Willis Towers Watson

Mining Risk Review 2019

Addressing uncertainty

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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 mining industry itself.

Introduction: addressing uncertainty

Welcome to the 2019 edition of our Mining Risk Review. The last 12 months have proved to be a difficult and challenging time, both for the mining industry and for those of us involved in the insurance and risk management industries. Our Review is being published in the aftermath of yet another tailings dam tragedy, at a time when the mining industry is already having to cope with an unfavourable press and, at times, a strident attitude to environmental concerns that often paints the industry in an unfavourable light. In the meantime, negative underwriting results across the global Natural Resources spectrum have brought about a distinct change in underwriting climate across several "heavy" industries, including mining.

As a result, all of us involved in mining industry risk management are facing a period of considerable uncertainty. This year we've split the Review into two halves; the first addresses uncertainties relating to the mining industry itself, the second addresses uncertainties involved in transferring risk as efficiently as possible, given the backdrop of a hardening insurance market.

So let's turn first to the industry itself - what are the four key areas of uncertainty for miners that we have identified for 2019?

1. **Digitisation:** Upgrades in digital technology and artificial intelligence are transforming the way in which the mining industry operates. Even now, this process is still in its infancy; human agency is still required to ensure that the process of mineral extraction is carried out to optimal standards. But already, this process is presenting its own challenges. As our mining engineering specialist Don Hunter points out, a combination of negative attitudes, increased cyber risk, a failure to train properly and upskill and the potential for the process to discard valuable human experience during the digitisation process suggests that miners are exposed to a number of new risks that can threaten project viability.

2. **Bottlenecks:** The linear nature of mining risk means that the impact of a natural catastrophe such as a windstorm or earthquake on a mining operation can be hugely significant. Far too often, getting a mine back up and running after a major incident is dependent on factors outside the mine operator's control; far too often in the event of a major loss, the precise cause can often remain uncertain. It's for situations like this that the quality of underwriting information supplied can be critical in buyers obtaining optimum insurance cover. Stephen Thorpe, an experienced Australian loss adjuster, explains that there is much more that clients can do to achieve optimal outcomes when faced with these challenges.

3. **Geopolitical risk:** Whatever side of the geopolitical fence you happen to sit, no one can doubt that we now live in a world where the geopolitical stakes have risen considerably during the last 12 months. Increased tariffs, regulations, legislation and tax liabilities imposed between different countries have had a direct impact on the viability of mining projects in a variety of locations around the world - especially given the global nature of the industry's supply chains. The Willis Research Network's Andreas Haggman suggests that mining companies adopt a more holistic approach to managing these risks and points to some useful analytical tools that can turn seemingly intangible problems into tangible opportunities.

4. **Social Economic Development (SED):** the relationship that miners form with local communities is always a fundamental factor to consider in developing an effective risk management strategy. Having a programme that assists in improving the economic potential of nearby communities and local stakeholders usually results in a symbiotic partnership that benefits both the company and the community. Our Latin American mining leader Tom Holliday spoke to Technoserve, a not-for-profit organization that has been at the forefront of implementing economic development strategies for over 50 years; it's clear from our conversation with them that mining industry risk managers and their teams need to be looking to the deep relationships and activities that need to be built and developed for real and sustainable long-term progress.

If only conditions in the global mining insurance markets were more certain. As we move further in to 2019 we are finding that the atmosphere in the market is becoming increasingly uncertain, not only because of the recent loss record in the industry but because of the increasing and worrying trend for insurers to withdraw from what they consider to be environmentally unfriendly industries such as coal. Our Review highlights the following key reasons for the rapid turnaround in market conditions, despite the continued deployment of excess underwriting capacity in the market:

- **A depleted premium income pool:** Given that no official global premium statistics exist for this class of business, we can only provide an estimate from our own experience and from our conversations in the market. We think that total mining insurance premiums remain under US$1 billion - not nearly enough to secure regular underwriting profits and well under the average annual burn. Indeed, premium income levels have been falling for the last five years, given the previous market conditions and weakening insured values.
- **An atrocious loss record:** Notwithstanding the latest tailings dam tragedy in Brazil earlier this year, and again from conversations in the market, we understand that overall mining losses for 2018 may exceed US$1.3 billion - following hot on the heels of 2017, where total losses apparently also exceeded US$1 billion.
- **Negative results for other parts of the Natural Resources portfolio:** It's not only the mining portfolio that's produced unfavourable figures for major (re)insurers. In the Review we show that almost every sector has been affected, with the result being a new determination from insurers to "hold the line" and impose rating increases and/or "re-underwritten" programmes.
- **Centralisation of underwriting authority:** Increasingly, we are finding that those insurers that had previously allowed a degree of regional autonomy to their various regional "hubs" in the past are now restricting underwriting authority to a restricted panel of specialist underwriters.
- **Major insurer retrenchment:** Last but by no means least, we are witnessing a major change of underwriting strategy from some of the largest (re)insurers currently operating in the market. Where this has not been anticipated by buyers and their brokers, it has led to some serious placement challenges, with brokers often having to supplement lost capacity with underwriting support from insurers at very different terms than had been negotiated the previous year.

However, the final chapter of our Review strikes an optimistic note, pointing to new ways in which miners can offset the current market uncertainties; firstly by using modern analytical tools to determine the optimum retention levels and secondly by considering parametric risk transfer solutions that would provide cover for disasters such as tailings dam collapses well in excess of what is currently provided by the conventional insurance market and/or captives/captive cells.

What's more, we would like to end by striking an upbeat tone of our own. Yes, rating levels are generally on the rise. Yes, insurers are certainly scrutinising programmes more closely, while gaps in coverage are becoming increasingly common, particularly for tailings dam exposures. But the reality is that this is not yet a truly hard market; capacity remains plentiful by historical standards and when rates are on an upward trend, we are by no means in the distressed situation that the market found itself in in the immediate aftermath of 9/11 some 18 years ago. Sooner or later, the laws of supply and demand would suggest an easing of these conditions at some stage in the future; it will be interesting to see which buyers – and their brokers – will be best positioned to take eventual advantage to navigate their way towards a more certain future.

We hope you enjoy reading the Review and as ever we would welcome any feedback that you may have.

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Part one: Addressing the uncertainties of mining risk

Digitization: emerging risks for the mining industry

Introduction: the potential value in data harvesting

We are in an era when the collection and processing of data drives businesses and is widely used to develop enterprise growth strategies. The likes of Google and Amazon have built their business models on their ability to collect and process vast quantities of our personal data to generate prodigious profits, primarily through sales advertising. Organisations such as the now defunct data brokerage firm Cambridge Analytica have developed clever ways to process harvested personal data to shape election campaign strategies, among other things. Clearly, there is huge potential value in data harvesting and a key to success is to know how to process that data to the benefit of the user.

According to McKinsey & Company:
"Less than 1% of available data generated by the mining industry is being used."

McKinsey went on to say that:
"By unlocking the value of this data, the (mining) industry could save $100 billion in cumulative maintenance costs by 2025." [1]

If this is true of mine maintenance, how much more could be saved in other parts of the industry by using the data generated more effectively?

Data generation: the new possibilities

Unquestionably the mining industry generates large amounts of data, albeit not on the same scale as Google and Amazon. So the question is: what is the industry doing with all these potential riches?

In the past, the amount of data collected was limited by the ability to store that data and turn it into something useful. A lot of thought was therefore put into (and still is being put into) deciding what data it is really necessary to collect for managing operational processes and reporting. Advances in data storage and processing technology have turned our approach to data collection on its head; it's now the case that instead of being highly selective, we are in a position to collect as much data as possible.

We can store vast amounts of data safely and cheaply; with continually improving ways to process it, it's possible that seemingly useless data collected today may be converted to something of real value in the future. Another important factor, not just for the mining industry, is that the miniaturization of electronic components enables us to install data collecting devices in places that were previously difficult or impossible.

[1] https://www.dingo.com/Dingo/media/img/Page%20Hero%20Images/Utilising-Digital-Enablement-for-Increased-Productivity_DINGO-CEO-Paul-Higgins-for-the-Future-of-Mining.pdf.

Digitization - meeting the need for real time accurate data

Traditionally, information from different parts of a mining operation has been used to generate reports which are mostly retrospective and therefore of limited use to shape operational and business decision making. But in an increasingly interconnected and globalised world, industry and commerce need real time access to accurate data, and this is provided by digitization.

New opportunities

Digitization is the process of converting data into a computer-readable format. Once data is in a usable format, the ability to collect, store and process that data opens up a vast field of new opportunities. On the operational side these include:

- remote controlling of machinery and whole processes;
- automation and use of autonomous vehicles;
- machine-to-machine decision making;
- predictive maintenance;
- remote condition monitoring structures such as tailings dams; and
- innovative ways of reporting operational performance.

On a broader front, digitization is providing ways to support business decision making as well as driving innovation and process streamlining. Importantly, through the use of interactive whole-of-enterprise modelling, digitization is providing a way to challenge existing business models and to unlock new revenue generating and value-adding opportunities. So how is digitization being used to transform business models?

How data usage is driving change

The development of digitization has gone hand in hand with our ability to store immense amounts of data cheaply which, with the help of miniaturization, enables data to be collected in ways that were previously difficult or impossible. Miniaturization, combined with improvements in component and instrumentation robustness and reliability, enable the installation of data gathering devices in places such as rotating machinery as well as electrical and power generating equipment.

Miniaturization enables sophisticated monitoring equipment to be mounted on remote terrestrial, submarine and airborne devices for observance of everything from human activity to environmental degradation. It has also enabled the development of lightweight, wearable personal devices which can be used by underground mine workers to:

- monitor environmental conditions (gas, heat, particulate matter);
- provide communications; and
- act as location devices which could save lives in the event of an accident.

Cyber security

It might be said that the challenges of storing and rapidly accessing data have encouraged the development of the digital cloud where entire operating systems and vast amounts of data can be stored. In part this development has been motivated by the desire to not overload personal devices with data and instead provide them with greater functionality as operating devices.

However, for cloud storage to be effective users need a secure and reliable way to access their data, and no one else's. Unfortunately, as fast as industries have developed to combat cyber malfeasance, so an even larger number of talented amateurs, criminal organisations and even governments have been busily engaged in finding ways to breach that expensively-provided security.

Cloud security?

Few organisations have the resources to be truly proactive so endeavours to defeat cyber criminality have to a large extent been reactive. This raises the question of cloud security; while we have been assured that sophisticated encryption and other measures have been implemented to ensure the security of our cloud stored data, it is probably only a matter of time before someone does find a way to defeat those defences to illegally access that data.

" In an increasingly interconnected and globalised world, industry and commerce need real time access to accurate data, and this is provided by digitization."

The digital nervous system

Being able to collect and securely store large amounts of data is one thing but it remains just data unless ways are found to turn it into something useful. This need continues to drive the creation of intelligent software and the development of artificial intelligence (AI) applications. These are evolving rapidly and have the ability to create something akin to a digital nervous system, in which all parts of a business are inter-connected and data can travel at high speed around the system to be used wherever needed.

Remote operational centres

Digitization and the concept of a digital nervous system have enabled a number of mining companies to build remote operational control centres such as that developed by a major global miner to remotely manage its Western Australian iron ore mining operations. Another example is a Latin American copper mining company which operates a state-of-the-art central control room for its operations at a mine in Chile. Situated about 50km by road from the mining complex in the Andes, mining and mineral processing operations are monitored in real time. Skilled operators sitting in front of TV screens remotely control the movement of ore from draw points located deep inside the orebody, through the underground transport system to the concentrator. Others remotely control ore flow through the mineral processing plant and can adjust process parameters for changes in feed rate, ore characteristics and equipment availability.

Continuing adjustments

The constant exchange of key operating data between remote controllers ensures that the operation can be continually adjusted and optimised. For example, if an underground ore drawpoint becomes blocked, the remote operator can move the loader to another drawpoint or even another part of the mine. This move may result in increased loader haul distances and cycle times, which could be compensated by making changes to other loader dispositions elsewhere. Moreover, the move may result in changes in the type and grade of ore going to the plant, requiring plant operating parameters to be adjusted.

Alerting maintenance crews

The digital nervous system can also react to equipment breakdowns by alerting maintenance crews, re-directing mobile equipment and re-routing ore flows to minimize production interruption. In a less digitally connected operation, it might take several hours to implement the changes required. With a digital nervous system, the necessary operational adjustments can be made almost immediately.

Reporting in real time

A key aspect of the digital nervous system is the ability to report on operating conditions and key performance indicators in real time and online. This is not only useful for operators but also enables operations management to keep track of what's going on in their area at any time of the day and from almost anywhere. By adding information

"Being able to collect and securely store large amounts of data is one thing but it remains just data unless ways are found to turn it into something useful."

about, for example, final product shipments, stockpile levels, metal prices, exchange rates and even share prices, senior management up to board level can track the health of the enterprise directly without having to wait for a retrospective monthly report.

Improving transparency and confidence

Real time reporting of key performance indicators to regulators and stakeholders could improve transparency and confidence in an enterprise's management. Moreover, in the case of tailings storage facilities, sharing key retaining wall condition monitoring data with local communities could help promote transparency, build trust and establish a Social Licence to Operate (SLO).

It should be pointed out, however, that sharing information in real time about an operation may challenge conventional wisdom and be seen by some as unnecessarily displaying the company's dirty laundry. Nevertheless, following recent major tailings dam disasters it has been suggested that local communities would benefit from being kept informed about the dam operator's efforts to manage dam safety. The digital era has made this possible but providing local communities with dam monitoring data is not a simple panacea for overcoming initial scepticism and building trust; regular consultation and honest face-to-face dialogue will also be needed.

Other benefits of digitization

Predictive maintenance

In the past, maintenance planning and scheduling have tended to be retrospective and largely based on historical performance and manufacturers' specified maintenance/ service intervals. Digitization has afforded miners with the ability to collect and store data about such issues as equipment breakdown frequency and causes, times and resources to affect repairs, life of components, oil and gas analyses, vibration and temperatures. With access to this information, asset management has moved increasingly towards predictive maintenance, with the result that assets are being used more effectively. As implied in the introduction, only a small part of the data generated from maintenance is being used, so there remains significant scope for improving maintenance and unlocking value that would otherwise be lost.

Autonomous haul trucks

Over the last decade very large autonomous haul trucks, mostly in the 280 – 360 ton payload class, have become an economic reality, largely as the result of collaboration between a number of equipment manufacturers and some of the major mining companies. These companies have visions about the mines of the future and have collectively invested hundreds of millions of dollars to develop the technology to enable un-manned equipment to be operated safely and economically.

"Providing local communities with dam monitoring data is not a simple panacea for overcoming initial scepticism and building trust; regular consultation and honest face-to-face dialogue will also be needed."

Now, after over 10 years of prototyping, steady development and full-scale operation, operators of very large autonomous haul trucks are reporting up to 30% increases in tyre life, smoother acceleration and deceleration resulting in less shock loading on transmissions and suspension units and improved fuel efficiency.

