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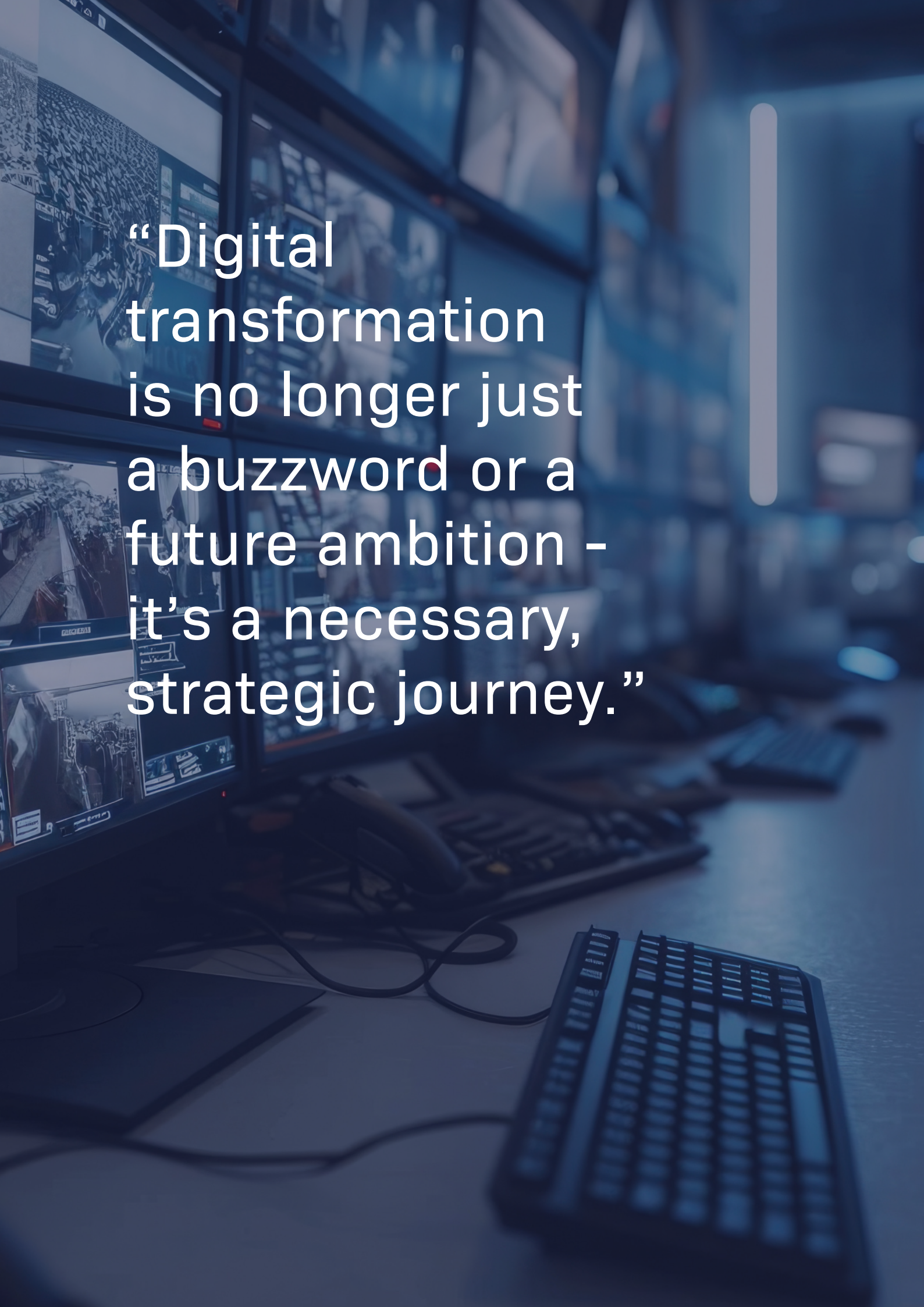
3RD EDITION

mipac

# Unlocking Value

## A guide for effectively delivering **digital transformation** in your mining operation


WHITEPAPER | MINING | DIGITAL TRANSFORMATION


“Digital transformation is no longer just a buzzword or a future ambition - it’s a necessary, strategic journey.”

