in making sure the procedure is fit-for-purpose and that workers are using it correctly and diligently, all of the time.

2. **Create a deep awareness of risk and the consequences of it materialising** – critical to the preparation phase prior to the hot work activity. A proper understanding of the risk assessment process will enable a supervisor and worker to best identify the risks in carrying out the intended work. This implies that risk assessment training is a critical requirement for workers and supervisors. This is not always the case.
3. **Establish a post hot work 'fire watch'** – essential in any hot work procedure, it can easily lose its effectiveness, by not being thorough enough in either the procedure or the execution. This is a key step and its value should not be under-estimated. It should be audited regularly for effectiveness.
4. **Regularly review and manage the hot work procedure** – regular critical review of the procedure should be built in to the policy. Audits and work study can give valuable information about changes that are required to the procedure. They can also indicate if the workers and supervisors require additional training in the use and execution of the procedure. Feedback from other sources may also enable procedures to be improved; for example, insurance risk engineers are often able to share best practices from other operations.

In the final analysis, it is clear that continual scrutiny of the effectiveness of the hot work policy will rest on the ability of those workers, supervisors and managers who understand and are aware of the risks of hot work. The final challenge rests with them.

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Alistair Forbes *worked for Willis Towers Watson in London for many years in our Engineering Risk Management team before retiring becoming a freelance consultant.*

BEPS, benefits and big data: the mining captive of the future

Introduction – a renewed interest from the mining community?

Captives have historically been quite prevalent in the mining sector. The ability to build cash reserves through risk retention, access greater capacity and exert greater control over insurance programme design has traditionally appealed to the larger mining corporation.

However, like everything, the relationship the mining sector has with captives is subject to change. A slight downturn in captive utilization was experienced during the extended period of macro-economic depression and then uncertainty from 2008 until relatively recently. Despite this, there has been a renewed interest in captive utilization amongst the mining community over the last 24 months or so.

The explanation for this renewed interest can be explained by the desire for the core risk financing benefits that a captive can provide, but also in some new developments in the captive industry.

How are captives being used for mining risks?

Mines introduce a particular set of risks, for which, a captive can be part of a solution. Although the risk profile associated with mine operation (low frequency/high severity liability risks) is not typically viewed as conducive to a captive participation, mines also contain their fair share of higher frequency and lower severity claims that a captive could accommodate.

In addition to this, some observable trends in mining industry captives include, for example, losses associated with process disruption/ key machinery breakdowns. Captives can also provide access to greater capacity for risks associated with pit wall collapse or tailings dam failure.

Parametric insurance is also garnering more interest as familiarity with the concept grows. Water availability based metrics can prove particularly relevant for mining based parametric solutions and help smooth the impact of any costs associated with the unavailability of water.

How are captives adapting to a new environment?

The emerging trends that provide an insight into the evolution that captives are currently experiencing is arguably more interesting and exciting.

In general, the two most notable evolutionary traits that captives have displayed in recent times have been:

- the utilisation of data to optimize risk financing arrangements
- the way in which they mirror the evolving risk profile of mining corporations accommodating a far broader range of risks

Data and captives

Data has become valuable currency in all facets of life in recent years and the capacity of captives to act as a repository for risk management data has grown exponentially as a result.

Through the correct use of their own data, mining corporations now have a wealth of insight to inform what and how they retain risk and this has led to an emergence of captive owners who speak in terms of “optimal retention structures”, “portfolio benefit maximization” and “maximization of return on equity” – a genuine insurance mind set. This has led to the pursuit of more sophisticated structures such as multi-year, multi-line programmes, to refine and optimize how corporates finance their risk and provide additional cash flow benefits – something that most mine operators would welcome.

In a sector with complex and potentially high severity risks, with high degrees of interdependencies between loss events, the ability to firstly model the operations risk profile, and then use these insights to make financially beneficial retention decisions is of paramount importance.

Broader risk profile associated with new ways of working

It is not a coincidence that the major trends and innovations of the captive industry in recent years have been in areas such as human capital benefits, political risk and cyber liability to name but a few – these represent the fastest growing risks of most major corporates.