Another obvious benefit is that autonomous vehicles do not have to stop for shift changes or for meal, rest and comfort breaks. By removing operators from vehicles, the number of people exposed to the hostile mine environment is reduced and operator error and the consequences of operator fatigue are eliminated. However, some machine-human interface actions will remain inevitable, for example during maintenance, periodic servicing and vehicle recovery. Importantly, because there is no on-board human operator to take corrective action should a control system fail, those systems must be robust, failsafe and have levels of redundancy and reliability approaching that of the aerospace industry.

Single, unified control centre

One benefit of digitization that goes beyond purely operational control aspects is in the way enterprises assess their performance and analyse how they operate. At the mine operating level, digitization has facilitated the move to replace several separate control centres (each of which shares only limited amounts of information with the others) with a single, integrated operations control centre.

Having a single, unified control centre which collects and integrates data from all parts of an operation provides line managers and operators with a means to immediately see how a change in one area impacts others. By extending the scope of data collection to include, for example, costs, commodity prices, market trends, competitor production and environmental data, it would be possible to build an interactive holistic enterprise model.

Simulations

By adding information on such things as the cost of capital, loan structures, labour productivity data, tax, political information and using intelligent software to interrogate this mass of data, the enterprise model could then be used to carry out simulations. These would test the effect on the business of changes to any one or multiple parameters and so determine the robustness and sustainability of the enterprise. This would also drive changes in the way a business sees itself, how it operates and, importantly, would help identify the need for new employee skills.

The digitisation risk landscape

As we've seen, digitization clearly offers significant benefits to miners but of course it's also important to understand the real and latent risks involved.

Attitudinal risk

Implementing digital solutions and systems requires a mind-set that recognises that the way of working will change. Work practice changes will have implications for skills requirements which will drive recruitment and training efforts. At a fundamental level, individuals will be concerned for their jobs and the prospect of job losses resulting from implementation of digital solutions will almost certainly be resisted by unions.

Negative past experience of cost delays and overruns

Past experience of implementing new management systems has not always been good and some enterprises have experienced near crippling delays and cost overruns when transitioning to a new "all bells and whistles" system. It would not be surprising if some C-suite conservatism influences the rate at which digital solutions are introduced into an enterprise. After all, senior managers, whose job it is to protect shareholders returns, will be concerned from past experience that an expensive digital solution may take longer to implement and not deliver the expected benefits in the predicted timeframe. As digital systems become more complex, implementation will become equally complex and the negative experiences of the past can be expected to be repeated in future.

Increasing cyber risk

As an organisation becomes increasingly reliant on its ability to collect, process and store electronic data, so cyber risk increases. Cyber risk is not only the risk associated with a malicious intrusion and breach of the enterprise's data security measures; it also includes risks associated with reliance on software that may not be fully developed before being implemented or is poorly suited to the application. As a simplistic example, imagine a company that introduces a new software package that it expects to simplify payrolling but then discovers employees' withholding tax or pension contributions are incorrectly calculated or paid to the wrong bank accounts.

"Past experience of implementing new management systems has not always been good and some enterprises have experienced near crippling delays and cost overruns when transitioning to a new "all bells and whistles" system."

Training & up-skilling

The digitization era is driving some fundamental changes in the way people work. For example, automation and automatization are replacing skilled and semi-skilled equipment operators. This is all very well in economically developed societies such as in Australia, Europe or North America where alternative employment opportunities exist. However, automation may not be so welcome in less developed countries where a major reason for encouraging mining investment is job creation. Upskilling also means that even in economically developed societies, operators whose work entailed the skilled, hands-on operation of equipment and machinery will have to learn new skills or risk becoming redundant.

As digital systems get larger and more complex, there is also a risk that fewer users will sufficiently understand the systems or the activities they are simulating to recognise when their output is incorrect. The old axiom of "garbage in, garbage out" still applies and there is a possibility that results will not be questioned just because they are computer generated. Enterprise models which are likely to be large and complex, particularly those used to motivate organisational change, should therefore be thoroughly tested and calibrated before being used in earnest.

Subordinating experience

There is a risk that digital solutions will subordinate the importance of experience. The use of computers and smart, hand-held devices in the workplace is something that Millennials will adapt to easily; older workers perhaps less so. However, experienced plant operators, engineers and production supervisors still have a role in ensuring digital solutions are practical and do not produce unintended consequences. An experienced production or project manager will have "been there and done that" and will have dealt at first-hand with the sort of practical problems and mistakes that do occur. That experience should be used to assist the computer specialists who develop analytical software, control systems and complex business models to ensure what they do accurately reflects reality. Therefore, until Artificial Intelligence completely takes over our lives, first-hand operating experience will remain a valuable but increasingly scarce commodity.

Conclusion: threats and opportunities

The threats

As with anything that offers benefits, there are also downside risks. Organisations will inevitably become increasingly dependent on being able to safely store and access ever larger amounts of their own or their clients' data. The consequences of unauthorised access or even loss of access to this data could potentially have business destroying consequences, which is why cyber security is probably the biggest single risk facing a digital data-rich enterprise. There is also a question of cloud security.

Process automation will require employees to be re-trained and new, suitably qualified individuals recruited to fill skills gaps. Automation will almost inevitably result in some positions becoming redundant, with all the associated political and social implications.

Implementation of digital solutions will require visionary leadership and changes in established mindsets. However, there will remain a risk that implementation of new digital systems may prove more complex than anticipated, resulting in cost and schedule overruns.

The adage of "garbage in, garbage out" remains true and there is a risk that as digital systems get bigger and more complex, fewer people in the user's organisation will understand the system sufficiently to recognise when it's producing garbage. Until recently, the traditionally conservative mining industry has been rather slow to adopt new digital technologies, with a tendency to rely instead on tried and tested processes. This has been changing and the rate of change is increasing as more digital riches are discovered.

The opportunities

The ability to convert data into computer readable format for processing has had an enormous transformative influence on the way the mining industry works and how its future is being shaped. For example, central control rooms are transforming how remote operations are managed.

The creation of what amount to digital nervous systems enables information to be collected and shared in real time right across an enterprise. This is not only a powerful management tool at the operating level but also provides senior management with the ability to log in and see how the business is performing from anywhere that has an internet connection.

A digital nervous system can provide the data to build holistic, whole-of-enterprise business models with the ability to simulate and analyse the effects of changing operational conditions and external influences. The corollary to this is that business models can be stress tested and modified very much more quickly than in the past. Furthermore, the ability to process large amounts of data quickly provides opportunities to identify behavioural trends, be they in operating, maintenance, cost or safety performance. Having identified these behaviours, they can be modified to maximize efficiency or even define new ways of working to unlock previously hidden value.

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Bottlenecks: beyond your control?

Introduction: the linear nature of mining risk

On the back of significant losses throughout the insurance world, insurers are revisiting their philosophies (as we outline in detail in Part Two of this Review). This is resulting in rate rises, coverage restrictions, downward pressure on sub-limits and a shrinking of capacity. The mining industry in particular is being closely scrutinised, with a focus on tailings dams, transportation infrastructure and potential operational bottlenecks.

Most mining operations are linear in that ore is extracted and processed, then transported to either the end customer (if within the same country) or a port for onward shipping. Any interruption can have significant impacts.

In the event of a break in the logistics chain, there are very few effective alternatives for miners; the only efficient way to move bulk commodities such as coal, iron ore, or even copper is via rail and/or ship. Trucks and airfreight are not viable for most situations and ports typically have little latent capacity to take up large demand if a neighbouring port suffers a significant outage, even if the mined product could be re-routed.

Roads leading to and from mining operations are often exposed to natural catastrophes (particularly flood) and if damaged will frustrate the ability of mining operations to bring in supplies, export finished product and for personnel to access the site. Cyclone Debbie, which smashed Queensland's Bowen Basin in March 2017, shut down coal mines and washed away vital infrastructure. Insurers have long memories and are at pains to avoid repeat exposure to such significant losses.

Mines are complex operations and constraints to production can and will change over their lifespan. This impacts all aspects of the operation, from the mine itself, to crushing, milling and processing and into transport and port operations.

But the challenge for mining companies extends way beyond their own operations; the potential impacts are increased when downstream logistics are not within their control – for example, the rail or port is owned and operated by third party entities.

Natural catastrophe impacts on infrastructure

Both mining companies and their insurers face significant challenges when a mine loses access for its processed product to key infrastructure operated by third parties; in countries such as Australia, this usually means rail transport.

Typically, that rail infrastructure (both above and below rail) is owned and operated by dedicated operators, and so is completely separate from the mining operations. Recent natural catastrophe events in Australia which damaged rail infrastructure highlighted some of the issues faced by mining operators which rely on that network:

- Without direct access to the areas of damage, it is difficult to ascertain the precise cause of the loss – whether it be flood or landslip, for example. This is important to ensure the insured's policy is engaged (that is, no exclusions apply). Cooperation from the rail operators is key, but often they are reticent to release market-sensitive information.

- The timeline for rectification is not in the ambit of the mine operator. They rely on the rail operator for this information, which may or may not be accurate. This makes it challenging for the mine operator to reschedule mining operations and to manage communications with their stakeholders – including shareholders, site personnel, insurers and customers.

- The ability to influence loss mitigation activities is limited. Most mine operators and their insurers will seek to mitigate losses through various strategies (for example overtime, airfreight and incentives to suppliers); the ability to influence these activities is limited when they are in the control of other parties (the rail operator in this instance).

- Even if temporary repairs are undertaken, competition from other users usually means that full access is not immediately available.

- The ability to use other supply chains might be restricted due to limited availability of alternatives and exclusivity provisions in the supply contracts.

These same issues arise for other independently-owned and operated infrastructure such as ports, power, gas and water suppliers, and even roads; the principle being that a loss at a key supplier, whether through natural catastrophe or other peril, can have a significant impact on an insured operation. Furthermore, the ability of that Insured to determine the cause of the loss, and influence loss mitigation strategies, is not direct; it relies on the supplier and their insurers to be transparent and cooperative, which is not always the case.

However, there are some positive developments; we have seen recent contracts from Insureds and their suppliers which seek to address these concerns.

Structuring CBI policies

The other key issue is to ensure that the mine operator's Contingent Business Interruption (CBI) policies are correctly structured, including:

- The suppliers are correctly identified – sometimes the structures of supply chains are complex commercial arrangements and it is vital that the correct "supplier" is named.

- The property and perils exclusions are amended to reflect the supply chain (railways and roads are typically excluded property) - flood exclusions also need to be properly considered for natural catastrophe exposures.

- Ensuring that the aggregate exposure to other operations is properly accounted for - a loss at one mine may have significant impacts at the Insured's other mining/processing operations.

Most mining operations have a detailed appreciation of their business and can understand and manage losses effectively within their own domain. We have seen and assisted in delivering some innovative solutions to outages which support the mitigation of losses which of course benefit the mine operators, stakeholders and their insurers.

However, it is far more challenging when the damaged infrastructure is not owned and controlled by the Insured. The Insured's ability to influence positive mitigation strategies relies on the cooperation of that supplier which, on many occasions, is not as transparent and forthcoming as it could be. This is compounded if the CBI exposures in the policy are not properly understood and/or structured.

Recovering from outages

The impact of any event, when overlaid against the cycle of constraints, will ultimately determine its significance to the overall mining operation. Insurers are paying close attention to the mine's ability to recover from, or "make up" losses from any outage. Two simple examples can demonstrate this further.

Rail outage

In the event of a rail outage lasting two months, the ability to send the end product to the customer is curtailed and therefore results in a direct loss of sales. However, mining and processing operations are not impacted and the mine can continue operations, subject to space, by increasing stockpiles at the site.

Providing there is latent capacity in the rail and downstream logistics there is potential to transport those increased stock piles within a reasonable time frame (and/or within the indemnity period) substantially mitigating the loss. However, this relies on the mine's ability to access any additional rail capacity.

Mill or wash plant outage

Alternatively, an outage involving a SAG Mill (gold and copper mine) or a wash plant in a coal mine, for a similar period (two months) would have the same impact on sales, but if the mill or wash-plant is the constraint (as is often the case), the ability to make up the lost production is limited, resulting in a far greater financial impact on the operation and or its insurers.

Conclusion: positioning clients for optimal outcomes

As the insurance market continues to work through the current hardening cycle, it is essential for clients to provide detailed underwriting information, including the ability to demonstrate a thorough understanding of their business relationships and identifying those suppliers and customers who are critical to their successful ongoing operations. Doing so will give insurers greater confidence and comfort in the risks presented, helping Insureds to retain existing coverage and adequate sub-limits.

With capacity constricting, insurers will be able to pick and choose where they deploy their capital; that choice will be based on their ability to appreciate and underwrite the risks associated with any operation. An inability to satisfy the insurer's demands will lead to reduced capacity, lower sub-limits and narrower cover. Ultimately, insurers will step away from certain Insureds altogether.

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"As the insurance market continues to work through the current hardening cycle, it is essential for clients to provide detailed underwriting information, including the ability to demonstrate a thorough understanding of their business relationships and identifying those suppliers and customers who are critical to their successful ongoing operations."

Keeping your head above the ground: geopolitical risk in the mining industry

Introduction: boards take notice!

More than ever, geopolitical risk is being recognised by company boards and executives as a primary concern. Data vindicates this: research from the Cambridge Centre for Risk Studies shows a 40% increase in risk to cities' GDP from geopolitics and security over the past four years, totalling almost US$140 billion in 2019, the biggest growth of any risk factor.[1] For the mining industry in particular, areas such as the Fennoscandian Arctic are "geopolitically sandwiched between NATO members in the west and Russia in the east"[2], and many other metal- and mineral-rich regions are situated in similar locations, sensitive to shifts in the global geopolitical arena. This year is likely to be one where nascent trends of geopolitical instability continue to foster uncertainty and hazards in the mining market landscape.

Mining industry particularly affected

More than many other industries, mining companies have traditionally been particularly sensitive to geopolitical fluctuations. With assets and people spread across the globe, often in locations with tenuous political and security situations, mining companies have been required to grapple with associated risks to investments and operations.

There is no shortage of examples of geopolitical risk that uniquely affects mining companies. A pertinent issue towards the end of the 20th century was that of "conflict diamonds", which entwined political, social, economic, and military strife in Africa with mining companies' global operations. The public attention this garnered, partly through representation in popular media such as the Leonardo di Caprio film *Blood Diamond*, gave the ethical considerations very real consequences in terms of market appetites. In the 21st century, equivalent consequences are perhaps more likely to come from public awareness of climate change and the demand to limit the environmental impact of current mining practices.

Big issues, distant time horizons

It's vital to recognise that the kinds of geopolitical risks outlined above did not arise out of the blue. Conflicts in Africa, for instance, often had roots in ethnic divides exacerbated by the tumult of colonial power withdrawal, which were processes that were decades in the making. Similarly, scientific recognition of human contributions to climate change first occurred back in the 1960s but is now gaining significant social and political momentum. The big geopolitical issues likely to face mining companies therefore come with distant time horizons; just as the causes of present risk can be traced to underlying historical drivers, so can present drivers point to future risk. In the wider natural resources sector, the Shell Scenarios team is perhaps the most well-known practitioner of forward thinking, putting together models exploring the state of the world out to the year 2100.