## Message from the Managing Director

At Mipac, we know that digital transformation is no longer just a buzzword or a future ambition - it's a necessary, strategic journey for mining operations aiming to stay competitive, efficient and sustainable in an increasingly complex world.

Yet we also understand that transformation doesn't happen overnight. It's a path that requires clarity, commitment and the right expertise to navigate both the opportunities and the challenges. That's why we've created this guide: to help mining leaders and operations teams cut through the noise and focus on the practical steps, technologies and mindsets that will drive real, measurable change.

Drawing on Mipac's deep experience across the mining value chain, this paper shares insights into how digital tools, data and integrated systems can unlock value - not just in isolated projects, but across the broader operation. We hope it provides useful guidance and sparks new ideas, whether you're just starting your digital journey or looking to take your transformation to the next level.

We're proud to be part of an industry that's constantly evolving, and we're here to help our clients shape that future with confidence.

Eddie de Rivera
Managing Director

# Contents

# Where the journey starts

There's no escaping the fact that the mining and mineral processing industry needs to keep up to date with the latest trends in technology.

The Industrial Internet of Things, artificial intelligence (AI), Industry 4.0, big data, digital twins, virtual reality and the role of technology in achieving Net Zero are hot topics at industry conferences, in the media, in academic research and online - and have been increasingly so since the COVID-19 pandemic.

Indeed, digitalisation has emerged as a fundamental strategy to future-proof the sector and keep investors happy. Technologies that enhance operational efficiency, improve safety standards and increase productivity are becoming widespread, with maximum growth anticipated by 2026.

But amidst the excitement of new opportunity, there needs to be a reality check: How ready is the mining industry – really – for digital transformation?

How ready is your operation?

This guide will help you to assess your operation's level of digital maturity – and give you some actionable steps to take to progress on your digital transformation journey.

# The current reality

## Industry pressures driving change

In the face of critical minerals supply questions, geopolitical uncertainties and tightening ESG regulations, not to mention challenges from senior management, unpredictable commodity prices, activist-investors, tightening regulatory environments and sometimes the press, pressures abound for the mining and mineral processing industries to continue to embrace digital transformation.

On top of this, 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,” says Ian Sanders, Mining Lead at Deloitte Australia, of the rapidly changing market.

In its ‘Tracking the Trends’ report for 2025, Deloitte pointed out that for companies who wish to lead the market in this complex, rapidly evolving landscape, a focus on low-cost, efficient and smart operations will be essential.

## Opportunities abound – but there's hesitation

"Organisations are leaning in, yet opportunities remain." This was a key finding from Deloitte's 2024 Digital maturity assessment for mining companies. Mining company representatives are well aware of the opportunities presented by digitalisation – but where their companies sit on the digital maturity spectrum varies considerably.

Indeed, despite widespread recognition of its potential, the digital transformation journey in mining has been slower than in other sectors.

It's a challenge that still keeps many CEOs up at night, not least because concerns over the risks associated with digital transformation investments have surged. Topics like cybersecurity threats, the need for upfront investments, skills gaps, connectivity issues in remote areas and the organisational change management required are just some of the hurdles faced by mining industry leaders.

Front-line staff are not immune to the concerns relating to digital transformation either. 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.

Later sections of this guide will look at the issues around stakeholder engagement more closely.

## Sector-specific challenges accelerate the need for action

Whilst the mining and mineral processing industries face similar challenges to other industries (e.g. the need to continuously improve operational performance while simultaneously creating shared value for stakeholders),

the extreme variability and unpredictability of ore bodies; remote and harsh operating environments and reliance on legacy systems and equipment – among others – create additional headwinds when it comes to digital transformation.

