The digital disconnect: problem or pathway?

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01 The key question of the digital future of the mining and metals sector

The digital disconnect in the mining and metals sector is the gap between the potential from digital transformation and the poor track record of successful implementations. The digital disconnect exists, not because of a lack of engagement from the sector, but because of a range of practical issues that continue to challenge the industry.

This paper, written from the operator's perspective, expands on the potential benefits of digital to help exploit the number one operational opportunity in mining – productivity. It also explores the common pitfalls, which include lack of practical pathways to an aligned vision, unclear accountabilities and poorly defined digital business models. Understanding these pitfalls will help answer the question: "With so much opportunity, why is the road to digital transformation littered with stalled or failed endeavors?" Addressing the digital disconnect will be critical to succeed in the rapidly changing digital world.

EY can provide advice on both the problem and the pragmatic pathways that companies should take to overcome it.

Definitions and scope

Terms such as digitalization, digital transformation and analytics, when used without clear definition, can lead to confusion within an organization, and, in turn, can result in misguided and poorly scoped projects. For the purposes of this paper, "digital" (and variants thereof) or the process of moving to "digital mining" is "the use of electronic tools, systems, devices and resources that generate, store or process data to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business." [1]

Preparing for tomorrow's digital mine today

Digital as an enabler

*There were more than 700 participants in this webcast poll.

84% of participants are considering having, have started or already have digital as part of their day-to-day business

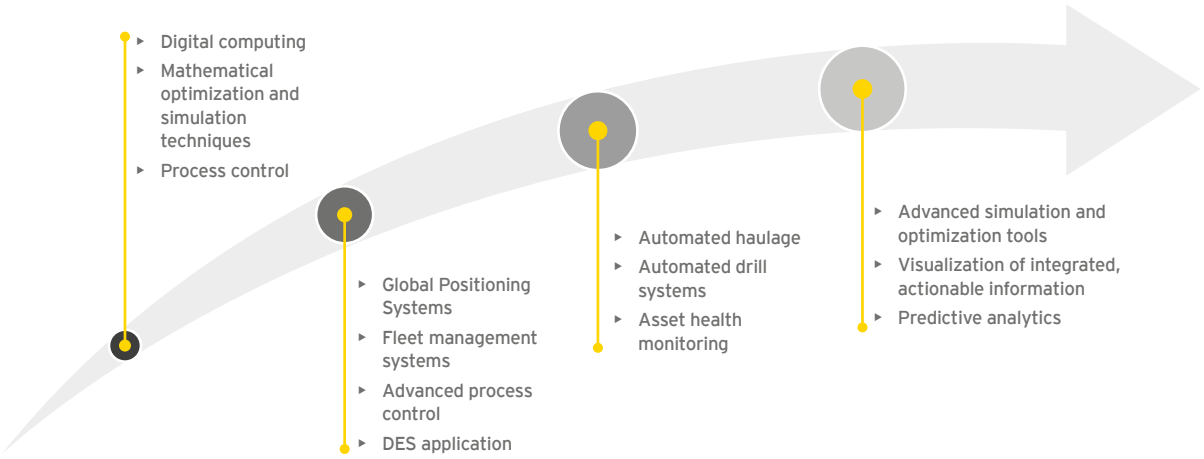
1 "IT Glossary," Gartner, www.gartner.com/it-glossary

02 Digital mining: the evolution

Digital mining is not new; it has been with us for over half a century. Over the last few decades, the mining sector has embraced the introduction of new technologies, such as mainframe and personal computing, processing plant control systems, Despatch, Global Positioning Systems (GPS), mobile broadband, cheap sensors and data storage, through to cloud computing. Significant benefits have already been realized from digital mining, such as:

- Simulation modeling: This has underpinned the decision-making for Australia's multi-billion dollar iron ore and coal expansions since the early 2000s.
- Mine planning and optimization tools: Applying intelligent optimization technology, devised by the COSMO – Stochastic Mine Planning Laboratory of McGill University, has improved production forecasts from 5%–25%.[2]
- Mine monitoring and control systems: Better results have been achieved through remote operations centers that allow companies to monitor activities happening hundreds of miles away via satellite link.[3] BHP Billiton is testing the use of sensors that could increase the grade of copper being sent to its processing plants by up to 10% and offset the need for costly plant expansions.[4] Goldcorp has deployed CISCO's "Connected Mine" solution at its Éléonore mine to track people and equipment at all times to improve the efficiency of its operations.[5]