Captives are rapidly adjusting to the new reality of a more interconnected global economy, where human capital is more than ever seen as the greatest asset a company can have.

The emergence of captives as viable insurers of employee benefit risk is one of the most noteworthy developments in recent years and exemplifies the evolution of captives from vehicles for ‘traditional P&C’ risk to enterprise wide risk solution vehicles. The ability for mining corporations to have more flexibility in employee benefit design and execution could have a profound impact on talent attraction and retention in a period of a well – documented ‘talent war’ within the sector.

This broadening of captive’s risk profiles has also improved the efficiency of captives through increasing diversification benefits but also ensured that they remain relevant to the key risks corporations face today.

Increasing globalization of captives

Another trend which has become more evident in recent years is the increasing global spread of captive hubs or domiciles. Historically, captives congregated in a handful of captive strongholds such as Bermuda, Luxembourg and Guernsey. However, there are now over 60 recognized captive domiciles with insurance legislation specific to captives.

This development underlines the growing demand for captive solutions outside Europe and the US, and is a reflection of the globalization of modern business environments. This is particularly encouraging for the mining community, which is truly globally spread and will likely provide mining corporations in locations such as Australia and South Africa having more genuine choice of where they locate their captive.

Current challenges to the industry – Base Erosion and Profit Shifting ('BEPS')

One of the most significant challenges facing the captive industry is BEPS, which is an Organisation for Economic Co-Operation and Development (OECD) led taxation initiative, expected to become a global taxation standard. This initiative aims to renovate global taxation frameworks and 'close the loop' in tax legislation which allows multinational corporates to artificially shift profit to lower tax jurisdictions and reduce their overall tax bill. Although the measures introduced by BEPS are not specifically aimed at captives, as subsidiaries of large multinational companies they fall within its remit. It is likely that many companies in the mining sector will own captives in locations where the corporate tax rate is lower than that of the headquarter jurisdiction, and if this characteristic applies, so may BEPS.

However, it is important to stress that having a captive in a location where corporate tax rates are lower (relative to the organization average) does not imply wrongdoing, nor should captive owners be unduly concerned.

However, what is important is positive preparation. Although the ultimate guise of BEPS in all jurisdictions is still to emerge, there is enough in the principles covered in the OECD guidance for captive owners to be preparing for. A sensible first step on the preparation project journey, through our proprietary proposition, RADAR, will be to review the captive's position in relation to the principle expectations of the BEPS package. Measuring the captive against key metrics, and documenting where positive compliance can be demonstrated - and where remedial action - is required will allow captive owners to begin thinking about BEPS in specific terms that are actionable. This can lead to a BEPS preparation plan which ultimately puts the captive owner in control of the challenge and removes much of the uncertainty that currently exists for many captive owners.

Historically, captives congregated in a handful of captive strongholds such as Bermuda, Luxembourg and Guernsey. However, there are now over 60 recognized captive domiciles with insurance legislation specific to captives.

Implications for the mining sector

So what conclusions can the mining industry draw from these developments?

Utilization of data to achieve a more analytical approach

A common theme ties the various developments observable in the captive industry of today – captives have continued to keep pace with economic and risk management developments. Big data, cyber risk, changing work places and practices, and challenges related to the governing of an interconnected global economy are all terms that will be encountered when reading any commentary of today's economy. Utilization of data to achieve a more analytical approach, accommodating risks such as employee benefits and cyber, and aligning to regulations designed for interconnected global economies through BEPS suggest that captives have more than kept pace and are displaying the ability to 'future proof' themselves.

Periodic review and realignment of captive deployment

However, none of these benefits will happen automatically. Captive owners who derive the best value, and maintain the greatest relevance from the captive strategy, employ an approach of periodic review and realignment of their captive deployment. The rate of change in the risk profile of mining companies, with changing work practices, regulations and commodity price volatility, together with the numerous external forces impacting a captive approach, results in the "shelf life" of a given captive strategy becoming potentially shorter.