But with increasing pressure to meet ESG requirements and Net Zero targets as well as the general COVID-induced move toward rapid technology adoption, embracing digital transformation – to some level – is no longer optional. But fear of failure needn't stop you from jumping in, nor should it prevent investment in digital technologies.

## 5 ways digital solutions can help mining companies meet environmental and social governance (ESG) targets:

1. **Energy and water minimisation:** automation and control can optimise efficiencies and reduce waste
2. **Media, reagent and chemical minimisation:** feed-forward control optimises the use of consumables
3. **Improved mineral recovery & resource efficiency:** sequence starts/stops and stable control minimise material loss and maximise productive time, which drives down unit costs
4. **Predictive maintenance & asset reliability:** sensors and analytics cut downtime and extend the life of equipment, meaning less manufacture and freight emissions for parts and equipment
5. **Data integration:** real-time monitoring, analytics and reporting can detect inefficiencies and identify opportunities for carbon reduction

## The business case for digital

Thankfully, it's not hard to argue the case for digital transformation in the mining and mineral processing industries.

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.

Digitalisation can lead to cost savings and operational efficiencies, reduced energy consumption, enhanced investor appeal and improved safety thanks to real-time data collection.

In the mining sector specifically, digital transformation can boost throughput, simplify processes, lower costs, improve metal recovery and reduce supply chain complexity. It can also help companies achieve ESG goals by providing accurate data insights and empirical evidence and facilitating sustainable design.

In 2019, Former Australian Federal Minister for Industry, Science and Technology Karen Andrews said the use of analytics and robotics would provide significant safety and environmental benefits, while rapidly increasing job opportunities.

To date, the mining and mineral processing industries have made notable progress in adopting digital technologies, and digital transformation is widely recognised as being a strategic move yielding tangible benefits. However, continuous investment will be crucial for companies that want to thrive in a rapidly changing environment.

So, where do you start?

## In focus: How digital tools can help you boost efficiency and productivity

Software solutions can provide real-time visibility and control over plant processes, enabling timely detection and management of production deviations.

Key features to look out for include:

1. Real-time visualisation: Dashboards offer complete real-time visibility into every area of the plant, allowing immediate identification of deviations.
2. Early detection and response: Process drivers help detect specific issues early, and digital tools can recommend accurate responses, empowering frontline teams to address problems promptly.
3. Integrated reporting: Production reporting integrates data from multiple sources, simplifying the tracking and reporting of production KPIs.

## Look at the whole picture – and start from the beginning

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

As Deloitte found in their 2024 Digital Maturity Assessment for Mining Companies, companies tend to see digital transformation as a goal, rather than a continuous process. Commonly, companies lack well-defined digital transformation strategies as well as robust governance frameworks to track and measure the value gained from digital initiatives. And even when digital transformation plans exist, they are not well communicated.

Indeed, 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 itself.

So what's the solution?

It's time to stop thinking digital transformation is just about technology.

Instead, it is helpful to break down how successful transformations are achieved. Usually, they involve a combination of systems thinking, incremental improvement, operational imperatives, human factors and operational excellence.

*"Understanding where your operation is positioned in its digital maturity journey is the best place to start." Dominic Stoll - Solutions Manager at Mipac*

Later sections of this guide will break this down in more detail.

## Case study: West Musgrave

Building a digital mine from the ground up

At the remote West Musgrave site in WA, BHP (formerly OZ Minerals) set out to create a fully integrated, low-carbon, digitally enabled nickel-copper operation.

Mipac was brought in early to help turn this ambitious vision into reality — designing the control system architecture, setting design standards and selecting the optimal control system.

From early feasibility through to detailed design, Mipac developed the digital backbone: network architecture, PLC and SCADA specs, alarm strategies and integration standards.

