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Digital
Transformation

Is digital transformation the answer
to increased industry pressures?

March 2022

The trouble with reality

There's no escaping the fact that the mining and processing industry needs to keep up to date with the latest trends in technology. The Industrial Internet of Things, artificial intelligence, Industry 4.0, big data and virtual reality are hot topics at industry conferences, in the media, and on Internet blogs, but there needs to be a reality check.

As McCoy and Auret ask in their paper 'Machine Learning Applications in Minerals Processing: A Review', 'should the current hype about machine learning be of interest to the minerals processing industry, or is this just another period of unrealistic optimism?'[1]

The reality is that the Digital Transformation challenge keeps many CEOs up at night – and for good reason. Many of these projects fail to deliver results. CEO concerns over the risks associated with Digital Transformation investments surged from previously being in 10th place back in 2018, to now be a number one concern.[2]

Front-line staff are not immune to the concerns relating to Digital Transformation. Workforces are often faced with receiving insufficiently scoped and planned deployments or being tasked to roll out programs that have been insufficiently aligned to requirements or lack the sponsorship, ownership, and change leadership necessary for success.

Billions of dollars miss the mark

It's not hard to see why the sector has a growing scepticism for Digital Transformation. The manufacturing sector has already experienced some well-known disappointments[3] from Digital Transformation projects that failed to achieve an adequate return on investment (ROI). In fact, research from McKinsey suggests 70% of transformation initiatives fall short – despite the huge sums dedicated to them.

GE spent billions on a whole of company IoT platform only to discover the company was simply too large to transform all at once, especially without a true vision of what it was trying to achieve.[2]

Enterprises are now expected to invest in excess of US$1.3 trillion for Digital Transformation initiatives to improve efficiencies, increase customer value, and create new monetisation opportunities. Tragically, research tells us that 70%[4] of these initiatives will not reach their stated goals. That equates to over US$900 billion worth of spend that will miss the mark. 'This is mismanagement on a colossal scale', writes Steven Zobell, Chief Product and Technology Officer for Workfront in 'Why Digital Transformations Fail: Closing the $900 Billion Hole in Enterprise Strategy'.[5]

Yet, the extraction industry faces similar challenges and headwinds that any industry faces.[6] You need to continuously improve operational performance (output, quality, system efficiency, safety, etc.) while simultaneously creating shared value to satisfy the community, shareholders and regulators. Being afraid of failure isn't going to cut it at your next performance review. So, what can you do?

You can stop thinking Digital Transformation is just about technology and breaking down how successful transformations were achieved – usually, a combination of systems thinking, incremental improvement, operational imperatives, and human factors.[7]

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Why digital is inevitable

In the face of challenges from senior management, unpredictable commodity prices, activist-investors, tightening regulatory environments,[8] and sometimes the press, the industry must deal with declining and variable ore quality, deeper deposits, experience shortages, and increasing stakeholder expectations, to deliver a better set of performance metrics.

'Australian mining companies must not only adapt to the disruption of industry from a technical viewpoint, but the disruption being brought about by changing community standards and attitudes towards mining,'[9] says Ian Sanders, mining lead at Deloitte Australia, of the rapidly changing market.

In its 'Tracking the Trends: The Top 10 Issues Transforming the Future of Mining', Deloitte points out that the need to remain competitive requires operators to 'push the boundaries on their Digital Transformation, attract truly diverse workforces, and avoid the capital project mistakes of the past. It also requires them to make technology a strategic priority by acknowledging its role as an enabler across every facet of their business'.[10]

It's a challenging environment, but throwing money and computers at the problem isn't going to guarantee success. There's no denying that there's a digital revolution underway in the extraction industry or that Digital Transformation promises a way forward. It is unavoidable if your operation plans to remain competitive, but there are traps and it is easy to fall into them.

'Understanding where your operation is positioned in its digital maturity journey is the best place to start,' says Dominic Stoll, Solutions Manager at Mipac. There is no point in applying advanced predictive analytics to data sets that are incomplete or questionable. By understanding your operations' Digital Transformation goals, timeframe and budget, it is possible to develop an actionable roadmap that transitions your operation through the digital maturity journey toward predictive analytics. Often the first place to start is at the enabling infrastructure level: are you able to accurately measure, monitor, and adjust the critical few parameters that are key to your operation? In other words, do you have the right instruments, historians, and control systems in place?