[1] https://www.jbs.cam.ac.uk/fileadmin/user_upload/research/centres/risk/downloads/crs-global-risk-index-exec-summary-2019.pdf

[2] Annika E. Nilsson et al, 'Regional futures nested in global structures', in E. Carina and H. Keskitalo, The Politics of Arctic Resources: Change and Continuity in the "Old North" of Northern Europe (Routledge), p. 228

Four key geopolitical drivers for 2019

To understand what the future may be like, it is imperative to understand the present. One of the most effective uses of scenarios is to take an envisioned future state and work backwards to establish signposts that are indicative of that future state. If one of these signposts can be seen today, it means the envisaged future is a possibility. Presented here are four geopolitical drivers of risk seen today which can serve as signposts, although the future they point to is for the reader to deduce according to their own scenario analysis.

Driver one: geopolitical instability

The risks associated with interstate and intrastate conflict remain high. A list of 10 conflicts to watch in 2019, published by Foreign Policy[3], contains some of the usual suspects, but also some entries which may not have been on everyone's radar:

1. Yemen
2. Afghanistan
3. US-China tensions
4. Saudi Arabia, US, Israel and Iran
5. Syria
6. Nigeria
7. South Sudan
8. Cameroon
9. Ukraine
10. Venezuela

Although the list can be debated (for example, tensions in South China Sea is not just a US-China issue and Libya should make the list), it is noteworthy from two perspectives:

- Firstly, the geographical spread of conflict is not confined to one area but covers multiple continents.
- Secondly, from a mining industry perspective, many of these countries are prime locations for metals, minerals, and rare earths extraction.

This does not just introduce direct risks to assets and people in and around these areas but may impact the wider industry if competition for mines in safer geographies increases or end products are tainted with ethical concerns.

Driver two: climate change

The physical risks associated with climate change are well documented (rising sea levels, increased severe weather events) yet the geopolitical processes which underpin these risks are less understood. Driven by bodies like the United Nations Framework Convention on Climate Change (UNFCCC), international agreements on emissions limits are not based just on science, but also on political and economic imperatives.

For example, President Trump's decision to withdraw the US from the Paris Agreement reflected less on a concern with the empirical data and more on the perceived impact on the domestic US economy and political situation. The mining sector is not merely a passenger in these processes; instead, it can leverage its position as a technology leader to advise decision-makers whose actions are liable to shape the industry in both the near and far future.

Driver three: cyber

As the world enters the fourth industrial revolution, there is an exponential growth in connected devices. This is not limited to consumer devices such as phones and laptops; indeed, the majority of new devices are in industrial settings, used for remote measurement and control of operational systems. This Industrial Internet of Things (IIoT) creates greater efficiency and allows the implementation of automated, AI-driven processes. At the same time, more devices and more connections introduce new attack vectors on a larger attack surface. The inability of industry to control these and apply sufficient security standards generates impetus for governments to introduce regulations and legislation, such as the Network Information Systems Directive 2016 (NISD), which carries stiff penalties for infringements.

Driver four: trade

The success of populist political movements, exemplified by President Trump in the US and Brexit in the UK, suggest that globalisation is losing momentum. In its place are more conservative trade relationships and protectionism, inviting a close scrutiny of the trade policies of some of the world's largest economies. Among these uncertainties and shifts, business opportunities will realign as some markets open up to participation while others become more restrictive. For the mining industry in particular, the on-again off-again trade war between US and China is likely to be impactful, especially given China's willingness to use rare earths as a bargaining chip[4].

[3] https://foreignpolicy.com/2018/12/28/10-conflicts-to-watch-in-2019-yemen-syria-afghanistan-south-sudan-venezuela-ukraine-nigeria-cameroon-iran-israel-saudi-arabia-united-states-china-kurds-ypg/

[4] https://www.economist.com/china/2019/06/15/rare-earths-give-china-leverage-in-the-trade-war-at-a-cost

What risks do these drivers manifest?

These drivers have directly-linked risks; consider, for example, the risk to business operations through improperly secured cyber systems. Importantly however, the linkages between the drivers create second and third order effects which introduce additional risks to companies and organisations.

Regulatory landscape

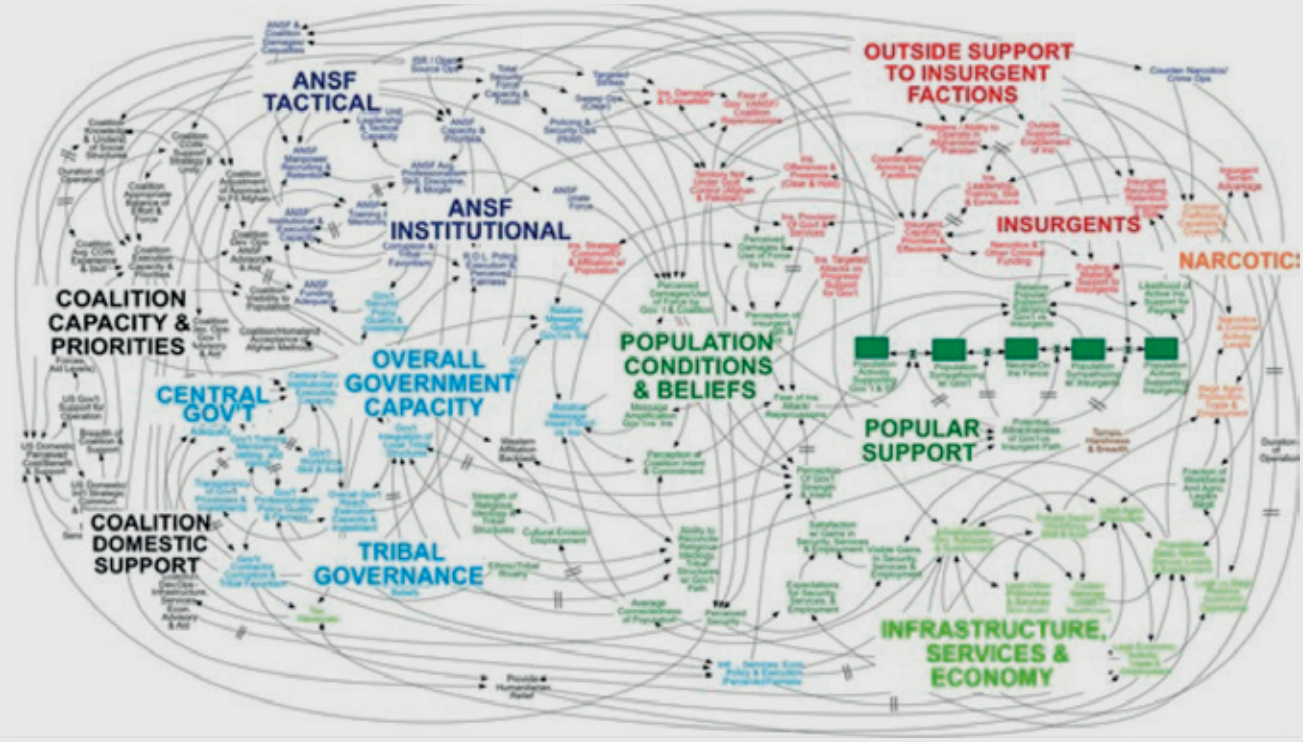
The mining industry is susceptible to new regulation, largely driven by climate change imperatives. The general public has woken up to the threat of climate change and is demanding action from policymakers. Already, several countries have committed to restricting sales of new road vehicles powered by internal combustion – for example full bans in Norway by 2025, the UK by 2040 and China at an unspecified near-future date – and as electric vehicle technology improves, it is likely this will extend to machinery crucial to mining operations. Volvo, for example, has revealed a range of all-electric excavator and wheel loader machines, perhaps prescient of the future character of operations in the mining industry.[5] The mining industry is not ignorant of these trends, but governmental action, which has until recently been half-hearted, is increasingly likely to be committed to change that will fundamentally impact the industry.

Supply chains

A diversified international supply chain presents significant risk. With regards to the IIoT, which is becoming as entrenched in the mining industry as it is almost every other industry, the cyber security shortcomings of many devices have left companies operationally exposed. Even if a company has comprehensive oversight of their own systems, there are few frameworks to determine if suppliers and subcontractors maintain equivalent standards. Unless identified and mitigated, a vulnerability in a suppliers' device introduces the vulnerability to a company's own systems. Moreover, geopolitical tensions can affect supply chain capacity. Recently, several western countries invoked national security as grounds to ban Chinese networking equipment manufacturer Huawei from supplying products to critical national infrastructure. Such bans, fuelled by geopolitical considerations, are liable to affect the mining industry supply chain.

[5] https://www.khl.com/international-construction/volvos-electric-excavator-and-wheeled-loader/137925.article

Fig 1 – US military's spaghetti diagram of the Afghanistan insurgency



Source: New York Times
https://www.nytimes.com/2010/04/27/world/27powerpoint.html

Workforce availability

The mining industry requires access to a highly skilled workforce. The core of mining industry workers comes from engineers and scientists who are in increasingly high demand. This is partly a problem of supply, with insufficient people being educated in the subjects and trained in the skills to meet the needs of the industry, especially as these needs shift away from digging holes. However, workforce availability is also affected by geopolitical exigencies: security turmoil creates unsafe areas, the political will to embrace migration is decreasing, and we will soon begin to see the first 'climate refugees' displaced by environmental changes caused by climate change. These factors may impact industry's ability to hire local talent, transfer personnel to international locations, or ship workers to operational field sites.

How should mining companies manage geopolitical risk?

Taking a holistic approach

The key to managing geopolitical risk is to take a holistic approach and understand the linkages between risk drivers. Drivers and risks are in a 'many-to-many' relationship, where one driver can cause multiple risks, and one risk is caused by multiple drivers. Sometimes these causalities are not direct, but manifest as second - or third - order effects, and some risks only manifest through a particular combination of drivers. Making sense of such a complex picture is not easy, as the US military's infamous spaghetti diagram of the Afghanistan insurgency illustrated in Figure 1 above.

Fig 2 – Six distinct risk lenses for the energy industry

Source: Willis Towers Watson

Distinct lenses

A more useful method to think about these issues is through distinct lenses. Lenses can help isolate risks to view them more clearly, to then be recombined into a holistic picture. For the mining industry, six particularly useful lenses might be: investment and return, people, business resilience, climate and environment, reputation, and cyber (see Figure 2 above). These capture the core geopolitical drivers, some of which have been elucidated above, and can be expanded into a mesh of interconnected risks.

"By assigning monetary value to risk percentages (likelihood multiplied by consequence), these tools turn the risk from intangible problems to tangible opportunities that can be understood in business terms, without deep geopolitical expertise."

Useful analytical tools

In order to evaluate the potential impact of these risks, it is also possible to utilise analytical tools such as VAPOR, jointly developed by Oxford Analytica and Willis Towers Watson, which turn qualitative findings into quantitative assessments. By assigning monetary value to risk percentages (likelihood multiplied by consequence), these tools turn the risk from intangible problems to tangible opportunities that can be understood in business terms, without deep geopolitical expertise.

No one credibly claims to be able to predict the future, but by employing lenses to observe geopolitical signposts, it is possible to illuminate potential futures and manage the risks contained therein.

Andreas Haggman is an emerging risk analyst heading up our newly-established Emerging Risks research hub at the Willis Research Network.

Social Economic Development: why it's key to an effective mining risk strategy

Many mining companies have a published and/or well-structured Social Economic Development (SED) strategy. Some will include it under their sustainability strategy, others as part of their Social License to Operate (SLO) initiative. But irrespective of where it sits, having a program which assists in improving the economic potential of nearby communities and local stakeholders results in a symbiotic partnership that benefits both the company and the community. Whilst such work is ongoing throughout the lifetime of any mining asset, it is after a major loss that many of the benefits of an effective SED strategy begin to play out.

To understand some of the social challenges faced by mining companies in more detail, not just those that emerge as a result of a loss, Willis Towers Watson's **Tom Holliday** (TH) spoke to **Andrei Belyi** and **Monica Coutinho de Souza** of **TechnoServe**[1], a not-for-profit organization that has been at the forefront of implementing economic development strategies for over 50 years.

How TechoServe supports the mining industry

TH – Monica and Andrei, many thanks for taking the time to talk to us today and allowing us a brief insight into some of the work you are doing with various mining companies around the world. Many mining firms already have well-developed and articulated socio-economic development strategies, so how does TechnoServe support the mining industry today?

TechnoServe – Mining company assets tend to require significant workforces and are often located in remote and isolated parts of the world. These areas usually offer only limited resources from the local communities; indeed, many gaps exist in technical capacities, be they soft skills, management skills or technical skills. There is therefore a huge potential for economic improvement by building local skills and developing entrepreneurship capacity. We provide solutions for small business owners in three different ways; through training, such as technical

[1] https://www.technoserve.org/

training, business and financial management, etc; through facilitating access for these entrepreneurs to better markets; and by facilitating access to funding and capital.

TH – Does this work focus exclusively on skills that can be used in the mining industry?

TechnoServe – No, and this is a critical part of developing sustainable economic solutions in the mining communities. Local entrepreneurs need to have as broad a view as possible, to allow their enterprises to prosper without reliance on mining companies. This is particularly relevant in situations after the mine has closed down and so local people are not dependent wholly on the mine as a source of revenue. There can sometimes be a perception that a mining company is a new "godfather", with the ability to offer gifts and build new facilities. But there needs to be an effective long-term economic management of the asset that can often conflict with short-term immediate needs. Through the royalties and taxes that an organization pays, there is also a crucial role for the government in the development of these areas, so the mining company is just another "actor" in a complex economic ecosystem, albeit an important one at the very centre.

The impact of mining companies on local communities

TH – Local communities rightly sit high up on the list of stakeholders for a mining operation and play an important part in their ability to carry out operations. But conversely, how important can the mining companies themselves be to the local communities?

TechnoServe – We see a full range of dependencies. Some operations are close to thriving cities and obviously in such cases there is a lower reliance on the local mine operations and a better balance of power, for want of a better expression. But there are others at the opposite extreme, with limited rural economies and poor capability of local "actors" such as local governments, who might not have necessary skills to support local economic needs, and whose population is very dependent on the mine - these are complex environments. The mining company, in its efforts to develop its Social License to Operate (SLO), will build new roads, schools, hospitals, etc, so there is often a significant expectation of a direct and immediate benefit. But there should be a more long-term strategic approach which perhaps sits alongside the immediate needs; to develop economies and markets, to encourage entrepreneurship and to ensure non-dependence on the mining operations.

"But there needs to be an effective long-term economic management of the asset that can often conflict with short-term immediate needs."

We work with some of the world's largest mining companies and we jointly design and implement programs aimed, among other objectives, to support local small and medium-sized enterprises (SMEs) to grow. For example, one of these programs might help a small company not only to be a supplier to the mine but also to branch out and service non-mining markets. We will also work to build local capacity of public services providers, for example working with the mayor's offices and technical schools to help reduce youth unemployment.

Compensation challenges

TH – Compensation can come in different forms, for example providing training. But typically, in the aftermath of major catastrophes, we hear talk of direct compensation for affected individuals and families. Does this bring with it further challenges?