However, this should not be viewed as a negative development as the greatest benefit of a captive is its ability to adapt and transform to meet the demands of the group as and when they change. If reviewed regularly, the enhancements to strategy will take the form of incremental improvements as opposed to any fundamental change in the strategic direction of the captive.

To conclude: a captive remains a flexible and dynamic tool for the management and financing of the traditional risks associated with operating a mine, but significantly it can also prove an effective tool for dealing with emerging risks associated with more sophisticated work practices. The benefits of a captive strategy also now span further than the risks typically under the remit of the risk manager and can be considered on a truly enterprise - wide basis.

Ciarán Healey *is Director of Consulting and Development for the Willis Towers Watson Global Captive Practice in Dublin*

The global mining insurance market: towards a turning of the tide?

The London market perspective

Commenting on conditions in the mining insurance market is somewhat akin to the playing of a scratched record on an old gramophone belonging to your grandmother: a repeated mantra, year on year, of increased capacity, more competition, reduced rates and dwindling premium income streams. In last year's edition of the Review we highlighted the main reasons for the continual excess supply of capital which has plagued the (re)insurance markets for some time now and while there is certainly no let-up in this excess supply we do at least sense that things may be beginning to change, at least in some areas of the mining portfolio.

A large number of parallels can be drawn between the mining and insurance industries at present. They have both experienced a prolonged downturn, with margins disappearing and oversupply persisting. Some consolidation has occurred and they have either neared or seen the bottom of the cycle. While the mining industry is ahead of the insurance industry in terms of pricing recovery, we see that trend emerging in the insurance market for miners as well in the second half of 2017.

Selected mining industry losses, 2015 - 17

Quarter	Year	Territory	Cause	Estimated Quantum (US$)
Q4	2015	Brazil	Tailings dam failure	open
Q1	2016	South Africa	U/g fire	100m
Q1	2017	Australia	Cyclone Debbie	125m
Q1	2017	Australia	Long Wall Collapse (Queensland)	50m
Q1	2017	Australia	Fire in Iron Ore Processing Plant (WA)	30m
Q1	2017	Australia	Flood	27m
Q1	2017	Peru	Conveyor failure	15m

Source: Willis Towers Watson

Please also note there was an underground flood with fatalities earlier this year in Chile - no information on quantum is available as yet.

STOP PRESS: Gulf of Mexico hurricanes

As this Review went to press, the (re)insurance market was beginning to assess the impact of hurricane Harvey, while hurricane Irma was crossing the Caribbean.

Clearly the potential loss to the global (re)insurance markets will be significant, although the full effects on the mining insurance market may not be able to be measured until the next reinsurance treaty renewal season at January 1 2018.

North American mining: still competitive

Let's start with the area of the portfolio that still remains relatively competitive – the North American mining book. The loss record for this sector has improved significantly in recent years and so competition remains robust. In particular, the entry to the market of Sompo Canopius has provided a significant leadership alternative within the Lloyd's market; this insurer can write either on a primary or quota share basis and furthermore has the benefit of offering an engineering service. Moreover, the Blenheim syndicate has hired two underwriters from the Cathedral syndicate which has also boosted Lloyd's profile in this sector.

We are therefore finding that the softening process has shown little signs of abating in this sector; miners and their brokers still have plenty of choice between opting for a Lloyd's based programme featuring layered placements and a more straightforward quota share programme featuring the major global carriers such as Swiss Re, Munich Re, AIG, SCOR, FM, Allianz and Zurich. Indeed, the London insurers that are prepared to follow the global carrier lead and offer terms on this basis are the ones that are most likely to thrive in this competitive environment.

As ever, risk quality and the prospect of fresh premium income are the key drivers in generating the most competitive terms from the market.

Casualty developments

For North American business, the market continues in the same direction that it has for the last half decade, showing no great movement in capacity or conditions. However, certain pockets are showing signs of ingenuity and expansion as capacity continues to increase. At the same time the market continues to deal with attritional losses – these have had a particular impact on the fresh underwriting capacity. These insurers have been seen to be underwriting to establish market share, and the timing of these losses into the market has brought havoc to some.