Now, as Main Automation Contractor (MAC), Mipac is delivering the complete process control system — enabling safer, smarter, more efficient operations with fewer people on site and a reduced carbon footprint.

**See the full story**

## Avoid these common challenges and pitfalls

Unfortunately, cynicism still abounds in the sector regarding the return on investment (ROI) from digital transformation.

Indeed, the manufacturing sector has experienced some well-known disappointments from digital transformation projects that failed to achieve an adequate ROI, and research from McKinsey suggests that at least 70% of transformation initiatives fall short – despite the huge sums dedicated to them.

An example of this was industrial giant General Electric, which 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.

Global spending on digital transformation is expected to hit nearly USD 4 trillion by 2027, according to IDC's latest Worldwide Digital Transformation Spending Guide. With artificial intelligence—especially generative AI—driving much of this growth, the market is forecast to grow at an average of 16% per year between 2022 and 2027.

But when 70% - 95% of digital initiatives don't reach their stated goals, that's a lot of money wasted.

"This is mismanagement on a colossal scale," wrote Steven Zobell, Chief Product and Technology Officer for Workfront in 'Why Digital Transformations Fail: Closing the $900 Billion Hole in Enterprise Strategy'

What's going wrong?

In our experience, **failures related to digital transformation are often caused by a top-down approach, the type of methodology employed or the human and cultural features of the organisation, rather than the failure of new digital technologies themselves.**

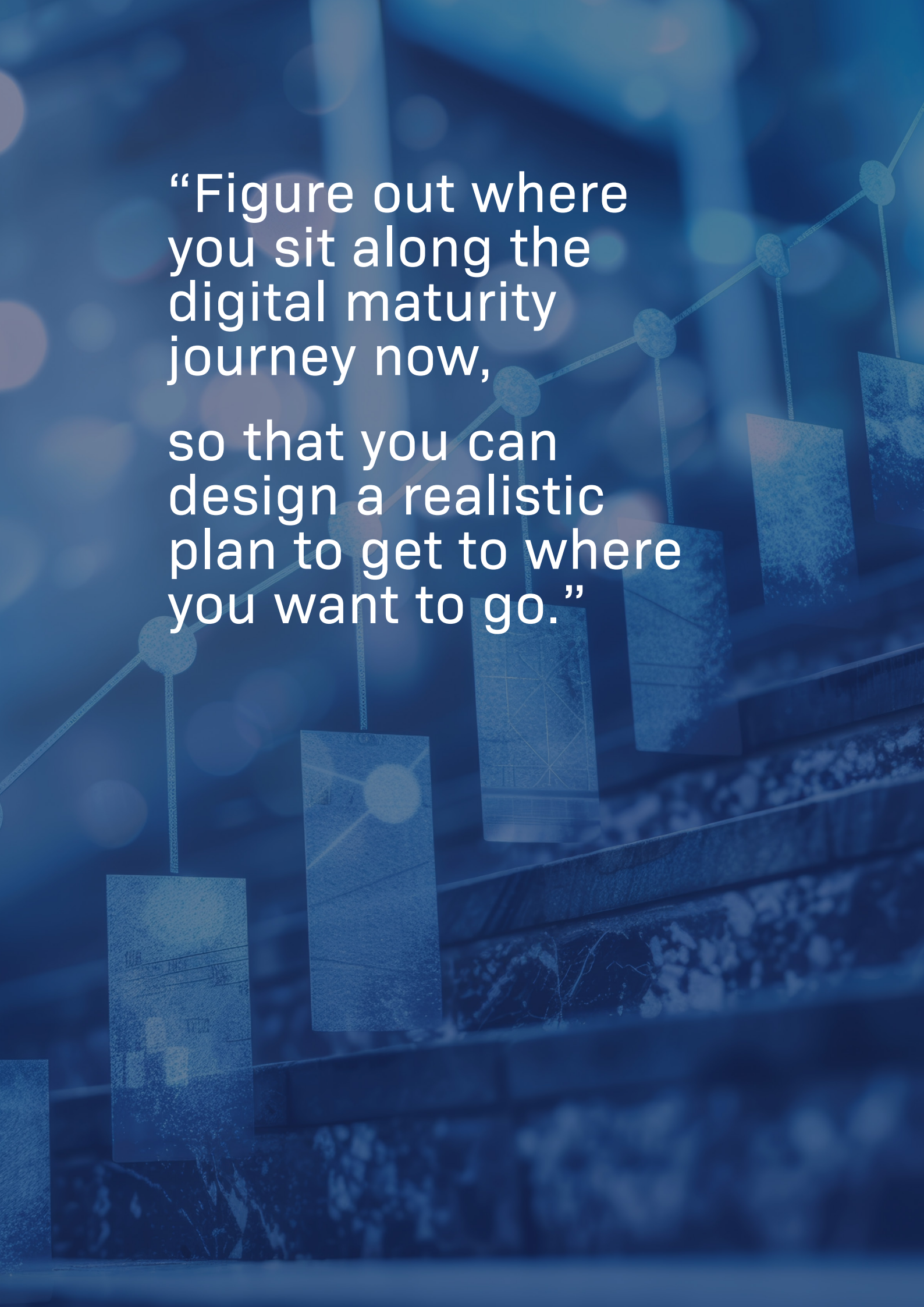
Typically, the problem starts with the idea that digitalisation has to be transformation rather than an evolution and the fact that greater emphasis is placed on technology's impact than technology's adoption.