TechnoServe – A good question, and one which carries with it many sensitivities. Compensation is part of the solution, absolutely, but you're right in that compensation comes in various forms. As mentioned earlier, TechnoServe and the mining companies can provide training which is not linked to any catastrophe or loss. But this can also take the form of highly value-added training, bespoke to their industry and designed specifically for their business. This training might last 6 to 9 months, it might involve 5 or 6 training sessions and be far more impactful than university or government-run courses; it's also designed to provide the small business with a robust foundation on which to succeed. Many mining companies also have a grant program, in which they provide a monetary grant to these businesses; however, this can sometimes distort incentives.

We have seen over many years that the training and education provide real long-term advantages, whereas we've also seen that the simple handing-out of grants, whilst perhaps quick and easy, often doesn't have the desired effect. The communities themselves want to be successful, they want to develop themselves and they are seeing that the tools which our training provides can help them with that. And mining companies are now starting to understand this themselves; for example, we are seeing situations in which grants are being phased out and replaced with loans or even disappearing altogether. But this is not an easy change to make; removing a financial benefit is painful at the start, but the initial pain naturally falls away as the value becomes more apparent.

TH – And so the challenges of post-loss compensation must be even more complex?

"We have seen over many years that the training and education provide real long-term advantages, whereas we've also seen that the simple handing-out of grants, whilst perhaps quick and easy, often doesn't have the desired effect."

TechnoServe – Yes, when you talk of compensation after an environmental or industrial loss, that is equally complex - if not more so - and it's important to strike a balance. First of all, companies must understand that a community's suffering runs much deeper than money, and they should act with sensitivity towards those who may be processing a lot of emotional pain. Secondly, of course, companies should do the critical work of improving their operations to ensure that they are doing as much as possible to prevent similar disasters in the future.

But to address the issue of financial compensation - simply giving money away rarely works, although it may help to manage the immediate emotions that the local community may feel. The problems really start when you stop the compensation payments. If the main breadwinner in the family earns, say, US$400 per month and a major event happens, it can be that each individual in the family is compensated at, say, US$300 per month. So that same family may have their household income increased 3, 4 or 5-fold, and that brings with it its own challenges when the payments stop - unless the community members have learned how to develop their own sustainable sources of income.

TH – Over the last few years, we've seen some high-profile losses affecting mining companies worldwide; for example, there have been at least five major tailings dam failures since Mount Polley in August 2014, which clearly have had an enormous impact downstream, both socially and environmentally. What are the key challenges that communities experience, and that you experience working within those groups, aside from the obvious difficulties families face with tragic bereavements?

TechnoServe – Again acknowledging the importance of the emotional and social factors in these situations, the risk of creating a financial dependency from compensation is a big challenge. When there has been an impact on household income, compensation is usually paid out very soon after an event and may continue for years. This can create a dependency; while it may make people better off in the short term, in the long term it can actually be detrimental to the community.

For example, prices go up as shopkeepers know that families, and the community in general, have more money; the cost for services likewise increases. Traffic increases as people from nearby towns come to sell their goods and services, hoping to benefit from the higher prices. Contractors and suppliers fill hotels, which increase their rates as a result. So there are some areas which will clearly improve from the compensation and it is therefore difficult to try to convince community members that compensation is not a sustainable solution.

Furthermore, there are downsides such as local inflationary effects; some sectors are impacted negatively, such as certain tourism businesses, and they largely end up going bankrupt. Of course, eventually the compensation stops. If people have been receiving money whilst not working, then two years down the line, when the financial aid comes to an end, there are significant problems to address. Crime can even increase at this point as a result of families' efforts to maintain their lifestyle, as they face higher costs of living without this previous income source.

Recommendations for improving local stakeholder relationships

TH – Clearly there is a broad range of how successfully mining companies are currently aligning themselves with their communities, from the very good down to those with significant issues still in front of them. If there were such a thing as a 'top 3', what would be your top recommendations for a positive and mutually beneficial relationship between a mining company and their local stakeholders?

TechnoServe – We get asked this question a lot, and the short answer is there is no simple solution and no quick fix. Each environment is profoundly unique, and each project or operation needs to look at its specific circumstances. But in general terms, firstly you have to keep to a long-term strategy; it's easier to look at the short-term and sometimes take the easier option, but over many years we have seen the benefits that a long-term strategy brings. Secondly, you have to maintain that strategy, which might sound straightforward, but over time there are many actors

"Each environment is profoundly unique, and each project or operation needs to look at its specific circumstances. But in general terms, firstly you have to keep to a long-term strategy; it's easier to look at the short-term and sometimes take the easier option, but over many years we have seen the benefits that a long-term strategy brings."

who will come into play and you need to ignore pressure from external bodies and keep to a more systemic approach to what you implemented at the outset. And thirdly, in everything you do, build a trustful relationship. When there is a major global company talking to a small local enterprise, it is easy to come across as arrogant or not interested. You have to be having the right conversation at the right level, building a trustful relationship that will last.

TH – Andrei, Monica, that's been a fantastic conversation. Clearly when talking about risk management in its fullest context, managers and their teams need to be looking at the wider picture and not just the risk of the enterprise in its operations, but also to the downstream risk to the enterprise, and the deep relationships and activities that need to be built and developed not just for short-term accomplishment, but for real and sustainable long-term progress. Both of you, thank you very much.

Andrei Belyi is Regional Vice President, Latin America and the Caribbean at TechnoServe.

Monica Coutinho de Souza is Country Manager Brazil at TechnoServe.

Tom Holliday is LatAm Reginal Industry Leader for Mining, Willis Towers Watson.

Part two: Addressing the uncertainties of mining risk transfer

The mining insurance market in 2019: the thoughts of an established leading underwriter

Rates going in the right direction - at last

For a couple of years now, the results for mining insurers have been mediocre at best, with the premium pool drained by attritional losses. Indeed, during the past two years, there has been not enough money to pay the bigger losses for which we are in business.

However, I would like to believe that currently rating levels are generally going in the right direction and market forces are doing their job. Most of us mature underwriters have been through those cycles one way or the other and I tend to believe we are able to cope with it – albeit that some clients would argue with that.

The dual challenge of climate change and mining losses

What's increasing, however, are the challenges introduced by forces not directly involved with mining activities. Indeed, the insurance of the risks associated with these challenges are already having an impact on the insurance industry at large and the mining insurance market in particular.

The global political situation, revolving around climate change, its impact and the reasons for it on one side and the catastrophic incidents in the mining industry on the other, is directly affecting the mining insurance market.

I´ll dwell on the climate change topic – albeit from a humanitarian point of view the latter is probably more relevant for the recent activities of UNEP, ICMM, PRI in relation to tailings dams.

There is no doubt that burning fossil fuels in the quantities that has been done globally does not do any good to our environment and is contributing to the climate change that we have been experiencing for some time now.

In particular, burning coal to generate electricity is being identified by the general public as being the "culprit"; hence the direct link to the mining industry and its insurers. With politicians seen at best as being too slow to tackle the challenges, "vox populli" is calling upon the financial industries to use their potency to leverage the de-carbonization process.

"Currently rating levels are generally going in the right direction and market forces are doing their job. Most of us mature underwriters have been through those cycles one way or the other and I tend to believe we are able to cope with it – albeit that some clients would argue with that."

The retreat from coal

Bluntly said: no investment in coal – no insurance for coal risks and vice versa. And the fact that we insurers and reinsurers are covering both sides, the risk taking and investment side, makes us an obvious “target”.

Adding to the challenges facing the insurance industry is the fact that most insurers are PLCs with private and institutional shareholders, both of which are becoming increasingly concerned about the Environment, Corporate Social Responsibility and Corporate Governance – in short ESG - and they are demanding answers from the C-Suite to their concerns.

Public perception unsympathetic

Unfortunately, the nature of mining and the public perception of the industry is that ESG has not been high on their agenda. Phrases such as:

- “Mining a finite resource, hence unsustainable in the long term”
- “Mining has a high impact on the environment with potential for catastrophes and social unrest”
- “The mining industry lacks transparency, showing little concern for communities and the future”
- “The mining industry is associated with corruption and conflict, unequal profit distribution, and is happy to just dig up resources and leave destroyed land behind”

are only a few of the typical phrases associated with the mining industry that one comes across in discussions over the last few years, in particular fueled by the most recent tragic incident in Brazil.

Pressure on insurers who continue to support the industry

All this is putting pressure on those insurers and reinsurers having supported and still are supporting the mining industry as one which we still need for some time – albeit that some commodities will become less important, others becoming increasingly important, but not without their own challenges.

However, the mining industry needs to overcome the perceptions that I mentioned - and I am confident they will do so. This will allow us underwriters to concentrate on what we know best - providing sustainable insurance cover for a sustainable industry.

Günter Becker is head of Mining at Munich Re.

Bluntly said: no investment in coal – no insurance for coal risks and vice versa. And the fact that we insurers and reinsurers are covering both sides, the risk taking and investment side, makes us an obvious “target”.

Hardening but not yet hard: London insurance market update

Property: a market where past loyalties matter

Introduction: the origins of today's market turnaround

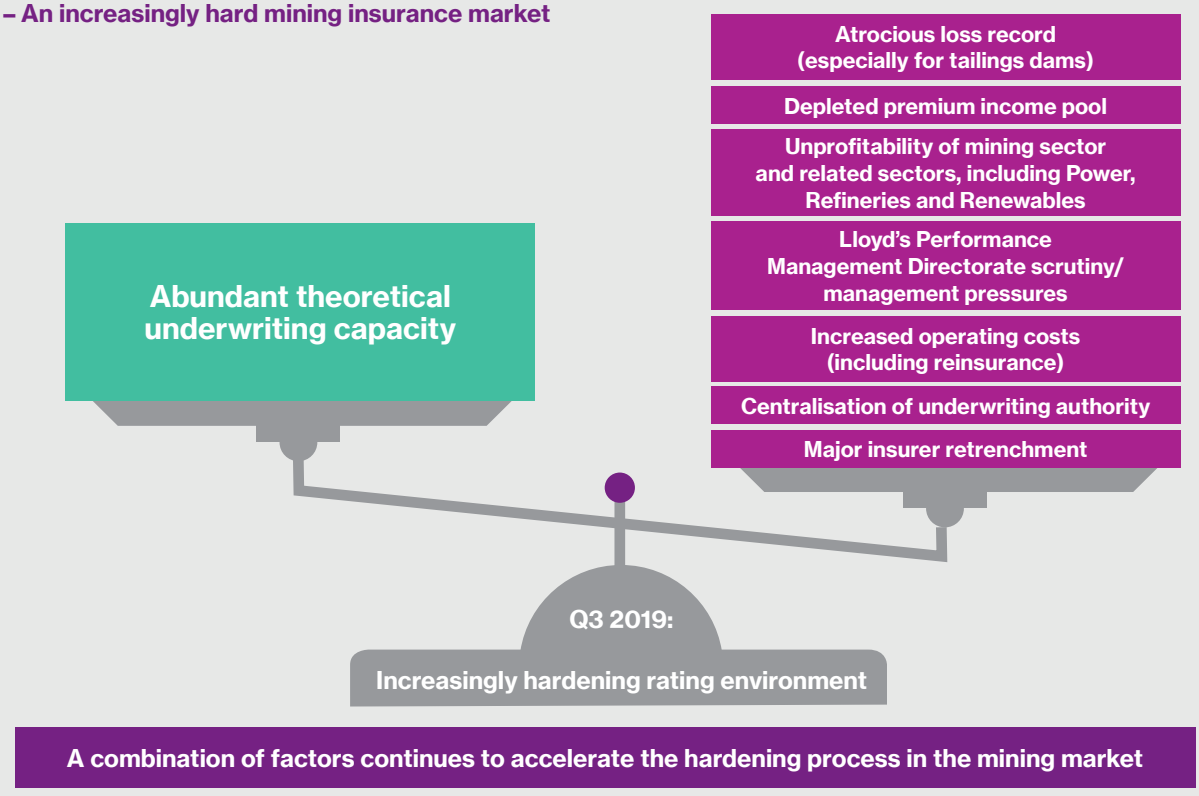
This time 12 months ago we described the mining insurance market for Property risks as being on the brink of hardening after 14 years of incessant softening of terms and conditions. However, at that stage in the market cycle we were not quite sure whether this hardening process would continue, or whether the continued overall supply of (re)insurance capital would eventually lead to a petering out of the process.

Perhaps, after 14 years of experiencing the same overall macro effect of (re)insurance market over-supply, we had reason to be cautious before we pronounced the end of the soft market. 12 months on, we now have no such qualms. During the last year a combination of factors has brought all sections of the mining market – the Direct and Facultative (D&F), major specialists and regional insurers – together in their determination to bring about a significant and permanent market turnaround.

What are the reasons for this turnaround, and what can buyers now expect from a market now buoyed by a renewed confidence that at last market dynamics are finally moving in their favour?

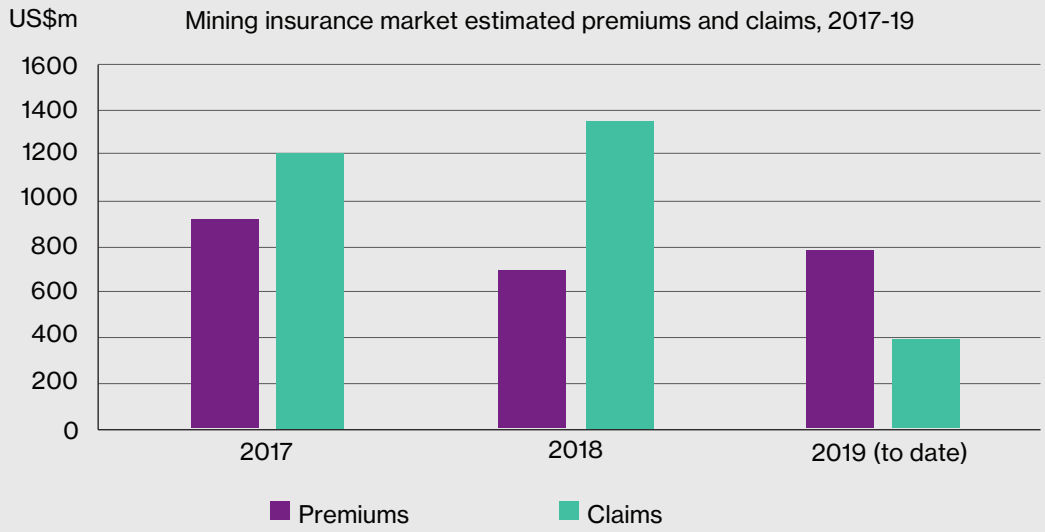
Figure 1 below shows how the balance of power in the international mining insurance markets has now tilted firmly in favour of the insurers. During the course of the last ten years or so, the continued provision of abundant capacity

Fig 1 – An increasingly hard mining insurance market



Source: Willis Towers Watson

Fig 2 – A sustainable portfolio?



Source: Willis Towers Watson/market intelligence

in the global Property & Casualty markets has created an advantageous market environment for buyers and their brokers. With a wide choice of insurers to choose from, each offering increasingly competitive terms to maintain and secure valuable premium income, buyers have been able to press home their advantage, forcing insurers to offer rating levels at way below what they regarded as the "technical" rates at which they could ensure underwriting profitability. Indeed, such has been the competition for some of the most valued business that underwriter "signings" for some placements (i.e. the different between their written and singed lines) have reached as far as 30% in some instances.