For International, i.e. non – North American business, more capacity is the order of the day as well. Indeed, this has been the most prolonged period of expansion since the

mid-1980s when a capacity crisis prompted the development of the Bermuda Excess Casualty market. But as well as new capacity and a wider choice of leaders, we have also seen some notable withdrawals from this sector, including Axis in London, Marketform (i.e. Neon) and Novae. Furthermore many carriers have sought to cut staff, offshore their back office operations and create cost saving synergies by merger and acquisition, thereby reducing their liability premium reserves.

Premium income thin on the ground

Mining remains a popular area of focus for London market insurers, with few withdrawals from the sector in recent years. However, the over-supply of capital continues to depress overall premium income levels. Given that mining is but one element of the overall general property/heavy industry portfolio, it is not easy to ascertain exactly how much premium from mining programmes is still finding its way into the London insurance market; however, there seems little doubt that the spate of losses in 2014-15 in particular has done much to throw the declining premium income for this sector into sharp relief.

But is a market turnaround on the horizon?

The mining portfolio from North America may be as competitive as ever; however, in recent months we have seen a change in market atmosphere as a result of more business coming to London from South Africa and Australia.

We understand that in the last year or so there have been several hot works claims from these countries. As a result, some of the less robust primary markets in these countries have been significantly impacted, which in turn has led them to begin to turn away those programmes that have been affected. And as a further result, brokers have had little option but to approach London insurers to secure the required capacity to complete their renewal.

Given that rates in the general Property insurance markets have been softening ever since hurricane Katrina in 2005 (with mining rates starting to fall a few years later), this development is probably the first time in several years that London insurers have felt that they can hold out for more favourable terms than they or the buyers might have initially imagined. This in turn is giving them the confidence they need to press for improved terms from their perspective, secure in the knowledge that they represent the insurers of last resort. For the first time in many years, they have found that they did not need to chase the market down; instead, they have been able to press for improved terms and indeed have secured firm orders on this basis.

Time to consider long term deals?

Given this unusual (and indeed unanticipated) development, we are perhaps now seeing a possible turning of the tide in the London market. So now might be an appropriate time for certain buyers and sellers to consider a suitably robust three-year non-cancellable programme. The upside for the buyer is securing a budgeted three-year insurance spend which would protect the company from any upturn in the insurance market; the upside for the seller would be guaranteed premium income at a time when, regardless of the recent developments outlined above, the market needs to generate additional income to keep this class sustainable.

The mining portfolio from North America may be as competitive as ever; however, in recent months we have seen a change in market atmosphere as a result of more business coming to London from South Africa and Australia.

The United States market perspective

A pricing recovery later in 2017?