The rest of this guide will take you through our preferred approach to digital transformation for mining and mineral processing operations. It's sequenced, it's logical, it gives you quick wins and it will help you better understand where to start.

Here are the five steps you'll learn about:

| | |
|---|---|
| **Step 1**<br>Define the case for change | This step is about understanding why improvement is necessary and making sure any improvement aligns with business goals. |
| **Step 2**<br>Identify the bottleneck | This step is about using data and insights to pinpoint where inefficiencies are occurring. |
| **Step 3**<br>Engage stakeholders | This step is about how to bring stakeholders along on your digital transformation journey. Cross-functional collaboration is key, involving everyone from finance to operations. |
| **Step 4**<br>Implement and iterate | This step explains how and why you should start with manageable changes, measure their impact, and build on their successes. |
| **Step 5**<br>Sustain the gains | This step is about defining measures of success early and using digital tools to monitor progress and ensure lasting improvements. |

Let's jump in.


“Figure out where you sit along the digital maturity journey now,
so that you can design a realistic plan to get to where you want to go.”

# Step 1:

# Define the case for change

Digital ‘solutions’ for the industry abound – but there’s no point jumping straight in the deep end.

Instead, it’s important to figure out where you sit along the digital maturity journey now, so that you can design a realistic plan to get to where you want to go.

For example, there is no point in applying advanced predictive analytics to data sets that are incomplete or questionable. Similarly, there is no point in investing in an Advanced Process Control System just because that’s what your competitor has. This is like trying to run before you can crawl!

A common pitfall is when operations want to transition all the way through to the ‘predictive’ stage of the digital maturity journey (see Figure 1) in one leap, without changing or implementing the fundamentals.