However, as we alluded to last year, that rosy position for buyers has now turned around. Indeed, following the tentative rating rises achieved this time last year, underwriters are becoming increasingly confident of securing further increases as 2019 has progressed.

Our schematic in Figure 1 on the previous page shows a combination of factors that has now changed the balance of power in the market. Let's look at them each in turn.

Premiums and claims – not a pretty picture

Gathering precise data for the global mining portfolio is not an easy matter, as mining business is written not only in various regions of the world but also as part of a combined Heavy Industry/General Property portfolio. However, from our conversations with insurers and our own data we can determine a reasonable estimate of the total premiums and claims relating to the industry, and this is represented in Figure 2 above. Given that we are only just over halfway through 2019 at the time of writing, it's not perhaps surprising that the claims reported to date only represent about 50% of the premium income. But if we look at the last two full years, a different picture emerges. In particular, 2018 is looking as if the market has sustained approximately US$1.3billion in claims, set against an estimated global premium income of approximately US$800 million, while 2017 is not looking much better.

So in terms of straightforward results alone, there has been plenty of incentive for insurers to increase their resolve to press for rating increases.

"Following the tentative rating rises achieved this time last year, underwriters are becoming increasingly confident of securing further increases as 2019 has progressed."

Fig 3 – Selected major mining losses, 2013-19

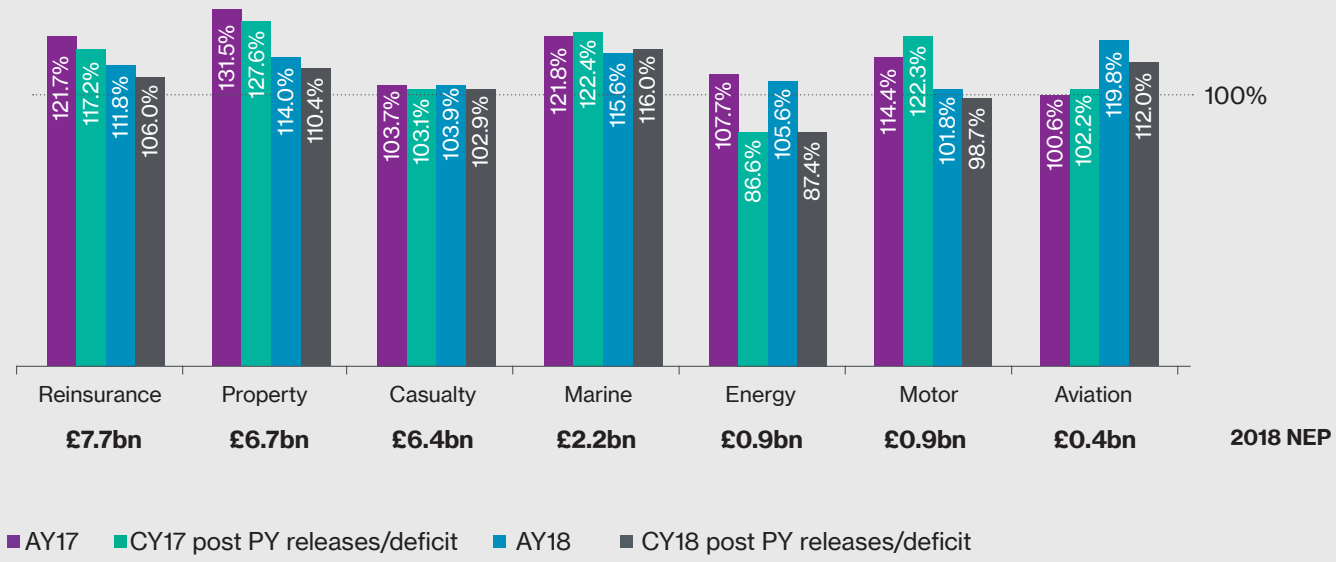
Date	Country/Territory	Cause	Quantum (US$)
Q1'13	USA	Pit wall failure	750,000,000
Q2'13	Canada	Machinery breakdown	300,000,000
Q3'13	USA	Buried longwall	180,000,000
Q1'14	South Africa	Earthquake & fire	200,000,000
Q1'14	Philippines	SAG mill machinery breakdown	10,000,000
Q1'14	Australia	Fire in a benefaction plant	120,000,000
Q3'14	Canada	Tailings failure	25,000,000
Q3'14	Asia	Fire - hot work failure	65,000,000
Q4'14	Australia	Flood - breach of sea wall	200,000,000
Q4'14	Papua New Guinea	Machinery breakdown - belt failure	15,000,000
Q1'15	Zimbabwe	Underground collapse	100,000,000
Q3'15	Chile	Conveyor fire	60,000,000
Q4' 15	Brazil	Tailings dam failure	600,000,000
Q3'16	Canada	Fire in processing plant	45,500,000
Q3'16	South Africa	Shaft fire	90,000,000
Q1'17	Australia	Cyclone David	125,000,000
Q1'17	Peru	Conveyor failure	15,000,000
Q1'17	Australia	Cyclone Debbie	250,000,000
Q3'17	Russia	Flood above and below ground	175,000,000
Q2'17	Australia	Earthquake underground	155,000,000
Q3'17	India	Unknown	250-300,000,000
Q3'17	Caribbean	Hurricane	outstanding
Q3'17	Chile	Flood	outstanding
Q3'17	Canada	Flood	outstanding
Q3'17	Israel	Tailings dam failure	57,000,000
Q4'17	USA	Chemical extraction breakout	400,000,000
Q2'18	Ghana	Operational & Construction*	outstanding
Q2'18	Australia	Pitwall failure	50,000,000
Q1'18	South Africa	Surface fire	outstanding
Q1'18	South Africa	Transformer fire	50,000,000

Date	Country/Territory	Cause	Quantum (US$)
Q1'18	USA	Furnace breakout	17,000,000
Q1'18	USA	CBI	5,000,000
Q1'18	Papua New Guinea	Earthquake - power plant	50,000,000
Q1'18	Chile	Machinery breakdown	20,000,000
Q1'18	Australia	Tailings dam failure	150,000,000
Q2'18	Mexico	Tailings dam breach*	outstanding
Q2'18	French Guyana	Flood	50,000,000
Q3'18	South Africa	Underground conveyor fire*	70,000,000
Q3'18	South Africa	Dragline failure	outstanding
Q3'18	Australia	Underground longwall fire	125,000,000
Q4'18	Australia	Train derailment	60,000,000
Q1'18	Mexico	Theft of concentrate	7,000,000
Q1'18'	Canada	Underground rock collapse:	5,000,000
Q3'18	Russia	Pit wall failure	10,000,000
Q3'18	Chile	Ship loader failure	outstanding
Q4 '18	Czech Republic	Methane gas explosion *	outstanding
Q4'18	Russia	Fire - potash mine*	outstanding
Q4'18	Chile	Ship conveyor at a port	outstanding
Q1'19	Chile	Landslip/tailings dam failure	100,000,000
Q1'19	Chile	Mill failure	25,000,000
Q1'19	Australia	Conveyor belt fire	outstanding
Q1'19	Brazil	Tailings dam failure*	150,000,000+
Q1'19	Peru	Torrential rain	150,000,000
Q1'19	USA	Coal - supports to conveyor failure	50,000,000
Q1'19	Canada	Underground fire – conveyor belt	125,000,000
Q1 '19	Australia	Flood – various mining companies	50,000,000
Q1'19	Australia	Underground coal – box cut slope failure	40,000,000
Q2'19	Australia	Surface conveyor fire	20,000,000
Q2'19	Peru	Earthquake to waste dam	20,000,000

**Denotes fatalities*
Source: Willis Towers Watson/market intelligence as at July 31 2019

Fig 4 - Another set of disappointing underwriting results for Lloyd's in 2018

Combined ratios by class of business



Source: Lloyd's market results, 31 December 2018. NEP: net earned premiun, AY: accident year, CY: calendar year

The Lloyd's Decile 10 initiative

But the mining loss record has not been the only driver for change over the course of the last 12 months; these results are reflected elsewhere in the Heavy Industry portfolio. Figure 4 above shows that the Mining portfolio in Lloyd's of London is only one part of an overall negative picture for major Property risks of this type, including power, refinery and renewable assets. With a Combined Ratio (CR) of 110% for Property, and other classes also falling into unprofitable territory, only Energy (dominated by Upstream) recorded a favourable CR for 2018.

The recent Decile 10 initiative instigated by Lloyd's management, prompted largely as a result of these figures, has ensured that a significant section of the Direct and Facultative (D&F) market has had no choice: either offer more improved terms from an insurer's perspective or have your portfolio closed down by senior management.

Increased reinsurance costs

Moreover, the availability of reinsurance protection for some D&F insurers has become increasingly restricted as this sector has become more unattractive to some significant Reinsurance markets from a strategic perspective. So with the reinsurance market as a whole tightening up, some insurers have now reviewed their mining portfolio and decided to withdraw from this sector completely, while others have been more circumspect and elected merely to cut back on their participation in this class.

Specialist mining market retrenchment

But of course, it's not just the D&F market that has been affected by the change in market atmosphere. The specialist mining market, including the likes of AIG, IMIU, Munich Re, SCOR, Swiss Re and Zurich, have conducted their own analyses of the mining portfolio and adjusted their own strategies accordingly. One major insurer has recently merged its retail and facultative operations into a single underwriting operation and we expect others to follow suit in the near future. This retrenchment has often resulted in the closure of regional offices around the world.

The most significant change in underwriting philosophy in this market has come from AIG; while in the past their strategy has been characterised by writing a significant - or even 100% - share of a given portion of the programme, we have now seen AIG cutting back heavily on such participations. Where this has not been anticipated by buyers and their brokers, it has led to some serious placement challenges, with brokers often having to supplement lost capacity with underwriting support from insurers at very different terms than had been negotiated the previous year. This has proved to be particularly

challenging on excess of loss placements further up in the program which traditionally attract less premium income; while the more primary quota-share layers have usually had the benefit of a low signings "cushion" to offset any withdrawal of capacity, this has been much less the case for these higher placements.

Meanwhile, other specialist mining insurers have focused their attention on other specific underwriting issues, including tailings dams, underground exposures, Contingent Business Interruption, port blockage and critical natural catastrophe exposures. Indeed, some programmes would appear to have been significantly re-underwritten rather than simply having rating increases imposed on them.

The result of this retrenchment has generally forced buyers to consider alternative sources of underwriting capacity, allowing opportunistic insurers to provide replacement cover – at a price.

Centralisation of underwriting authority and the flight to quality

As ever in a hardening market situation, we are finding that insurers are increasingly focusing on programmes featuring both quality risk management and significant premium income. Indeed, we can now say that a significant differentiation is now being made towards those buyers who have shown loyalty to a particular set of leading underwriters during the soft market years as opposed to these buyers for whom price has always been the strongest determinant in their purchasing strategy.

Another facet of an increasingly hardening market has been the increased centralisation of underwriting authority as insurers consolidate their portfolios and tighten their overall underwriting discipline. Especially among the major insurers from the specialist mining market, we are seeing a gradual withdrawal from certain regions and a tightening of underwriting control from the centre, whether that centre be located in London, Western Europe or North America. Moreover, any differentiation between insurers operating in this sector between those operating on a gross line basis (i.e. providing capacity on the back of reinsurance purchase) and those on a net line basis (i.e. underwriting without the benefit of reinsurance) is fast disappearing as at least one major (re)insurer is now augmenting their net line capacity with additional reinsurance purchase.

Withdrawal from certain territories

At the same time, specialist insurers are differentiating against operations in certain territories. For example, following the destabilisation of the political situation in natural resource rich nations in central and southern Africa, insurers are showing a marked reluctance to continue to offer cover for mining projects whose viability is threatened by political unrest. Notwithstanding the political situation, insurers are also taking a dim view of both the loss record and the quality of risk management in some countries; this somewhat sudden change in underwriting direction has, in some cases, caught both buyers and their brokers off guard, requiring them to re-evaluate their marketing strategies and access insurers that has hitherto not been considered to be deployed on their programmes. Other territories such as Russia have also proved to be challenging, with AIG again significantly reducing their share on key programmes. However, an increased participation by local insurers has generally ensured that Russian programmes have managed to be placed without any significant negative impact.

Large global miners equally impacted

The very large global mining companies would, on the face of it, have even more leverage with the insurance market, given the degree of premium income and global spread of risk that they offer. However, even they have found the new underwriting climate something of a challenge. For these major buyers, it has not been so much the rating increases which have been the challenge; it is also insurers' relentless focus on the coverage provided in terms of retention structure and pricing caps. As a result, it would seem that they are likely in the future to retain an even greater proportion of their risk internally as they continue to develop their captive capabilities.

Tailings dams – the market imposes restrictive cover

Of course, given the recent tragedy at the Brumadinho mine in Brazil, it's not at all surprising that the issue of tailings dams continues to be the most contentious issue in today's mining insurance market. Brokers and their clients now have precious little choice but to accept insurers' tailings dam clauses, which defines what is and what is not covered by the policy in the event of a tailings dam loss. To begin with, insurers are now insisting on a declaration of values at inception and imposing an aggregate limit in the event of a loss by means of a non-stacking clause. This effectively prevents buyers from recovering secondary or tertiary damage to their own property further downstream from any tailings dam collapse as the aggregate limit imposed by insurers is likely to take into account only the value of the tailings dam itself. This of course means that in several instances it is likely that tailings dam owners will be faced with some uninsured exposure in the event of another major collapse on the scale of Brumadinho or Samarco a few years ago.

In any event, the significant programme limits enjoyed by some buyers at the height of the soft insurance market two or three years ago are very likely to become a thing of the past, if they have not done so already. Indeed, it is becoming increasingly clear that some mining companies will be shortly looking at gaps in coverage for this particular exposure – if they are not doing so already.

Conclusion: three pieces of advice

So what advice can we give to mining insurance buyers, given this hardening market outlook? It's true that this is not yet a truly hard market - there is still too much capital in play in the global (re)insurance markets for that. However, there is no doubt that those buyers (and their brokers) that were ill-prepared for the turnaround in the market over the last 12 months have either ended up with significantly more expensive insurance or with gaps in cover - and possibly an unattractive combination of the two.

Despite this, with proper planning and with the right long-term approach, much of the last minute "panic buying" that we have seen in the market over the last few months can be avoided. There are three pieces of perennial advice that in all but the rarest of cases should be taken to minimise the effects of the hardening market:

- **Get your underwriting submission in early.** The earlier the renewal process begins, the easier it will be for buyers and their brokers to develop alternative risk transfer strategies that can offer a viable substitute to those insurers who are adopting the most aggressive underwriting stances.
- **The provision of quality data to the market is essential.** The more that the insurers understand about your risk, the more seriously they will want to invest in your programme at more generous terms than would otherwise have been provided.
- **Consider showing loyalty to your established programme leaders.** While this strategy can never guarantee to deliver optimum terms, from our own experience those buyers who have developed long term relationships with key strategic risk partners have tended to fare better in this market than those who have not.