Regressive	Reactive	Planned	Proactive	Predictive
Insufficient hardware	Limited automation	Automated, measured and monitored	Alerts & notifications	Automated decision management
• Limited/no standardisation • Limited/no instrumentation • Limited/no connectivity • Manual operation of equipment	• Control system operational • No process historian • Manual operation of equipment • Manual condition monitoring	• Operational data informs daily plan/priorities • Online condition monitoring • Planned maintenance/operations	• System bottlenecks known and prioritised • Performance measured in $ & in real time • Online automated and actionable decision prompts	• Upstream operations adjusted to push system bottleneck downstream • System performance automatically adjusted in real time

ENABLING INFRASTRUCTURE

MONITORING SYSTEMS

INTERVENTION SYSTEMS

The ROI can
be substantial

According to a report commissioned by METS Ignited and National Energy Resources Australia (NERA), embracing new technologies in the resources industries could add $74 billion to the Australian economy by 2030.[11] Federal Minister for Industry, Science and Technology Karen Andrews said the use of analytics and robotics provided significant safety and environmental benefits, while rapidly increasing job opportunities.

While there have been some notable failures, these are more often than not caused by a top-down approach, the methodology employed, or the human and cultural features of the organisation, rather than the failure of new digital technologies; like automated decision enablement, machine learning, or process automation. Typically, the problem starts with the idea that it's a transformation rather than an evolution.

Minerals processing is a capital-intensive industry that relies on metallurgical processes that can take decades to evolve into effective, efficient and viable solutions. Many processes remain fundamentally unchanged for generations. When evolving these processes to take advantage of new, digital technologies, it is easy to think too big, too soon.

The job of a solutions salesman is often to sell the Board and the CEO on a vision that a comprehensive re-engineering will deliver a satisfactory return on the investment. However, large scale re-engineering projects can lead to elaborate new solutions that do not represent a positive cost/benefit trade-off while ignoring problems that exist at a more fundamental, operational level. This can translate to wasted money and little incremental improvement on the plant floor. For example, getting the right information to the right worker in the right context is still a problem for 75% of organisations![12]

In unsuccessful projects, the most common pitfalls include a lack of employee engagement, inadequate management support, poor or non-existent cross-functional collaboration, and a lack of accountability, rather than the technology. The latter is comparatively easy in contrast to the challenge of knowing what needs to be done. Furthermore, sustaining a transformation's impact typically requires a major reset in mindsets and behaviours – something that few leaders know how to achieve.[13]

Five insights to avoid failure

1 Is the problem insufficient advanced analytics capability or insufficient enabling infrastructure to measure and monitor key performance metrics?

2 How do you combine offline and online advanced analytics to gain hindsight, insight and foresight of key performance metrics?

3 Is your partner technology agnostic with a history of co-operation and capable of collaborating with other vendors to deliver a holistic solution that unlocks value for redeployment?

4 How do you ensure your workforce is engaged when a digital solution is rolled out by allocating appropriate project sponsorship, ownership and change leadership?

5 Does your plan focus on unlocking the system bottleneck then redeploy that value to consistently shift the bottleneck down stream via small successive improvements?

This isn't Silicon Valley

Australia has one of the most competitive mining, oil and gas industries in the world, which will continue to boost its economy as it transforms,[14] says Karen Andrews, Minister for Industry, Science and Technology. It didn't get to be that way by taking unreasonable risks, and there's no reason why leveraging new digital technologies should be considered unreasonable.

If done properly, significant operational improvements can and will drive profitability. Successful change is approached from an operational perspective and not a top-down corporate world view that ignores expertise and practicalities on the shop floor.

The Harvard Business Review recommends one of the key approaches that can help ensure a successful project is to recognise that 'Digital Transformation is not about technology'.[15] Let's face it, a lot of the hype around Digital Transformation is based on white-collar workers or developers building iPhone apps in Silicon Valley.

As Joe Pease, Principal Consultant at Mineralis, said in a MetPlant keynote, 'fail fast' doesn't cut it in this industry. 'The poster child of Silicon Valley, Lean Start-up thinking, just doesn't apply in the mining industry,' he said. 'Even the Digital Transformation arguments that you will see in the information industry are hard to apply in the complex, variable industry of minerals processing where even the raw materials are constantly variable and the processes are extreme.'

> " We all know the challenge was never "should we" innovate, but "how" should we innovate. Innovation in this industry doesn't look the same as in other industries and "fail fast" is not an option. "
>
> Joe Pease - Principal Consultant at Mineralis

Human factors at the heart of success

In his analysis 'Turning Mining Performance Around: Moving From Efficiency to Effectiveness', Stratflow Australia's Hendrik Lourens reminds us that a production system includes three critical, interacting elements: technology, process and people. 'Most productivity improvement efforts have focused on these elements in isolation, and in particular on better technology (automation, big data) or improving on process models. Strengthening and adjusting the linkages from these elements to the people link, and the people element itself have not received much attention,' he says.[16]

There is little doubt that human factors are a core success indicator that require separate consideration. On-site experience shortages frequently place stress on operators and maintainers that can be relieved through automation and real-time decision enablement. Technology solutions must be designed, deployed and evolved to promote acceptance and avoid resentment due to front-line workers feeling the pressure of becoming a human-machine. Engagement and consultation to ensure technology is enabling and empowering rather than hindering or replacing human capability is key to success. 'Magic happens in the blends of discipline,' says Peter van den Heuvel, Manager of Shell's PI CoE, explaining how Shell has put technology into the hands of managers, engineers and operators.[17] Cutting-edge technology and talent are not enough. Companies must break down organisational and cultural barriers that stand in the way, recommends the Harvard Business Review.

