This month I am going to detour briefly into one of my other passions, fly fishing, while exploring the continuing theme of change and evolution in our minerals industry.

My introduction to fly fishing came from a dour Englishman who moved to Africa after the Second World War. My recollections are of his beautifully crafted cane rod, a masterfully woven silk line, a gut leader which had to be pre-moistened and kept between two damp chamois leather pads, and a tippet which I think was horse hair. His self-tied flies were works of art. Decades later, under the tutelage of a good friend, I too learned fly fishing and fly tying.

But 45 years later fly fishing has evolved from a mystical sport practised by a few to a near billion-dollar global industry covering specialist apparel, dedicated fly-tying material suppliers, carbon fibre rods, beautifully engineered reels, high-strength polymer fly lines, continuous taper monofilament leaders, and high-strength fluorocarbon tippets so thin you can barely see them, and more flies than you can imagine. Notably, however the core technology being applied in the fly fishing industry comes predominately from other industries and applications. For example, the move from cane to nylon to carbon fibre in fly rods resulted from materials developed primarily in the military and aerospace industries, but they have resulted in dramatic improvements in casting distances, accuracy, and angling success.

I do not believe that the technologies that we apply in the mining and metallurgical industries should happen by chance or by simple adoption from other industries. Theory and experience suggest that the success of innovation hinges on two factors: understanding the inherent capability of the core technology and its implications for business practice.

This raises the perennial question of how to create, adopt, or adapt new technology for the minerals industry. Perhaps more pertinent is the question of what mechanisms are put in place to proactively scan, identify, prioritize, promote, and ultimately transfer possible technologies for the minerals industry?

Technology scanning and assessment should attempt to:

- Evaluate a given technology's technical merit and evolution, but also search for constraints or compromises that may reduce capability, affordability, adaptability, economies of scale and scope, or market demand
- Examine, across several technologies, competitive and complementary elements and emerging value chains that can encourage a given technology's widespread application
- Identify centres of research excellence in government, academia, and industry, and experts to speculate on a given technology's potency, desirability, and timing.

Using a structured approach to technology scanning will help the industry to sift through the myriad possibilities and formulate a coherent strategy for research and for investment. Ideally there should be a series of ongoing studies that track trends, technologies, and innovations that could influence, or be leveraged as part of next-generation intelligent mining systems over different time horizons. The initial technology scanning activity should be a collaborative, pre-competitive activity that is centrally executed and enhances national competitiveness. Out of this would flow a number of technology development opportunities that could be further developed on a competitive, commercial basis. The outcomes of this work could then be shared with stakeholders on a regular basis to create awareness of pending technological change and to highlight potential social issues. This would address questions such as what skills would be needed, in which areas and by when, to implement the emerging technology.

Historically, this type of research work was undertaken by a number of institutions, such as the Chamber of Mines Research Organisation, the CSIR, Mintek, and a number of university research centres. Significant progress has been made and we have seen material changes in surface mining and coal mining operations technology and systems, coupled with advances in metallurgical technology. However the majority of the national mineral resource asset value is in platinum and gold resources, which are predominantly narrow tabular mineral deposits. Underground, narrow tabular mining is still largely locked in a paradigm of post-war technology; hand-held pneumatic rock drilling and double-drum scrapers. The real value of this national asset will be realized only through the concerted development and application of new mining technologies in the narrow tabular mining realm. Unfortunately the bulk of this work now resides in a competitive environment, with duplication of scarce resources and little shared learning between competing solutions.

As we move forward and the resource nationalism perspective matures, business, as the custodian of national mineral assets, is likely to be expected to extract value from mineral resources so as to build national competitive advantage rather than individual success from our mineral endowment. The competitive advantage is less likely to reside in technology selection but rather in the effectiveness and efficiency of its application. Thus there is a compelling argument to leverage new competitive narrow-reef mining technology development activities in order to accelerate delivery and reshape the platinum and gold mining industries.

The real question is how we catalyse this collaboration in the midst of the current industry challenges; depressed metal prices over a protracted period while the world economy readjusts, an uncertain industrial relations environment, and increasing involvement of the regulator in business.

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