One thing is abundantly clear – those buyers who are forced to approach insurers with whom they have not been doing business for a number of years can expect a determined stance and perhaps some radically different terms than they might have expected in the past.

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Liability: a polarised and evolving market

While the Mining Liability market was already showing signs of hardening as we entered 2019, it's clear that the Brumadinho dam collapse on 25 January 2019 marked a notable change in underwriting appetite for the mining sector.

The overriding result has been a polarisation of the market, as insurers have either looked to reinforce their position as risk transfer providers for mining clients or pulled out of writing mining risks altogether. This dichotomy has effectively led to a quasi-specialist market, formed of insurers still willing to provide capacity for mining exposures.

Most significantly, the latest disasters in the mining sector have put Tailings Storage Facilities (TSFs) under the spotlight.

Three ways in which the market has changed

In general, we can categorise the consequences of this development into three key areas:

1. **Capacity:** a number of insurers, particularly those with modest mining portfolios, have stopped writing mining accounts completely and many are significantly cutting back on line size. Concurrently, underwriters are seeking to manage their capacity deployment by either 'ventilating' where appropriate (i.e. writing multiple layers of a programme but avoiding writing consecutive layers) or limiting their line sizes in proportion with the total programme limit.

2. **Information:** Those insurers continuing to write mining business now do so with rigorous information requirements, particularly around TSFs, and are happy to walk away from risks where the information provided is deemed to be insufficient or unsatisfactory. Where historically basic information regarding TSFs may have been sufficient, Insureds must now provide a survey or inspection report per site as well as a suite of details including (but not limited to) dam construction, lifespan and maintenance arrangements.

"The overriding result has been a polarisation of the market, as insurers have either looked to reinforce their position as risk transfer providers for mining clients or pulled out of writing mining risks altogether."

3. **Pricing:** Average rate increases are significantly greater for mining risks than in other sectors. In addition, there is a high level of price volatility (ranging from 20% to 400% for loss-free accounts), not only between programmes but also between insurers participating on the same programme. This volatility is predominantly being driven by a greater focus on price benchmarking and a stricter observance of insurer pricing models, which have been adjusted to more accurately reflect the catastrophic risk profile of TSF exposures. The net effect is that Excess of Loss layers are being subject to the greatest premium increases as well as programmes that were historically most under-priced.

Current underwriting drivers

While Brumadinho can be recognised as the catalyst for change, there are many other factors contributing to the current dynamics of the Mining Liability market. For example, underwriters are analysing which territories are producing the greatest number of losses as well as considering which countries are enforcing the highest operational and maintenance standards. Consequently, there are regional implications to the current underwriting approach and the Law & Jurisdiction of a policy is of greater consideration to underwriters.

The type of dam construction has become a critical underwriting factor, with some markets unwilling to provide cover for TSFs built using the upstream construction method. In conjunction with this, underwriters are still seeking to ensure they understand Insureds' joint venture operations, contractor management policies and underground mining exposures, as these remain pertinent from an operational point of view.

Reinsurance treaties are also playing a role in driving underwriting appetite and many (if not all) insurers have recently undertaken a thorough review of their mining books and TSF exposures. There is also a much greater emphasis being placed on company reputation.

Notwithstanding the above, there is a growing tendency for underwriters to decline to review new mining risks citing a lack of time as insurers look to prioritise their underwriting focus on other target sectors. Moreover, there is a noticeable flight to quality business as the limited premium income available to Lloyd's underwriters increasingly influences selection.

What does the future hold?

In light of the discernible shift in market conditions, the value of long term relationships will become increasingly important for Insureds as those who nurture key underwriting relationships stand a better chance of limiting the effects of the hardening market. It is also likely that the fragmented nature of the current mining market will lead to an increase in differential pricing and therefore 'split slips', whilst at the same time, the reduction in market participants is likely to result in the emergence of recognised mining leaders within the market.

The withdrawal of capacity may also result in a renewal season where some Insureds are faced with the prospect of not finding 100% support for their programmes on a like-for-like basis and will need to consider either increasing their self- insured retentions in order to maintain existing limits in addition or reducing their programme limit altogether. Some Insureds may also be faced with the introduction of TSF exclusions on their policies where minimum information and/or risk quality standards cannot be met.

Another consideration for insurance buyers in the mining sector will be the developing mind-set surrounding ethical mining and the consequent withdrawal of capacity for certain coal mining exposures. Whilst this is particularly prevalent amongst the major composite insurers, Lloyd's of London hinted that it may at some stage adopt a similar position when it confirmed last year that it would start excluding coal from its investment strategy.

A further final consideration is the impact of significantly restricted business plans that Lloyd's imposed for 2019, as it is likely that syndicates' ability to write new business will be significantly limited (if not non-existent) by the time we reach the latter stages of the year.

What does this mean for Insureds?

The net effect of the above is that insurers are being very selective in the mining risks that they will consider and will only commit capacity where they can evidence internally that an Insured operates excellent risk management and that the chance of a TSF failure is extremely low. The corollary is that insurers are not hesitating to come off risks where best in class risk management cannot be evidenced, as restricted growth targets now mean that below-par mining risks are dispensable accounts from a portfolio perspective.

However, notwithstanding the various challenges and changing dynamics outlined above, the London contingent within the International Liability market still remains well-positioned to provide mining companies with insurance solutions - provided sufficient information can be furnished and adequate risk management demonstrated. However, in light of the palpable shift in market conditions, clients will need to ensure they appoint a broker with specialist Mining Liability market knowledge and experience, as this will be critical if their risk profile is to be adequately differentiated as part of their broke to underwriters. Only then will Insureds be able to obtain the best possible terms from what is ultimately a very challenging market.

Matt Clissitt is a Director at Willis Towers Watson Natural Resources London.

"In light of the palpable shift in market conditions, clients will need to ensure they appoint a broker with specialist Mining Liability market knowledge and experience, as this will be critical if their risk profile is to be adequately differentiated as part of their broke to underwriters. "

Directors' and Officers' (D&O) Liability: increased claims activity leads to more challenging conditions

There has been a sharp rise in the number of shareholder lawsuits against public companies, emanating from the US in particular where securities class action filings are at an all-time high, in conjunction with an uptick in investigations. Global regulatory activity and country specific spikes in activity (e.g. Australia) has resulted in insurers experiencing increased claims activity involving fraud, bribery & corruption and concomitant civil, criminal and regulatory activity. In the UK there have been significant losses defending Serious Fraud Office (SFO) related claims - even where directors have been exonerated.

Also impacting the D&O insurance market is event-driven litigation, where plaintiff attorneys react to negative news by filing litigation; examples include cyber breaches, plane crashes and tailings dam collapses. When this constant trend of increasing claims activity and rising defence costs and settlement values since 2010 is taken in conjunction with decreasing premiums across the market during the same period, it is not surprising that a hardening insurance market has resulted.

There is a mix of both perennial and topical challenges facing the mining sector when it comes to liability insurance coverage for Directors and Officers:

- Perennial challenges include pollution, physical damage, personal injury and death
- Topical challenges include the highly significant issue of tailings dams

Capacity changes

Generally, there is still an abundance of D&O capacity in the insurance market; however, for mining companies in particular we must advise that there has been a significant reduction for 2019. Overall global 'technical' capacity remains just below US$1 billion, although there has been a significant reduction in per risk appetite. Available capacity depends on whether the company is public, private, and if publicly traded, the location of the listing.

Average rate changes

In Q2 2019 the D&O rates increases have been most severe for US and Australian publicly traded companies, particularly those who have had losses and/or open claims. The mining industry across the globe has also been afflicted with significant rate increases.

Applying a significantly higher retention can help to mitigate premium increases. Alternative programme structures can also be considered, for example a Side A only programme, i.e. cover for non-indemnifiable loss for insured persons.

"When this constant trend of increasing claims activity and rising defence costs and settlement values since 2010 is taken in conjunction with decreasing premiums across the market during the same period, it is not surprising that a hardening insurance market has resulted."

Common exclusions and limitations on cover

As discussed, the D&O market has hardened considerably over the past year; this has also been manifested by insurers also looking at either excluding or sub-limiting areas of cover they perceive as potentially difficult.

Virtually all D&O policies contain bodily injury and death exclusions, on the basis that these exposures ought to be covered by other insurances. An important so called "carve back" to this exclusion (i.e. granting of cover) is for defence costs for directors in respect of a claim made against them. Something which is sometimes more difficult to obtain, however, is the equivalent cover for legal representation expenses in the event of an investigation following an incident giving rise to bodily injury or death. Policies vary widely on the extent of this cover; some contain extensions for so called "corporate manslaughter" but again these need to be treated with caution, not least because in the UK the offence can only be committed by a company and the chances of an individual company director being successfully prosecuted for involuntary manslaughter are small.

Also to be taken into consideration are the typical D&O exclusions for property damage and for pollution. In the case of property, insurers impose these on the basis that this insurance cover is provided elsewhere. With pollution, it is more often the case that insurers simply do not have the appetite to cover it all.

While these coverage positions are clear, careful thought still needs to be given to the question as to how the exclusionary language is applied since there is a real danger that quite legitimate D&O claims will get caught up in the wording of these exclusions. For example, if a company suffers severe reputational damage, or its share price falls following a serious mining accident, it is highly likely that shareholders may seek to bring a securities claim against the company and its directors. Such a claim should be covered under a D&O policy and should not be restricted by the terms of any exclusion or other limiting language; this should be so regardless of whether property damage or pollution (as is highly likely) are also involved. More difficult coverage issues can arise in relation to other follow-on civil and criminal investigations and proceedings.

A focus on tailings dams

After a few well-publicised recent disasters in which tailings dams have been implicated, D&O insurers have been seeking additional information and/or imposing additional limitations on cover in respect of tailing operations. Their starting point is that this is an additional "known risk" which they need to underwrite as, for example, trading in crypto currencies might be for a financial services company seeking D&O insurance. One of the challenges here is to identify precisely what tailings are for this purpose.

Insurers are responding in varied ways to this new issue. Some are asking Insureds to complete detailed supplementary questionnaires; others are seeking to impose blanket exclusions or limitations, including a significant increase in the self-insured retention payable in the event of a tailings incident. To complicate matters further, any additional tailings related restrictions on cover have to be blended into and made consistent with the existing web of restrictions for pollution, bodily injury etc. referred to above.

Outlook

Given the overall hard market conditions, it seems likely that coverage challenges of the kind summarised above will continue to feature in the renewals of D&O programmes for mining companies for some time. That being said, there is a strong case for seeking expert input and assistance from advisers specialising in this sector of the insurance market.

Mark Wakefield is D&O Practice Leader, FINEX Global at Willis Towers Watson.

"Given the overall hard market conditions, it seems likely that coverage challenges of the kind summarised above will continue to feature in the renewals of D&O programmes for mining companies for some time."

"The Good, the Bad and the Ugly": International Insurance Market Update

United States

Introduction: "The Good, The Bad and the Ugly"

Approaching the midpoint of 2019, the US market for miners hasn't been immune to the pervasive hardening that other industry segments have seen. While there are pockets that remain stable, most lines have seen significant upward pressure - perhaps less than the International markets, but upward pressure nonetheless. Programs are experiencing much greater scrutiny than in years past and rate reductions are completely off the table for most lines of business. Conditions can perhaps be best expressed in terms of a famous spaghetti western from the 1960s.

The good

- **Workers Compensation:** a lone bright spot for insurance buyers, the market for Workers' Compensation seems to be holding stable, with flat renewals a real possibility in most cases and actual loss experience driving increases or decreases, as opposed to insurers taking a "broad brush" approach. Most miners (other than coal) have very good options in today's market; however Occupational Disease-exposed programs, and in particular Pneumoconiosis (Black Lung) will continue to see large rate increases, due to an increasing amount of industry claims and a decreasing pool of coal companies left to support them.

The bad

- **Liability:** On renewal business that has not experienced recent loss activity, rate increases have been in the +5% to +10% range across the board.
- **Auto Liability:** irrespective of industry class, we are in a market that is demanding minimum rate increases in the +10% to +20% range.
- **Umbrella and excess business:** these insurance markets haven't always followed primary rate trends as they have in past years, with insurers often looking for rate increases that are beyond the primary markets' needs. Where the rating base has declined, we also don't see insurers giving premium relief in step with that reduction. Moreover, many insurers are looking to reduce capacity on even the longest term and most profitable programs, ultimately leading to higher costs due to the need for more capacity. Attachment point continues to be a "gating" issue for many insurers as well, pushing many miners into larger retentions.
- **Thermal coal:** There are as usual specific pockets that have more challenges than others, such as thermal coal where the capacity situation is more tenuous that ever, with Chubb's recent announcement that by 2022 they will no longer insure thermal coal programs generating more than 30% of their revenue from such. This follows Zurich's withdrawal – both have previously been stalwart coal markets. This leaves very few primary markets left for coal miners to turn to.
- **International tailings facility risks:** for programs with international tailings facility risks, the increased underwriting scrutiny and voluminous requests for information have only been dwarfed by some eye-watering rate increases. This is a trend which no doubt is echoed across all markets, not just the US.

For all types of miners, there continues to be significant scrutiny on loss record and property risk engineering reports. Quality market submission preparation, transparency and access to senior members of the insured's management team are all now seeming prerequisites to renewal terms being offered.

The ugly

And finally - the ugly. Property markets have perhaps seen the most dislocation and volatility in 2019. While many mining companies are more heavily weighted towards London and European markets where specialist underwriting is more common, the US markets still provides a meaningful piece of a miner's overall market selection process.

Whether a single small operation or on larger layered and quota share programs, the pressure on rate and capacity has been significant in 2019. Most of the global insurers have had mining industry loss activity on top of catastrophe losses from windstorm, quake and wildfires. We have seen US markets open the negotiations at +20% to +30%, though normally that tends to be tempered a little once all is said and done. We see US insurers trying to get back to circa 2014 rates, essentially attempting a five-year correction.

However, we have seen more significant changes on mining programs with losses. In past years there was a glut of new capacity ready and willing to displace the more expensive capacity; now, this is no longer the case.

Another trend that we have noticed in the first half of 2019 is that US property insurers are increasingly taking isolationist approaches, looking after their own long-term interests; where deal specifics don't conform to that view, they will choose to walk away. Where target rate increases aren't achievable, we see attempts to restrict coverage terms and conditions, or in some cases, both. AIG and FM Global have also shaken up the markets, with both choosing to non-renew or significantly reduce capacity on programs that they have been writing 100% of for many years. This has left a huge void and many miners scrambling to access dwindling capacity.

Miners should get into the markets early and be prepared for a long negotiating period on upcoming renewals. Having a large number of insurers participating on a program, while more complex, can also provide a bit of buyers' protection from the effects of one or two volatile insurers. Lastly, those miners with captives should be prepared to think about their long-term risk finance strategy and how to better utilize their captives to moderate capacity and pricing issues down the road.