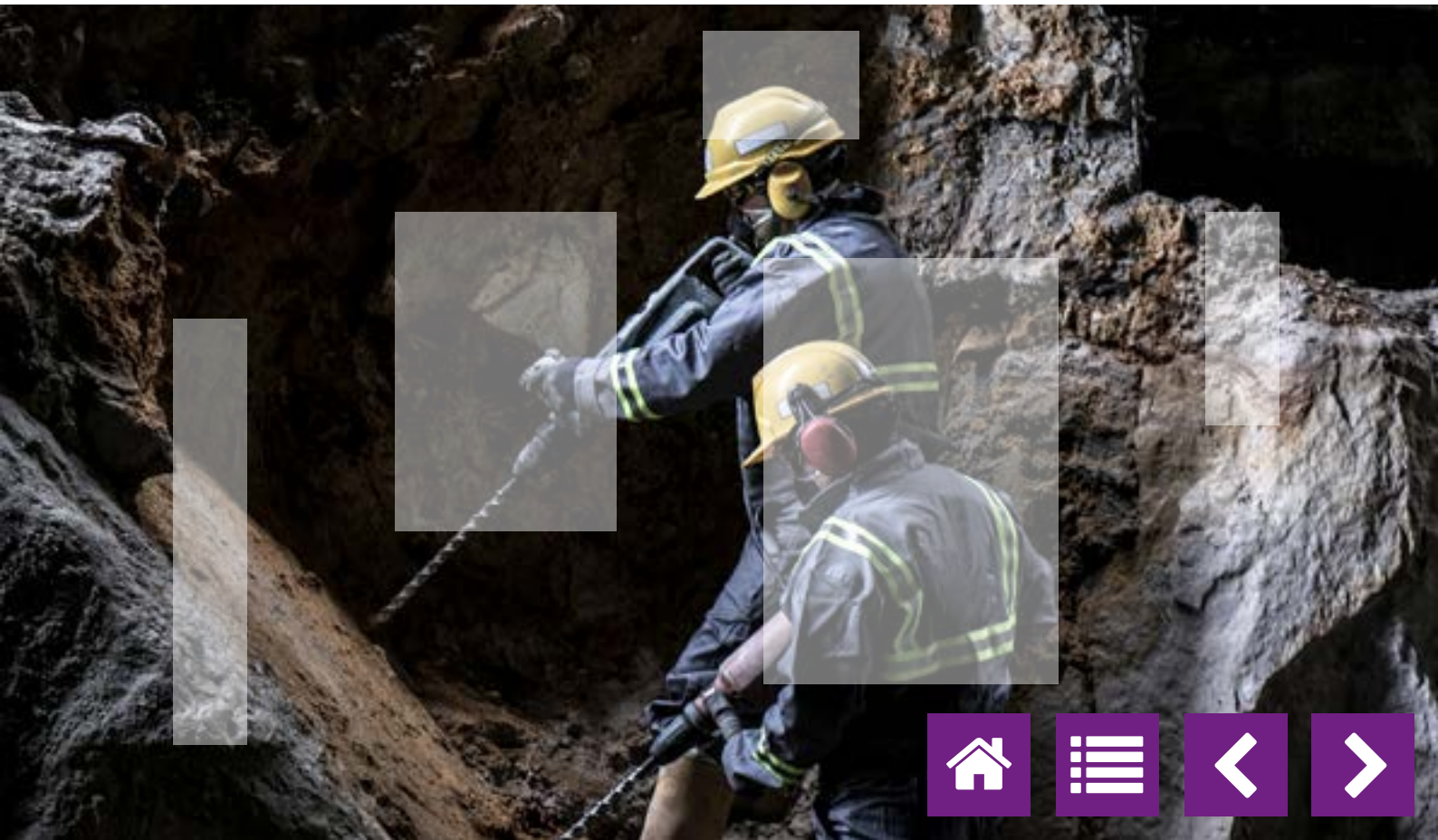
In the Unites States, Property insures have seen double digit rate decreases piled on top of reduced exposures for many years. However, in 2017 we have seen many markets begin to stand their ground, with low single digit rate decreases being the norm and some finally choosing to walk away from business rather than acquiesce to further reductions. Legacy clients with good loss records and proactive loss control efforts continue to obtain preferential terms. While the flattening trend is growing, there is still plentiful capacity, allowing miners to choose a lower priced program at the expense of conventional insurers and long term relationships, if so desired.

Massive Primary Casualty rate hikes for Appalachian coal

Primary Casualty markets are an interesting case in the US. Auto rates are escalating as that class continues to suffer from heavy loss activity across all industries, partially driven by the proliferation of the smart phone. Workers Compensation in general has levelled out, though some areas continue to see massive rate hikes, namely federal black lung rates for underground coal miners where in Appalachia we have seen Federal rates increase by 167% and 125% the past two years respectively, with the five year cumulative increase averaging 285% (Source: NCCI).

More casualty insurers active in mining segment

However, we see more casualty insurers active in the mining segment than we have in many years. Starr continues to add experience to their team, many from AIG, and Liberty as well has begun ramping up their mining expertise. Rather than opportunistic rate hunting due to a soft market, we see a concerted effort by insurers to hire and train the right teams that will be in a position to support the US mining industry for some time. Other than a few like Zurich and Chubb, the Liability mining



underwriting community in the US has been rather transient over the past few years, allowing companies to obtain seasoned teams in a relatively short timeframe. However as rates move upward, insurers' fortitude to sustain mining losses and continue underwriting will have to be tested.