Approaches to data and automated decision management that emphasise and support human decision-making, rather than detracting from it, will find better acceptance and yield more reliable results.[18]

Change needs to leverage the skills that are present and allow Digital Transformation to be undertaken in a way that is sensitive to the needs of workers. This means to leverage the skills of those familiar with the plant and processes and who can provide valuable anecdotal support for inferences drawn from advanced analytics.

Simple and proven digital solutions can be quickly deployed to enable real-time monitoring and analysis, but then human expertise can augment this to identify and decide on the biggest constraints impeding efficient operations.

By investing the time and resources to resolving the worst-performing parts of the operation, and always targeting the bottleneck first, digital solutions can deliver fast returns on investment to support the ongoing transformation.

As knowledge and understanding of the system increase, more sophisticated analytics and automated decision management techniques can be applied to better enable front-line workers. In doing so, operations can transition through a digital maturity journey and shift to a predictive environment leveraging what machines are good at (event detection, database queries, etc.) and empower front-line workers with what they are good at (complex reasoning, intuition, field inspections, etc.).
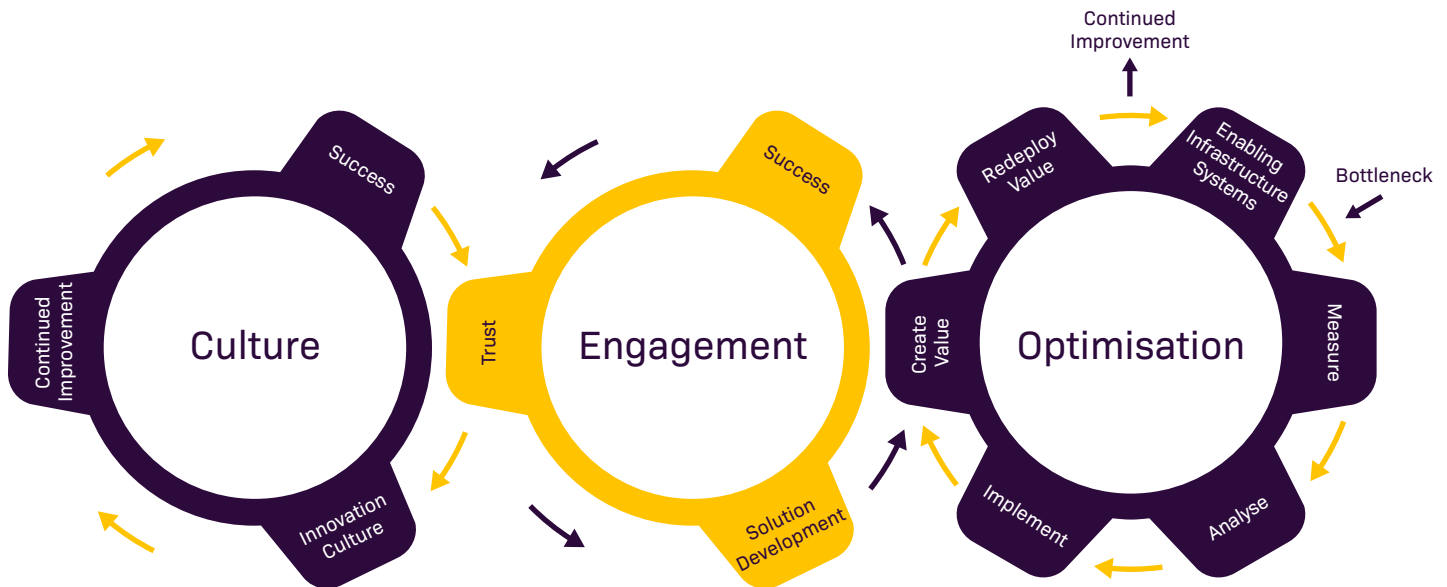
Key to a proven methodology for change

Mining and minerals processing industries have the potential for significant operational and production benefits when digital solutions are applied with a strategic, iterative approach, aligned with change leadership principles and tailored to workforce skills and behaviours. Embracing digital change as an evolution, rather than complete transformation, has the ability to solve a range of operations-wide challenges efficiently and effectively.