Environmental: more centralization of underwriting authority

In general, the Environmental Insurance sector is experiencing its first hardening market in over a decade as a result of a loss-driven reduction in underwriting appetite. High severity claims have hit a number of different classes of risk, including the natural resources industries. This unfavorable loss experience has resulted in underwriting authority being taken away at the field level and placed into the hands of executive underwriters, where greater scrutiny is placed on all complex programs. In addition, capacity has been further reduced in light of recent significant market consolidation. In the last few years eight of our veteran environmental carriers have merged into three: XL-Catlin (now owned by AXA), ACE-Chubb, Liberty-Ironshore and The Hartford-Navigators.

Specific to the mining industry, the Environmental market is still very limited and has been since AIG left this sector in North America, with Ironshore and Zurich being the key domestic markets. The only new specialty carrier to enter the mining space in recent years is Channel 2015, a Lloyd's syndicate supported by Scor Re. While their appetite for US-based risk remains low, they're a viable option for predominantly "Rest of World" mining operations, including Canada, Europe and Australia.

Securing meaningful Environmental Liability coverage for tailings dams has become even more challenging in the aftermath recent catastrophic breaches. In response, many umbrella/excess carriers are non-renewing "Sudden & Accidental" pollution coverage, or imposing strict underwriting information requirements, higher attachment points and significant increases in premium. This has resulted in more Insureds turning to the dedicated Environmental marketplace to obtain terms for Pollution Liability ("PLL") programs.

Unfortunately, there has been further withdrawal from environmental carriers in this space as well. In May 2019 AIG announced they were no longer writing any PLL programs for global mining/tailings risks (previously they had only exited the PLL market in Canada and the US). Other insurers, including those noted above, have introduced and imposed sub-limits, leading to the creation of layered programs to achieve the required limits; this has inevitably driven prices upwards.

In short, capacity remains limited and terms and conditions are hardening for pollution/environmental lines of coverage. The type and extent of engineering information required to underwrite any tailings storage facilities is far more extensive than in years past, with pre-renewal engineering site surveys often a binding subjectivity. Premium increases at renewal are expected to range between 10 to 20%, notwithstanding any change in exposure and claims performance.

Bermuda: consistent appetite but firmer approach

Over the last 10 to 15 years the Bermuda Property market has proven to be consistent and disciplined in its approach to underwriting mining risks. Whether writing US or International risks, the Bermuda market has supported the class through the various underwriting cycles, demonstrating a commitment to the industry. And while there are instances of markets pulling back from or exiting Thermal Coal, the core Bermuda carriers remain steadfast, and have largely maintained a consistent appetite, albeit that consistency has been dependent upon achieving "Rate Adequacy"; in the first 6 months of 2019 this has translated to average composite rate increases in the region of 20% to 30% for loss-free business.

As we move into the second half of the year, we anticipate a continued upward pressure on rates, as well as an increased focus on terms and conditions. Capacity is likely to continue to be trimmed, although the trend of buyers opting for reduced limits will go some way to mitigating the impact of the globally diminished capacity. A strong market relationship, robust risk management practice, and a firm understanding of the commodity market are likely to be key focal points as we move forward.

We also need keep an eye on the impact of losses from the broader 'Energy' market; while each risk is underwritten on its own merits; underwriters' ability to continue writing an inherently complex business is dependent upon a profitable portfolio.

Surety market: a turning ship?

While Combined Ratios remain favorable and the recent international entrants have attained their budgeted goals, the political headwinds have moved onshore. Large US insurers such as Chubb and Zurich have announced their exit from thermal coal; however, they have carved out Reclamation Surety from the exit. A lingering question is how the international non-governmental organizations (NGOs) will interpret this accommodation as they look to further their influence in the US.

Specific to the coal industry, recent bankruptcy filings by middle tier operators may cause Surety underwriters to pause; though largely unknown, these operators have nine-figure exposures to the markets. Significant losses in this space could drive the underwriting community, and their reinsurers, to re-evaluate their appetite for this space. Should this over-reaction occur, strong relationships with the surety markets will be of paramount importance.

Due to the favorable loss ratio and declining rates, North American insurers continue to branch into international jurisdictions to provide surety and other financial assurances for mining reclamation and remediation; this provides an opportunity for the mining industry to offer third-party promises regarding any environmental transgressions. While the insurance cover reflects a tailored approach resembling stand-by letters of credit, capacity is currently available from the insurance industry to offer an option.

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

Canada

Property – a constantly changing market

To say that the Canadian Property market is changing would be an understatement and early, accurate renewal information will be more valuable than in previous renewals. Property underwriters posting unfavourable results due to increased loss activity across several industry classes has led to a considerable increased pressure on rates and reduced line sizes being offered.

Rate increases will be the norm for even the "best in class" risk, with careful review of supply chain exposures, interdependency risks and deductibles also playing a considerable role in the underwriting process. With respect to capacity, while it remains plentiful and available in the Canadian market, geographic diversification will be beneficial to miners when completing their programs.

In addition to detailed renewal information, underwriters will be keen to understand what miners have done in the past 12 months to improve their risk and look for alignment with their social values and corporate cultures.

Casualty

The outlook for 2019 for casualty markets for mining risks in Canada is significantly different than first half of 2018. During the final quarter of 2018, we are saw signs of concerns from Canadian primary liability markets for mining risks, especially from key carriers such as Zurich, Chubb, AIG, and, QBE, which continues throughout 2019 to date.

For 2019 renewals, Primary carriers are reducing GL and Umbrella combined limits; this is forcing brokers to formulate options for buffer layers down low or arranging Excess carriers to drop down to lower attachment points.

It's perhaps not surprising that key concerns from Liability underwriters include Tailings Storage Facilities (TSF) collapses causing severe environmental claims as well as massive property damage and bodily injury, including deaths to nearby local communities. Full and complete detailed information on TSFs are mandatory for underwriting purposes.

There has been a consistent increase on primary CGL rates and Umbrella layers, ranging from flat to 5% on good risks; Excess Liability carriers will follow the increase from underlying layers. There has also been significant rate increases in Automobiles, ranging from 5-10% on good risks.

Executive Risk (D&O)

The Executive Risk market has firmed significantly over the past 18 months; however, marketplace competition continues to be present amongst carriers due to available capacity. The market has largely followed the leaders on rate-increase strategies for primary and lower excess layers, therefore insureds should not expect pricing reductions on D&O placements. Leading insurers have demonstrated effective discipline and are more conservatively deploying capacity in the face of profitability challenges due to large volumes of securities class actions, uptick in the cost of defense, and a general shift towards both high frequency and severity claims in this space.

The severity of losses could worsen as relatively higher stock prices could produce precipitous stock drops, this is particularly noted for the natural resource space. Additionally, more merger and acquisition suits surviving the transaction effective date could drive up losses and increase premium pressure.

Michael Benoit is Senior Vice President at Willis Towers Watson in Toronto.

South Africa

Property - Munich Re withdraws

The biggest issue is the withdrawal of Munich Re of Africa (MRe's South African office) from all forms of mining risks in South Africa. This action followed three years of underwriting losses for the company, principally as a result of mining industry claims.

There is very limited lead capacity, with only three recognised lead markets. Their capacity and pricing are very much driven by the international reinsurance markets. There are also a restricted number of following insurers, due to the reluctance of insurers to provide capacity for underground risks; as a result, most insurers prefer an excess of loss position above the underground limit.

The anti-coal movement has had insignificant direct effect; the local offices international insurers such as Allianz, AIG and Chubb have advised that they will no longer be underwriting coal programs. However, these insurers have provided little if any mining capacity in recent years.

Risk management, especially the response to surveyors' risk improvement recommendations, is paramount. Insurers will not provide capacity for existing or new risks unless they receive proof of compliance with recommendations.

Liability – AIG withdraws

The withdrawal of AIG from the mining liability market and the exit into run-off of a Lloyd's liability underwriting facility has caused a serious gap in capacity. Liability insurers require far more detailed information regarding tailings storage facilities following the Brazilian losses.

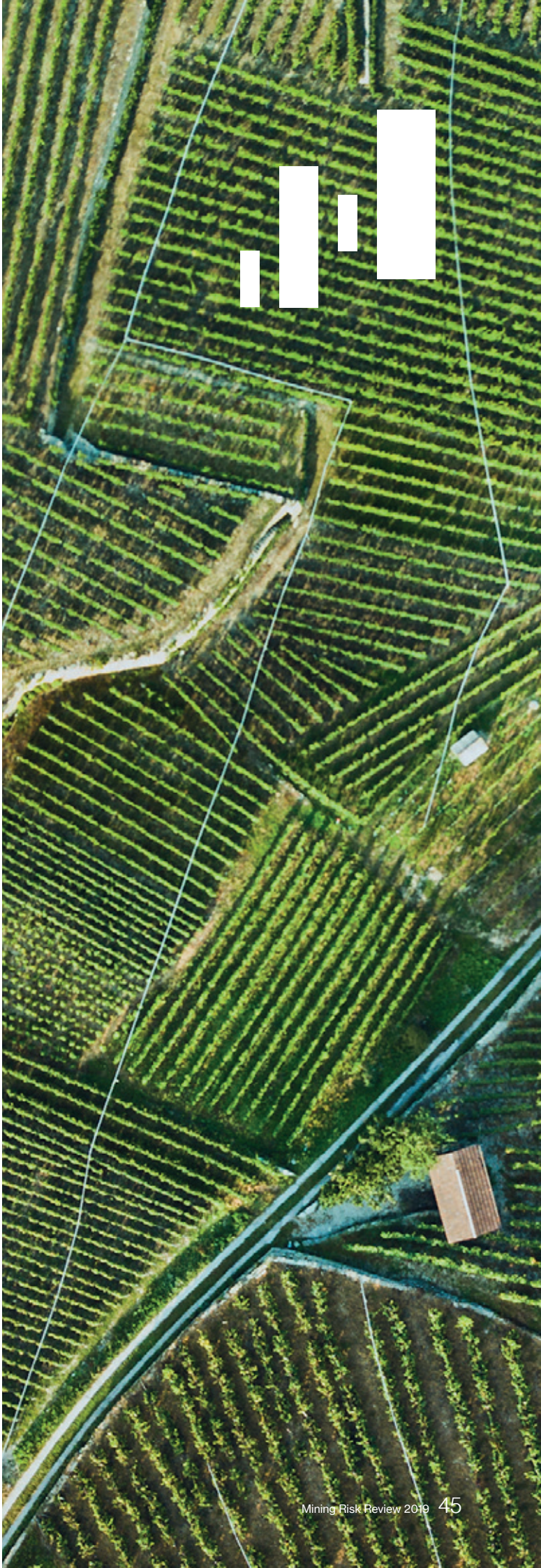
D&O – hardening pressures ease

The premium pricing for mining companies has generally been stable to 10% uplift increase in 2019 which is a significant improvement compared to the huge increases experienced over the 2016-2018 period.

Commercial Crime

Premium increases of around 10% are normal. Clients with perceived poor risk quality have suffered higher increases & scope of cover restrictions.

Adrian Read is Industry Specialist Leader: Natural Resources, Willis Towers Watson South Africa.



Australia

The Australian mining market has seen a continuation of the conditions from 2018, with further increases in premium rating experienced throughout the first half of 2019. The previous twelve months was another challenging year for underwriters in this sector and has seen the enforcement of underwriting guidelines from management, with requests for more granular information that in past years as underwriters seek to return to underwriting profitability.

Quality submissions, inclusive of detailed operational exposures (especially tailings dams) and natural catastrophe exposure information, analysis of commodity price changes and Business Interruption values that are declared, risk engineering programs and mitigations that are in place will all be crucial to ensure that optimal renewal outcomes are achieved and that underwriters continue to deploy their capacity to expiring levels.

Capacity remains relatively stable; however, underwriters are reviewing the deployment of their capacity to each and every operation. The exception to this trend is the continued constriction of capacity for thermal coal operations, with further insurers recently announcing they are also withdrawing from this part of the mining sector.

Stephen McDermott is Placement Services Director at Willis Towers Watson in Brisbane, Australia.

"Capacity remains relatively stable; however, underwriters are reviewing the deployment of their capacity to each and every operation."

Combining data with analytics: a different view of your insurance programme

Introduction: the traditional single view of risk

These days data relating to many aspects of the performance of mining companies is widely available, but many miners miss the insight contained within the data and as a result make sub-optimal decisions. So how are leading mining companies combining data with focussed analytics and deep industry knowledge to view risk in a different way – resulting in better quality risk financing decisions?

Too simplistic?

Traditionally, mining companies have insured their risk exposures on an individual basis with reliance placed on historical losses to assess risk, usually by considering each class of insurance in isolation. Premium, market capacity, deductible and insurable limit have been the main drivers, with only limited analytical decision support undertaken to assess placement outcome and pricing. But this single view of risk doesn't take the true nature of risk into account, which is more complex; it also includes dependencies within and between risk exposures that can now be better understood by combining data with modern analytical capabilities.

Too complex?

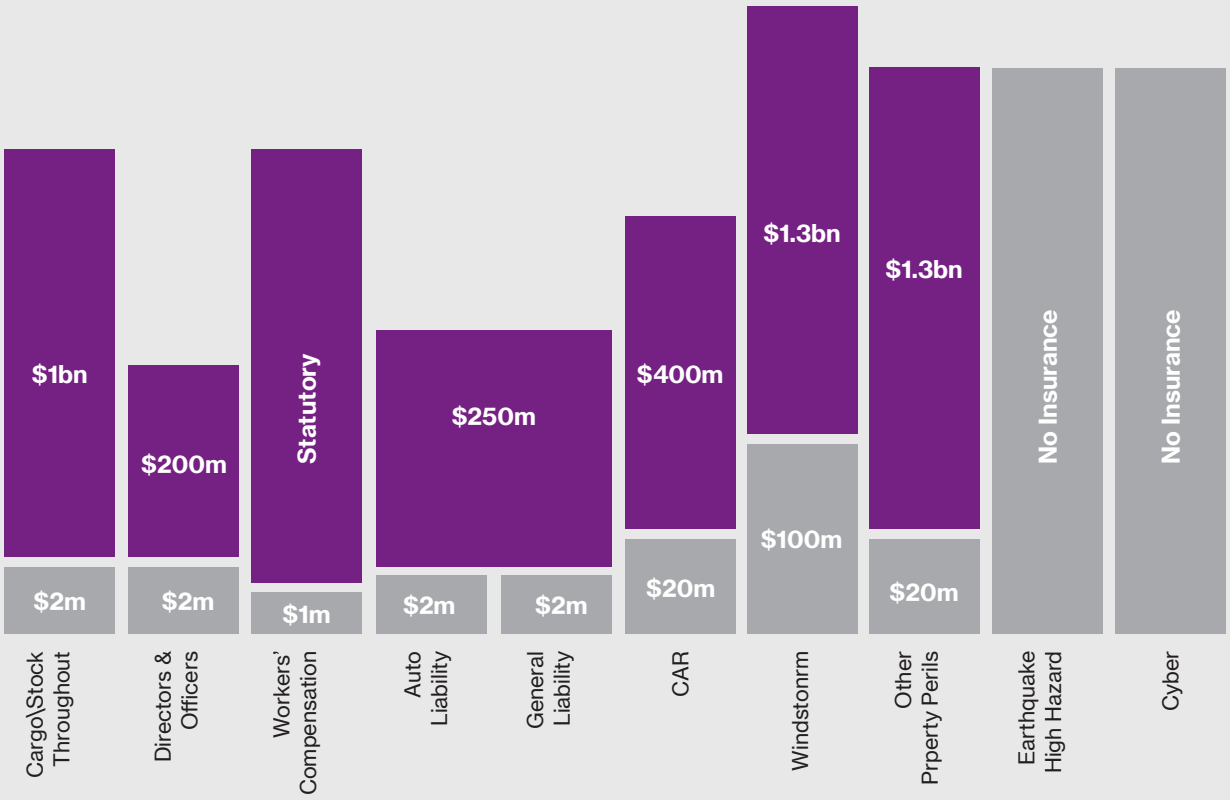
In addition to buying insurance as individual lines of cover, the various insurance lines are often bought with different renewal dates, with many local policies stretching across different geographies as well as varying levels of deductibles and limits. This complex structure of cover makes it difficult for key decision makers such as Treasurers and CFOs to understand precisely how their company is protected in the event of a series of losses, and as result may lead them to underestimate the true value of insurance as a hedge.