Environmental market still limited

From an environmental standpoint the market is still very limited since AIG left this sector, with Ironshore and Zurich being the only key markets. Coverage for tailings dams is still the biggest challenge, where markets have instituted sub-limits, leading to layered programs to achieve required limits, inevitably driving prices upwards. However, there has been some interest from new carriers though, notably Channel 2015 (supported by Scor Re) in Lloyds, where creative approaches have gained some favor and we have been successful in structuring two recent new programs for mining companies.

Surety remains competitive

Broadly, North American surety remains competitive, with new entrants quarterly. Performance by the product line of a combined ratio in the lower 70 percentile attracts capital resulting in markets returning (such as XL Caitlin), markets entering (such as Euler Hermes and Sirius), reinsurance markets growing their primary writings (such as Swiss Re) and – not surprisingly – underwriting talent moving as competition for senior teams intensifies.

Specific to mining, underwriting terms and conditions are favorable to our clients as the appetite for remediation and reclamation bonds is at an unprecedented level. The surety markets have witnessed the US coal industry reorganize its financials without bearing a loss to the markets which has caused a response of them increasing their overall capacity to the product. Rates and collateral requirements continue to relax as commodity prices improve. Expectations are that the current federal administration will cause a favorable effect on the mining and extraction industries, further improving conditions for our clients. Barring an economic event, the near-term future is brighter for the space than experienced the past several years.

The Canadian market perspective

Property – still a buyer's market

The oversupply of capacity in the Canadian property market continues to support a buyer's market; insurers are supporting single digit rate decreases for buyers with good loss history and solid preventative maintenance programs. Insurers' focus continues to be on risk management, loss prevention and engineering; insureds that can differentiate themselves from their peers in these areas will receive preferred rates.

There have been some changes in market appetite, especially given the recent mergers and acquisitions in this sector, as insurers review their portfolio to determine fit and limits. Meanwhile there has been some market restructuring at AIG and Zurich, and internal operational changes at these insurers could impact capacity and coverage in the future.

In general terms the recent loss record has been benign for the last 12 months or so, although the portfolio continues to be impacted by the significant losses incurred during the past 3 years and 2016 also saw several hot-work claims impact the

market. Tailings dam exposures remain a focus, with specialist mining insurers requiring detailed information, while risks with high Natural Catastrophe or marginal risk management standards will continue to prove to be more difficult to place.

As mentioned in the London market perspective, increasingly Canadian clients are opting for 2-year Long Term Agreements (i.e 24-month policies), reinforcing the view that the market softening may be beginning to bottom out.

Casualty – additional excess market capacity but basically flat

From a casualty perspective, Zurich has been reducing capacity from C$30m to C$15m on larger mining accounts, although they are still comfortable in deploying these limits on a primary and umbrella structure. Other key liability markets that are providing the "buffer" layer and comfortable in playing down low include AIG, Allianz, XL Catlin and Ironshore.

Meanwhile breach of tailings facilities and foreign employers' liability are continuous concerns for Canadian carriers, with additional requests for underwriting information on inspection process and protocols – design of TMFs are now required to underwrite the risk properly.

We have also seen some renewed interest and additional Excess Liability market support from the likes of Berkshire Hathaway, Liberty, AIG, Temple and Ironshore. However, Lloyd's syndicates continue to dominate the Excess Liability sector by offering larger capacity and more competitive pricing.

For the best risks, Primary GL and Umbrella programmes are seeing flat to minimal premium increases, while High Excess Liability markets are maintaining flat premiums. Rate reductions can still be achieved, but this will likely involve a full remarketing exercise and replacing the incumbent insurers.

The Australian Market Perspective

Mining insurance programmes in Australia continue to require the participation of key mining insurance markets if the risk profile features natural catastrophe exposures or where large underground policy limits are required.

Diminishing rate reductions

Consistent with our 2016 viewpoint, we can report that rate reductions have continued to diminish in the second quarter of 2017. However, competition continues for those risks that demonstrate a commitment to ongoing loss control and risk management; this commitment allows insurers to either review or maintain their level of participation at favourable terms. As part of the request for risk profiling, significant information around tailings dams' management and design remains a feature of renewal negotiations with the insurance market.

