Meeting the mining industry challenges of tomorrow

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The 'easy stuff' is long gone, but what does that mean for the resource industry's future?

To get a sense of the answer, we need to look closely at the challenges and complexities facing new and ongoing mining projects and operations in a changing industry landscape.

TECHNICAL CHALLENGES

Several large-scale surface mines are at, or nearing, the end of their economic life, and with mineralisation often continuing at depth, it is sometimes viable to transition to a large-scale underground operation. But the typical transition lead time of up to 20 years is often underestimated and poorly planned for, with some mines discovering this to their detriment. As a result, value is eroded by open pits having to continue yet another cutback simply to provide production continuity.

An increasing number of new larger-scale deposits will be mined by underground – rather than surface – mining methods, which presents numerous challenges.

It takes considerable effort and cost to acquire the required knowledge for an ore body at depth. Without this ore body knowledge, the underground projects may carry elevated risk.

Long access development lead times, elevated in situ stress, seismicity and higher virgin rock temperatures are just some of the challenges faced by miners as an increasing number of projects look to mine via the use of underground methods.

Similarly, existing open pits are marching ever deeper, and require a very good understanding of the geotechnical and hydrogeological parameters to ensure long-term slope stability. Slope failure examples demonstrate that not fully understanding these conditions can generate unexpected and significant production interruptions.

These and other technical challenges are expected to become more prevalent across the industry. It is already not uncommon to see projects experience multiple materially challenging areas that require resolution prior to demonstrating a project's viability.

SOCIOPOLITICAL CHALLENGES

On a macro level, profound sociopolitical change continues to shift the markers as project owners negotiate approval paths.

An increasing number of jurisdictions are now modifying their tax regimes. The tendency to target resource-related projects, seen

as 'low-hanging fruit', results in a selective curtailing of investment and potentially restraining commodity supply, along with eroding relationship capital between industry and governments.

The industry's social licence to operate is also under pressure from many angles in parts of the world. In particular, water resources are under increasing pressure, and miners can no longer rely on water rights that will detrimentally impact the local community water supply.

Poor past behaviours and outcomes in the resources sector have decreased social licence support from those outside the industry. The reality is that even the best operators are judged by the lowest common denominator.

This has created an increasing need to address the extent to which modern lifestyles are reliant on commodities, particularly the required rate of ongoing extraction to meet demand, while at the same time mining sustainably and in line with community expectations.

The industry needs to foster a greater collaboration to continue the drive towards technology and innovation, as well as doing more to encourage the younger generation to stick with the industry and use the original thinking that they will bring.

WHERE IS THIS ALL LEADING?

During the recent downturn, the supply–demand balance was negatively impacted. While demand generally continued unabated, the supply chain, particularly exploration, has lagged in some commodities.

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The latest downturn has been particularly challenging, and as an industry, we have experienced a loss of personnel across the ranks. This is exacerbated by the significant drop in new students entering resource-related tertiary subjects – which is, in part, a reflection of the recent challenging market conditions.

While it is commonly recognised that more needs to be done to attract and retain new entrants into the industry, the messaging and execution are often conflicting.

Many companies espouse mentoring programs, for example, but these have been seen to unravel on site, where line management may not share the vision or have the required skills to implement the corporate aspiration. The net result is the loss of aspirant scientists and engineers.

As mining activity continues unabated, mining companies still require significant numbers of tertiary graduates, while the number of students graduating has materially dropped. What does that mean for the industry?

TOWARDS A SOLUTION

Looking beyond the challenges, the industry needs to foster a greater collaboration between companies and industry bodies to continue the drive towards technology and innovation; and to inspire the incoming generation to stick with the industry and harness the original thinking they will bring.

The drive for collaboration and engagement with technological innovation are tools that can help in attraction and retention across the board, but particularly for the valuable new entrants into the industry that we need to prosper and survive. Observations on some mine sites indicate that younger engineers are often in personal holding patterns, looking to move into city-based roles in a compressed period and leaving companies short of a direct production workforce.

With many projects still to be fully evaluated or even discovered, exploration processes need to continue to innovate for deposits that are under cover. This then needs to be followed by downstream studies that are more robustly evaluated to ensure that the viability of those projects can be demonstrated, and funding can be secured.

This is particularly relevant to projects outside of the major mining companies where the supply of capital is more constrained.

The international underground caving community is a shining light in how collaboration promotes thinking differently about complex issues. There is a high degree of connectivity and networking that benefits all caving operations and projects through a willingness to share lessons and experience in what is arguably the most technically challenging mining method. Nurturing 'knowledge communities' to share ideas, resources and promote innovative thinking should be the way forward.

With the pace of change increasing, contending with growing complexity in all types of mining projects and operations will require a collective commitment to communication, collaboration and empowerment across the mining value chain. AR&I