Identifying where you can unlock value before you begin is crucial. As Paul Mitchell, EY Global Mining & Metals Leader writes, 'We take the view that digital initiatives should only be commenced where there is a demonstrable link to productivity and cost benefits. Sometimes this will require a long-term view; but organisations should avoid doing digital without this link to exploiting clear business opportunities'.[19]

The key to Digital Transformation is first assessing a plant's digital health (e.g. enabling infrastructure and technology, processes and people), and developing a roadmap with clear actions that unlock value and engage the workforce.

Embarking on Digital Transformation

- Ensure sufficient and appropriate, enabling infrastructure.
- Start at the bottleneck.
- Reinvest unlocked value to incrementally and progressively push bottleneck downstream.
- Select a partner that can bring other complementary partners to the table.
- Engage workforce with dedicated change leadership.

Digital solutions offer new approaches to a range of challenges, including:

Operational stability

Increased productivity

Asset availability, utilisation & lifecycle

Safety & security

Improved regulatory compliance / reporting

Reduced energy use

Lower operating costs

Mipac: Beyond the solution

With more than

300

projects delivered worldwide, over more than 25 years.

Mipac has a long history in the mining and processing industry. Our experience has guided the development of our end-to-end solutions portfolio spanning the design, supply and commissioning of enabling infrastructure, development of visualisation and communication systems through to deployment of intervention systems and optimisation solutions.

Our Digital Solutions are grounded in first principles. We ensure there are sufficient and appropriate enabling fundamentals in place before recommending more advanced and sophisticated solutions. Our unique approach to always commencing at the bottleneck ensures solutions are deployed from the operations up, as opposed to corporate down. In this way, exposure to failures from digital solutions are reduced by a low-risk approach that incrementally and progressively unlocks value that can be reinvested to successively push the bottleneck downstream.

The focus is on practical, continuous operational improvements that demonstrate a clear and sustainable ROI across the entire system and not just at a unit operation following TOC (Theory Of Constraints) principles.

Our deep technical knowledge and whole-of-plant experience allow us to collaborate and solve key operational problems in process control and performance through intelligent solutions that deliver results in the short and medium term.
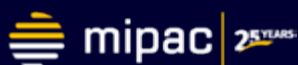
Our Digital Solutions team can assess your digital health and develop an actionable roadmap to unlock performance, no matter the stage of your digital journey. We ensure our advanced analytics are grounded on and supported by engineering and science fundamentals, ensuring the appropriateness of recommendations.

With more than 300 projects delivered worldwide, over more than 25 years, we deliver high-quality, intelligent solutions that drives performance for every operation.

We specialise in Automation, Control and Digital Solutions, providing end-to-end, customised solutions for greenfield and brownfield projects around the world to enhance productivity, safety and performance.

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[1] https://www.sciencedirect.com/science/article/abs/pii/S0892687518305430?via%3Dihub | [2] https://hbr.org/2019/03/digital-transformation-is-not-about-technology [3] https://www.forbes.com/sites/blakemorgan/2019/09/30/companies-that-failed-at-digital-transformation-and-what-we-can-learn-from-them/ | [4] https://www.mckinsey.com/industries/retail/our-insights/the-how-of-transformation | [5] https://www.forbes.com/sites/forbestechcouncil/2018/03/13/why-digital-transformations-fail-closing-the-900-billion-hole-in-enterprise-strategy/ | [6] https://www.australianmining.com.au/news/trends-challenges-technology-mineral-processing/ | [7] https://www.osisoft.com/whitepapers/shell-s-enterprise-journey-to-digital-transformation.pdf | [8] https://www.pwc.com/gx/en/energy-utilities-mining/assets/pwc-mining-transformation-final.pdf [9] https://www.miningnews.net/leadership/news/1355234/disruption-and-volatility-the-new-normal | [10] https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Energy-and-Resources/gx-er-tracking-the-trends-2019.pdf | [11] https://safetowork.com.au/tech-transition-to-disrupt-jobs-boost-safety-performance/ | [12] https://www.cmswire.com/information-management/failure-to-launch-5-causes-of-digital-transformation-failure/ | [13] https://www.mckinsey.com/industries/retail/our-insights/the-how-of-transformation [14] https://im-mining.com/tag/mets-ignited/ | [15] https://hbr.org/2019/03/digital-transformation-is-not-about-technology | [16] https://www.australianmining.com.au/features/turning-mining-performance-around-moving-efficiency-effectiveness/ | [17] https://www.osisoft.com/whitepapers/shell-s-enterprise-journey-to-digital-transformation.pdf [18] https://hbr.org/2019/07/building-the-ai-powered-organization | [19] https://www.ey.com/en_gl/mining-metals/wave-approach-transform-digital-effectiveness