Differences from other hedging strategies

This is in stark contrast to the value that mining companies perceive from transferring risk by purchasing hedges in commodity markets, interest rate and currency markets. Due to the binary nature of such structures (there is only a pay-out if an index or a currency falls below a pre-agreed value) they are often viewed by Finance functions as simpler to understand than insurance.

Moreover, layers of hedges across different risk types may be bought to protect the organisation from scenarios that are deemed too risky without transfer of risk to the external market. It is this simplicity that is regarded as particularly attractive by CFOs and Treasurers, compared to the perception that insurance is more complex to understand and hence use as a hedge for effective risk transfer.

Fig 1 – A typical insurance programme structure



Source: Willis Towers Watson

Looking at risk through a different lens

Common insurance structure

How then should these different points of view be reconciled? A good place to start is a common representation of the insurance structure that is purchased by the organisation. The structure is often depicted as a series of bars or towers, where the height of each bar approximates to the amount of cover bought, and may look like this:

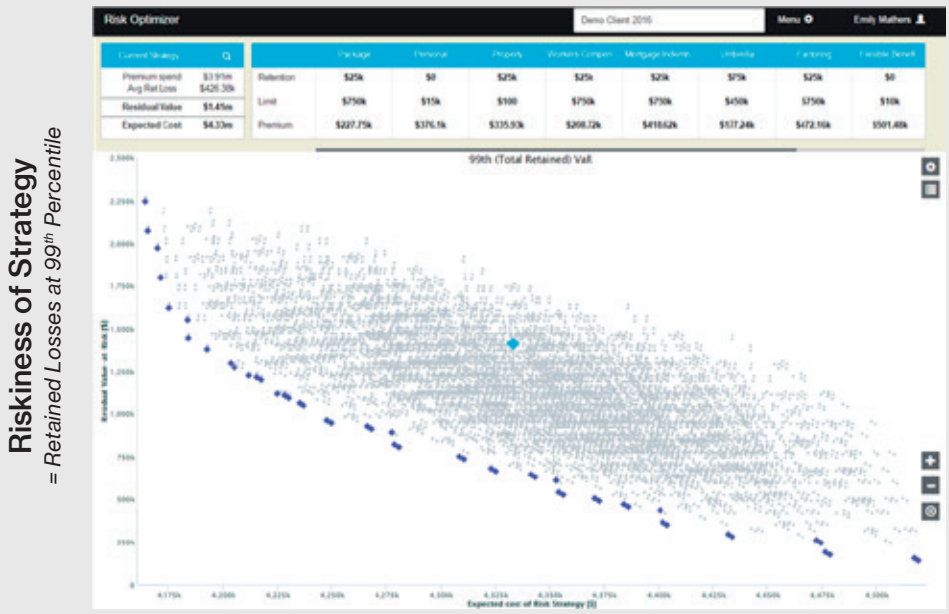
Does this structure work when the company is under stress?

Whilst this depiction is helpful for understanding exactly what amount of cover has been purchased for each line of insurance, it is less helpful when seeking to understand the protection afforded to the organisation in times of financial stress. For this to become easier to understand, we need a different viewpoint.

Retained risk and expected cost

One viewpoint that CFOs and Finance teams will be familiar with is one that identifies the trade-off between risk and return. For our purposes we will amend this slightly to show the trade-off between retained risk and expected cost, as outlined in Figure 2 overleaf. This view has been designed so that it is easy to see the merits of different financing strategies as well as their impact of the organisation's bottom line.

Fig 2 – Establishing the efficient frontier



Source: Willis Towers Watson

- The horizontal axis shows the **expected annual cost** of the insurance strategy, which is made up of the premium spend and the cost of the retained losses.
- The vertical axis shows the **amount of retained risk in a 'bad year'.**

The objective is to reduce the amount of retained risk and at the same time reduce the expected annual cost and move to a more efficient programme, closer to the edge of the cloud in the above diagram (in this example, the current strategy, represented by the blue diamond, is positioned way behind the "efficient frontier" and so can be significantly improved).

Towards the efficient frontier – and a better understanding of risk

By combining data, industry knowledge and modern analytics, a better understanding of the company's risk exposures and their variability may be obtained. This insight will often reveal a very different picture from the traditional siloed view of considering different classes of risk in isolation. A significant benefit of this approach is to show where concentrations of risk occur as well as where there are currently inefficiencies in the transfer of risk off the balance sheet.

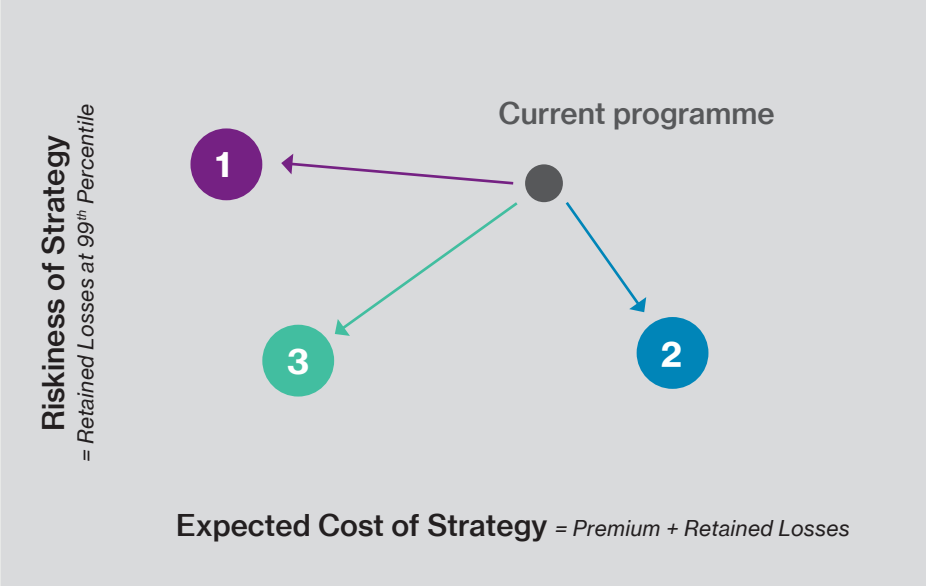
Combining analytics with industry data to identify trade-offs

As a result, many leading companies are now beginning embrace combining analytics with industry data to better understand risk at a portfolio level, and hence to understand the trade-off between the cost of retaining vs the cost of transferring risk.

This deeper understanding of the correlations of risk helps to identify ways to reduce volatility by measuring the effects of diversification and may be used to develop alternative strategies. These strategies may then be assessed and compared using the lens of riskiness versus expected cost shown above.

"A significant benefit of this approach is to show where concentrations of risk occur as well as where there are currently inefficiencies in the transfer of risk off the balance sheet."

Fig 3 – The path to efficiency



- **Option 1:** Reduces premium spend by US$5m
- **Option 2:** is equally efficient, but with primary buy downs
- **Option 3:** is Option 1 with an aggregate stop loss

Source: Willis Towers Watson

Transferring volatility: a path to efficiency

This path to efficiency was recently highlighted to a client in the following diagram and shows three different options, all of which are more efficient than the current strategy. They represent an annual cost saving to the company, as well as significantly de-risking the balance sheet at the same time.

Advantages of optimization

The proposition for mining companies here is clear:

- Firstly, they will spend only what they need to on insurance - and not a penny more.
- Secondly, they will effectively and efficiently protect the company against the insurable risks that matter most to them.
- Finally, in our experience, optimization leads to a 10-30% reduction in risk and/or insurance cost savings.

Methodology

In practice, this is carried out in six distinct steps:

1. Set key metrics for insurable risk
2. Define cost and risk profile of current insurance programme
3. Identify alternatives to optimise the cost/risk profile
4. Define insurable risk tolerance
5. Identify optimal insurances to stay within risk
6. Adjust programme as risk profile changes

Transferring volatility: parametric solutions

Developing tailored cover

The increased availability of data and use of analytical methods is also leading to the development of alternative forms of risk transfer, such as parametric solutions, which can transfer financial volatility arising from weather related events or natural catastrophes away from company balance sheets. By understanding the variability inherent in risk exposures that are not necessarily insurable, it's possible to use analytics to develop tailored cover based on measurable factors such as volume of rainfall, wind speed, footfall and temperature.

Decision making audit trail

Another important benefit of using an analytical approach is the creation of an audit trail of decision making for risk financing. By considering current risk exposures, as well as the efficiency of both the existing risk transfer programme and of alternative structures, it can be shown that an objective and robust approach has been followed which takes both the interdependencies of risk and a consideration of the merits of different strategies into account before any decision is taken.

Benefits of this approach

More generally, companies that use this approach find that they:

- Change the nature of conversation about risk
- Increase focus on the portfolio of risks rather than individual types of risk
- Recognise the value of transferring risk above their risk tolerance
- Save money through the process of optimising their insurable risk financing
- Improve their corporate governance with an audit trail of risk financing decision making

"By understanding the variability inherent in risk exposures that are not necessarily insurable, it's possible to use analytics to develop tailored cover based on measurable factors such as volume of rainfall, wind speed, footfall and temperature."

Conclusion: time for a new conversation?

To conclude, a couple of recent examples will help to show the breadth of questions that can be answered by this approach.

Multinational mining company – retaining and optimizing risk

Following a series of large liability losses, this client recently approached us with two critical objectives:

- **To help business units to make informed choices on the level of risk to retain.**The analytics demonstrated the trade-off between retaining additional risk and the correspondingly lower premiums charged, allowing the business units to make better decisions on risk financing.
- **To identify and prioritize options for reducing Comprehensive Cost of Risk (CCOR).** The analytics demonstrated how the captive could significantly reduce the total cost of risk by innovative structuring of the cover it provided, whilst not exposing the captive to a level of risk outside its risk appetite.

Dam owner - breach assessment

We recently helped our client to better understand their Third Party Liability loss potential arising from a dam breach. This multi-disciplinary study, including hydraulic modelling, risk engineering and loss control approaches, provided a threefold benefit as detailed below:

- A **hydraulic simulation** that allowed the client to fully understand the potential flood footprint extent resulting from a critical failure, together with its propagation timescale;
- A **risk engineering assessment** that estimated the potential third party losses resulting from different failure scenarios;
- A **loss control assessment** which provided cost-effective risk measures, such as alarm procedures and secure zones, to reduce expected third party losses.

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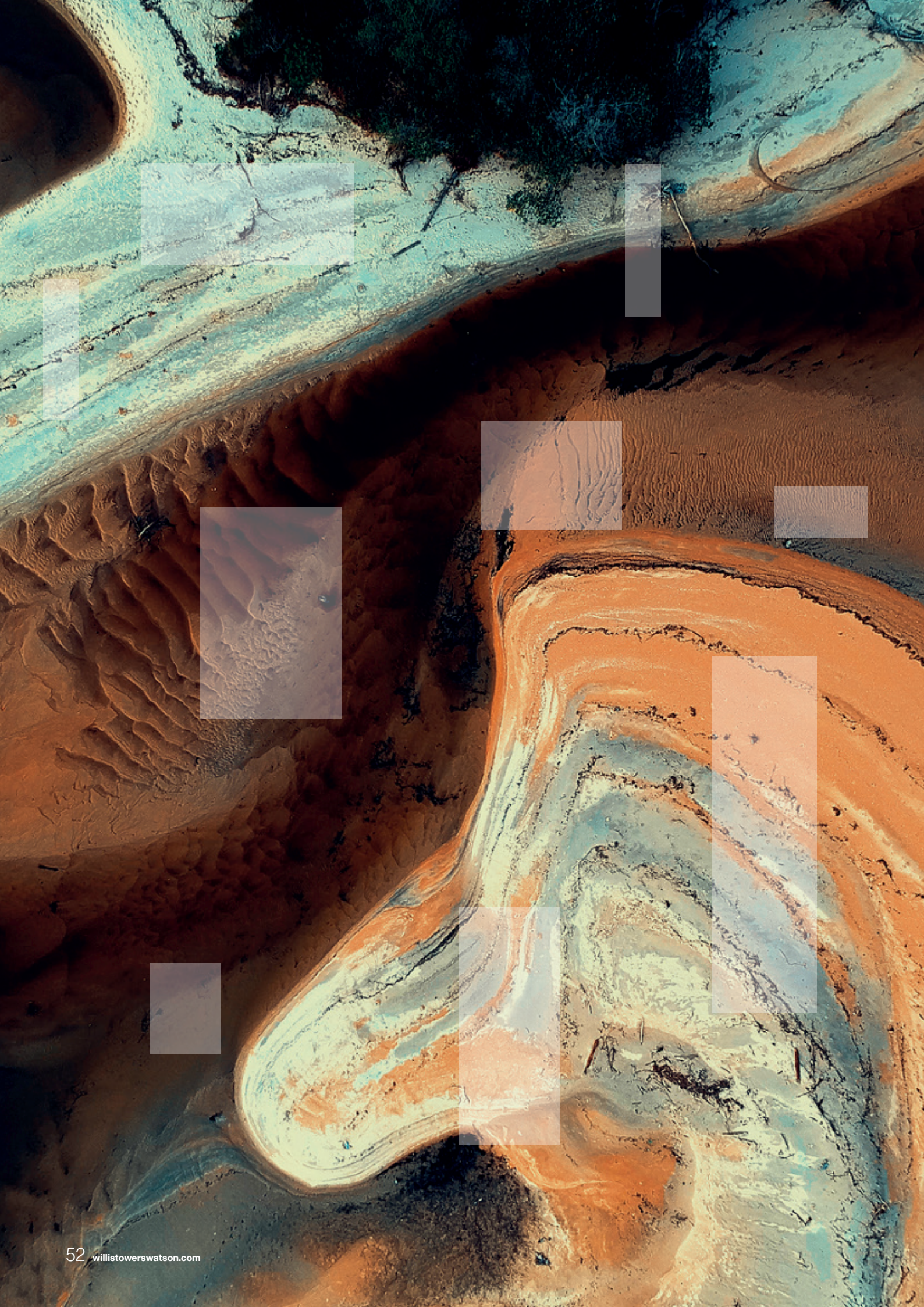

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