Cyclone Debbie poses CBI aggregate issues

Following Tropical Cyclone Debbie, insurers continue to monitor accumulations arising from natural catastrophe and contingent business interruption exposures. The improvement in commodity prices has resulted in increases in declared Business Interruption values, particularly as a percentage of overall values. With base rates for Business Interruption being higher than material damage, this is also placing further pressure on the ability to maintain existing pricing.

Following Tropical Cyclone Debbie, insurers continue to monitor accumulations arising from natural catastrophe and contingent business interruption exposures.

Most programmes still placed domestically

Capacity for most programmes continues to be sourced in the local Australian market. Large and complex programmes are led by markets that remain dedicated to the mining sector, such as Swiss Re. The consistent offering of lead capacity is supported in both the local and global markets. Global markets that provide significant capacity include Munich Re and Scor, while mid-tier programmes can be led by competitive local markets, including Zurich, AIG and Vero.

QBE steps away

Berkshire Hathaway Specialty Insurance, Allianz, AXA, Liberty, CGU and CV Starr remain significant supporters of Australian risks. Support from these markets remains dependant on operation type, commodity, and risk profile of each client. FM Global has also been competitive through the back end of 2016 continuing into 2017. However, some incumbent insurers such as QBE have been unable to support ongoing rating and terms of programmes such that their participations have been replaced.

As rating reductions continue to diminish, clients will have to balance long term relationships (and the associated consistency of coverage and capacity) against any further potential savings by selecting new markets to participate on their programmes.

The South African market perspective

The market begins to stabilise

Following a series of mainly general property losses (which have affected profitability), the South African mining market appears to have stabilised, following several years of rate reductions. At this stage it is still possible to negotiate small discounts for quality, well-engineered programmes with good claims experience, whereas stable rates with coverage restrictions are the normal outcomes for lesser quality risks. Interestingly, the market is also currently less eager to provide competitive terms for new business, in contrast to other mining markets around the world.

Emerald involved in hot works losses

Emerald is considered one of the lead South African markets for mining risks and has a deep technical understanding of the sector. They were reportedly the lead market in two large property losses at just under US$100 million, both caused by hot works. Their rates are often higher than other local insurers but they have the capacity, technical expertise and market security to secure the business.

Axxis the new kid on the block

Axxis is a new underwriting manager (MGA) established by two respected mining underwriters, with we understand about US$40m of underground capacity; they use Centriq Insurance Co's licence (a wholly owned subsidiary of SA's largest insurer Santam). It is possible that this new entity may be able to reinvigorate the competitive tension in the market that was lost with the closure of AIG South Africa's Energy & Engineered Risks division in 2016. However, as a new entrant in the market they are not quoting as a lead market for the moment.

Most markets retaining a cautious approach

Larger mining risks have become treaty referrals following Hollard's loss of its two senior sector underwriters, while Old Mutual Insure (formerly Mutual & Federal) remains a potential lead market for mining risks and are able to quote for underground risk which many other markets are reluctant to do. However, their underwriting philosophy does remain conservative on new business, despite the fact that they will aggressively defend existing accounts. Meanwhile other markets are generally adopting a more cautious approach than in the past, following recent large mining losses in South Africa.

Conclusion: is this the turn of the tide?

We have seen that our review of the global Mining insurance markets shows some very differing underwriting trends, largely depending on geography. It is perhaps a little early to suggest that some of the signs of resistance in South Africa and Australia are indicative of an overall market turnaround – particularly when one considers the continued glut of (re) insurance capital and the continuing soft insurance market conditions in North America. However, we should remember that Mining is only a part of an insurer's overall Property or Heavy Industry portfolio, and choosing to deploy capacity away from Mining and towards other areas would for most not be a difficult decision to make. Buyers should therefore be alert to any further changes in market conditions and be prepared to react quickly to ensure optimum terms and conditions continue to be secured.

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