Waves of digital transformation since 1950



Source: EY and Graham Walker, Consultant, Productivity and Value Chain, Bad Wolf Advisory

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2 "Canadian research contributes step change to world mining," *Canadian Newswire*, www.newswire.ca/news-releases/canadian-research-contributes-step-change-to-world-mining-595874881.html, 4 October 2016, accessed 15 March 2017.
3 "Technology: Mines turn to robots, drones – new technology is helping companies reach remote areas, get ore to market faster," *The Wall Street Journal*, 1 August 2016, via Factiva, © 2016 Dow Jones & Company.
4 Ibid.
5 "Cisco's connectivity solutions paving the way for the next generation of mine," *Goldcorp blog*, www.goldcorp.com/English/blog/Blog-Details/2017/Ciscos-Connectivity-Solutions-Paving-the-Way-for-the-Next-Generation-of-Mine/default.aspx, 20 February 2017, accessed 15 March 2017.

In the digital world, the desired end state for mining and metals companies has been generally accepted. This future is characterized as one where decision-makers (either human or automated) rapidly optimize decisions to maximize some objectives (e.g., cash flow, NPV) through the efficient use of resources (e.g., ore body, assets, labor), subject to some constraints (e.g., market, regulatory, ethical). This decision-making process strives to make the most **effective** decisions through the most **efficient** use of the available resources.

Various aspects of this vision are already playing out in differing degrees of aspiration and scale. These developments are maturing in parallel with an increase in commentary highlighting the opportunities offered by analytics, big data, Internet of Things and machine learning — terms that are used liberally and often with little definition.

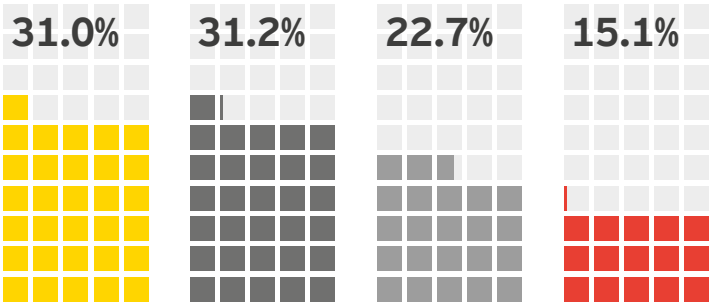
Against this backdrop, the mining and metals companies are looking for a sober assessment of genuine potential from digital transformation along with the implementation pathways, which take advantage of the opportunities while avoiding common pitfalls.

03 When and where do we start on digital transformation?

In our recent webcast, we asked participants how high up digital was on their business agenda. Twenty-three percent of respondents said it was something they were currently considering, whereas 15% said it was not yet on their agenda.

How high on the agenda is digital in your organization?

Percentage of respondents



Source: EY "Preparing for tomorrow's digital mine today" webcast poll, with more than 700 participants, February 2017

Organizations seem to recognize that digital is the way forward but are grappling with:

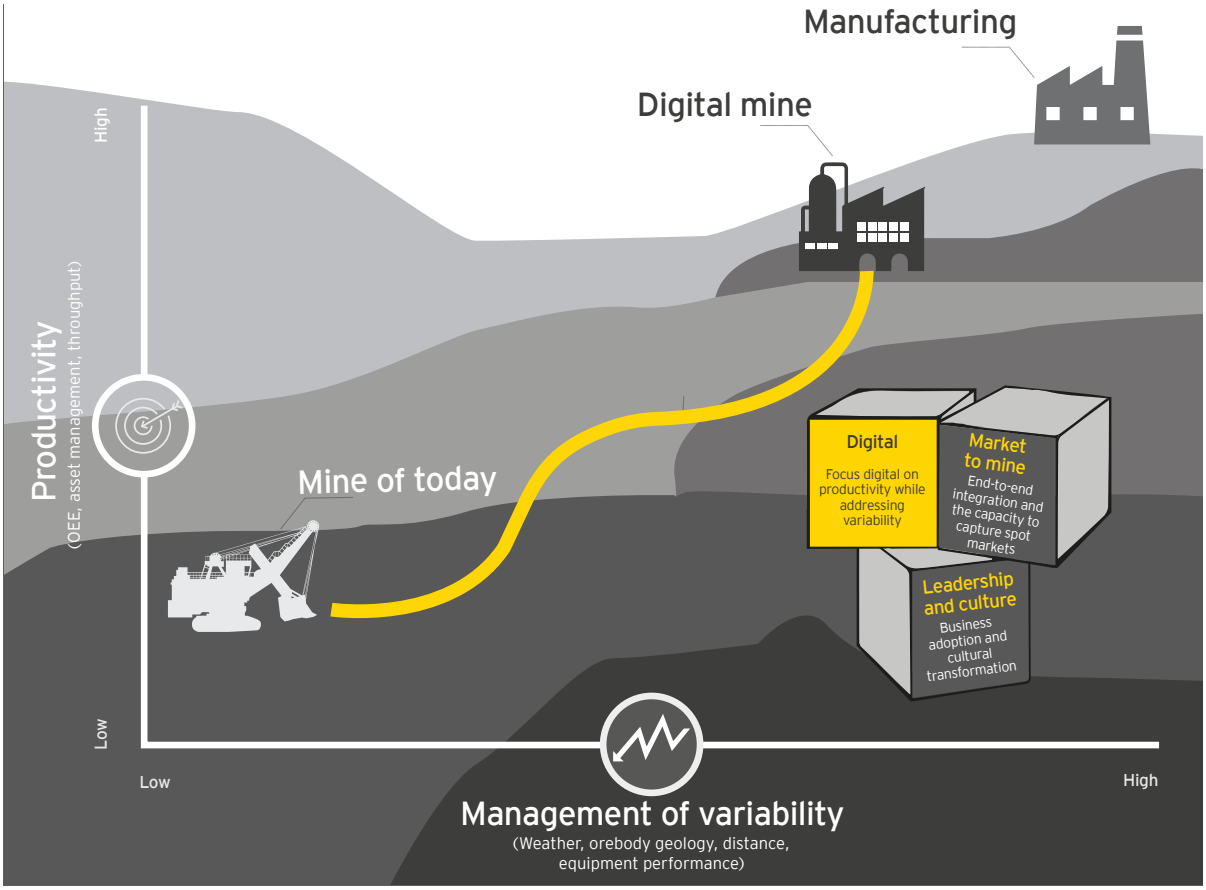
- The large amount of information available
- The costs involved
- The change processes required

Many in the industry still believe mining is simple enough not to warrant the investment.

Viewed through the correct lens, digital becomes part of an end-to-end process change the sector needs to achieve the next level of productivity.

It is not a question of when to go digital; it is about how to start thinking of a fully integrated business culture shift.

04 The pathway for digital mining enterprises



Productivity remains the number one operational risk in the sector. Despite recent improvements in cost reduction and labor productivity, asset productivity continues to lag, and this is the next area miners need to focus on. To address the productivity gap, miners need to focus on improving the management of variability in their organization. The manufacturing industry is the best example of a sector recognized as a leader in asset productivity as measured by overall equipment efficiency (OEE). By adopting a manufacturing mindset, miners can better manage variability and hence improve productivity.

We believe there are three key elements to this:

1. Digital alignment to the productivity agenda (digital as the enabler)
2. A market-to-mine approach to the business (end-to-end)
3. Leadership and culture to support elimination of loss (zero-loss focus culture)

Digital can enable new ways to drive productivity, manage the variability challenges of the sector and pursue commercial excellence. Some examples of what mining and metals companies can achieve with the right focus on digital include:

1. **Optimizing plans and productivity rates across any operation and managing variability under any conditions:** Digital will enable this through combining detailed ore body data with equipment operational and maintenance data, in a real-time environment, to produce alternative operating plans and the ability to refine these plans for variability.
2. **Enhancing asset availability and reliability:** A move to digitally enabled predictive maintenance would allow for the extension of maintenance windows, reduced component and labor costs, and the minimization of costly breakdown events. Further, once the effective maintenance practices are standardized, the introduction of robotic process automation (RPA) and schedule optimization tools is possible.
3. **Understanding true end-to-end capability and systems bottlenecks, and supporting loss elimination:** This is fundamental to the manufacturing mindset.
4. **Increasing agility and responsiveness to changes in market factors, such as freight rates and customers' buying behavior trends:** This would optimize shipping and scheduling to reduce demurrage, maximize port utilization and also enable miners to capture spot markets and price premiums via sales contracted at different points of the value chain (e.g., on the water sales).

05 The digital disconnect

Digital mining has been with us for over half a century, and the mining sector has embraced the introduction of new technologies, such as plant control systems, GPS technologies, mobile broadband and automated haulage. Notwithstanding the long journey that digital mining has already taken, the rate of recent development seems incongruous with the perceived opportunity.

So the big question is – if the benefits truly are so large and game-changing, why are the many established technological implementations not delivering on their full potential? Some of the common pitfalls driving this disconnect are:

- **Lack of detail on the implementation pathway:** There is consensus between stakeholders on the digital vision but little discussion on how to practically and effectively move from current state to this vision.
- **Perception of high costs:** There is a valid perception from decision-makers that projects linked with IT systems often over-promise and under-deliver, often with a significant budget overrun. This perception delays decisions to commence a digital initiative.
- **Unclear accountability and disconnect with the current operating model:** Owners of digital transformation are often unclear, and silo organizational structures are mismatched with a fundamentally different way of operating.
- **Ill-defined business model and business case:** There is a degree of skepticism from leadership as to the robustness of the business case for digital and a lack of clarity on what the new business model will look like.
- **Lack of digital education and understanding:** This can result in behaviors such as:
  - An aversion to change or the implementation of something not fully understood
  - A naïve rush to implement something on promise often through a misguided desire to appear progressive
- **Remote decision-making creates dissonance with local leadership:**
  - Cultural difficulties of new remote operating models are not fully recognized.
  - Operating site leadership is reluctant to concede critical process ownership to external teams, and the external teams often fail to deliver positive outcomes due to a lack of deep understanding of the site issues.
  - Resourcing requirements to support a global business from a single location are under-estimated, as are the difficulties in gaining access to accurate data.
- **Data systems lack maturity to support the future vision:** Perhaps one of the biggest disconnects with the vision of the digital future is the quality of the data available for decision-making. While in some areas there are massive amounts of new data, there are other parts of the value chain with gaps in data quality and issues in gaining access to required information.
- **Systems and processes are already in place but are not being optimized:** Business cases often do not recognize that there may be a significant digital footprint already in place. Leaders must understand why this footprint is not fully utilized before implementing new approaches.

Having a clear understanding of the key elements of past successes and failures is critical to developing a truly transformational digital approach to the productivity challenge.

06 The way forward

The same rigor that underpins other major change or expenditure initiatives needs to strengthen digital transformation, too. Before embarking on the digital journey, a sober assessment of the way forward is required:

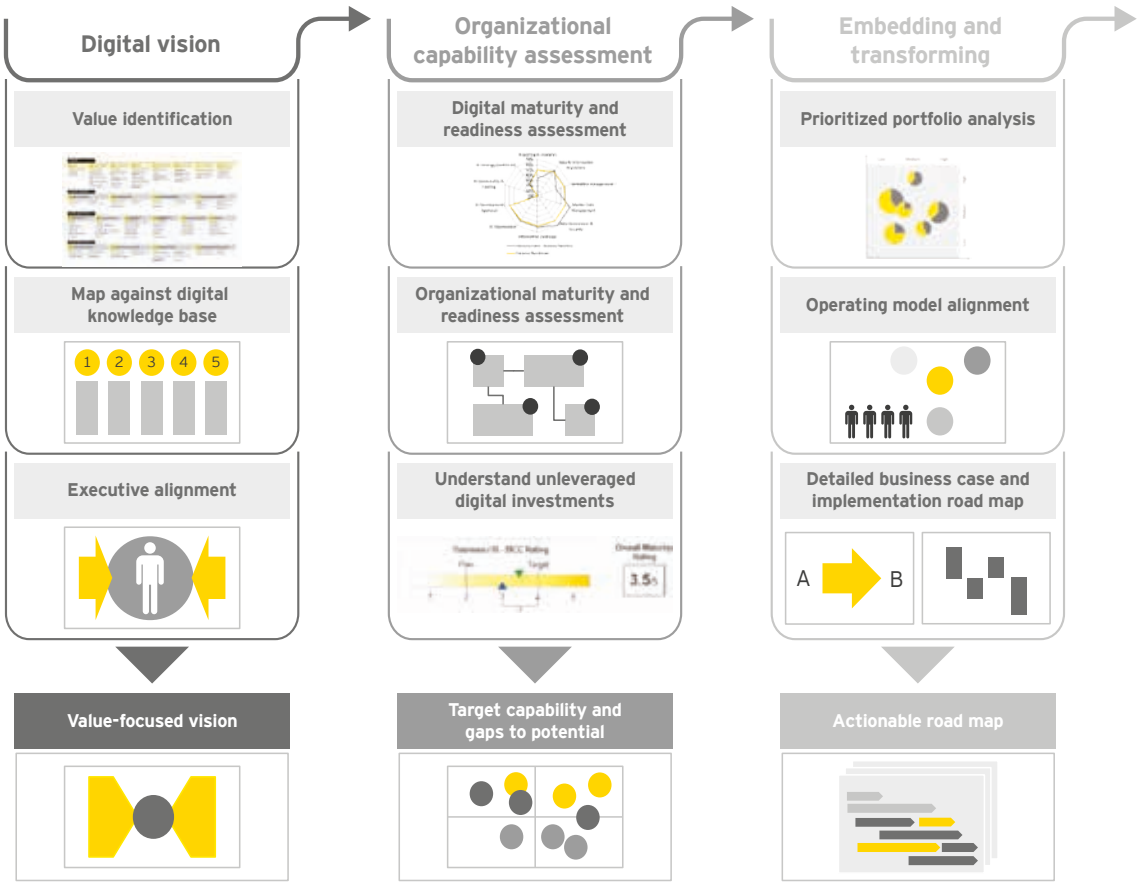
- Do we have an alignment between the digital vision and the business strategy?
- How long will it take, and what is a reasonable estimate of cost?
- Do we have a clear business case to support the change?
- What capability do we need, and how does this compare with our current resourcing?
- What are the packages of work, at an appropriate level of detail, required to move from our current state?
- What is the level of cultural support, and have we addressed critical elements of the change?
- Do we understand how the new digital operating model will look? Have we tested this with those who understand the operations in depth?

Given the digital disconnect, the right approach to transformation is crucial. The industry does not need another cheerleader but requires a navigator in what is a difficult but highly prospective journey.

How can EY help?

Recognizing that the industry needs a steady and sober judgement of what is in place and what is the next wave of opportunities, EY member firms have developed the Digital Navigator. This unique approach and toolkit enables EY to assess a company's digital maturity and help create an actionable digital road map for our clients based on linking current capability and existing investments with business ambition and strategy.

The Digital Navigator takes an end-to-end approach, starting with vision and strategy and finishing by embedding digital across your business



This road map provides a platform to drive the execution of a digital transformation focused on productivity. The Digital Navigator takes an end-to-end approach, starting with vision and strategy and answering the key question of "What next?"

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How EY's Global Mining & Metals Network can help your business

With a volatile outlook for the sector, the global mining and metals industry is focused on how to maintain a strong and flexible balance sheet while preparing for future growth. The sector is also faced with the increased challenges of improving productivity, access to capital, dealing with increased transparency, maintaining license to operate and cybersecurity.

EY's Global Mining & Metals Network is where people and ideas come together to help mining and metals companies meet the issues of today and anticipate those of tomorrow by developing solutions to meet these challenges. It brings together a worldwide team of professionals to help you succeed – a team with deep technical experience in providing assurance, tax, transactions and advisory services to the mining and metals sector. Ultimately it enables us to help you meet your goals and compete more effectively.

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