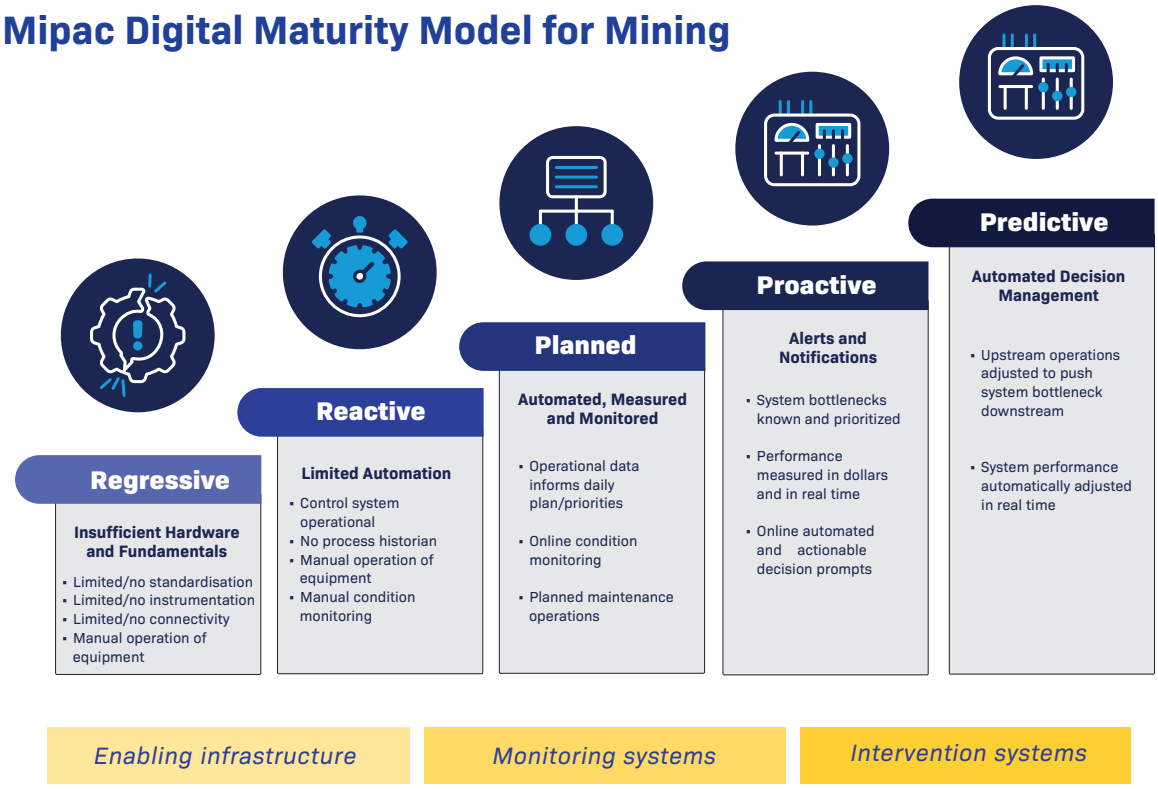
Instead, by understanding your operation’s digital transformation goals, timeframe and budget, you can develop an actionable roadmap that transitions your operation through the digital maturity journey, starting where potential is greatest, typically the bottleneck, and progressing in deliberate, manageable stages, with small slithers of investment (you’ll hear more about this in Step 2).

We've done this with one of our key clients in the South Pacific, resulting in increased gold and copper recovery, enhanced digital maturity and a more stable, automated operation (see *Case study: Charting a path to full automation at Ok Tedi* later in this guide).

The mining and minerals processing industries have the potential for significant operational and production benefits when digital solutions are applied with this kind of strategic, iterative approach, aligned with change leadership principles and tailored to workforce skills and behaviours.

Furthermore, embracing digital change as an evolution, rather than complete transformation, can solve a range of operation-wide challenges efficiently and effectively. Digital roadmaps provide a logical way forward with key milestones and measurable targets. We will cover roadmaps in detail in Step 4.

*Figure 1 A basic digital maturity journey*



# Self-assessment:
# Where does your mine sit on the digital maturity curve?

Tick the statements that apply to your operation to gauge your digital maturity level.

## 1. Enabling infrastructure & data readiness

- ☐ We have a modern (integrated, flexible and data-driven) control system in place.
- ☐ We have a centralised data historian that collects and stores operational data.
- ☐ Our critical plant equipment and process are instrumented to provide real-time data for decision-making.
- ☐ We have reliable connectivity across our operation (e.g., sensors, Wi-Fi, fibre optics, etc).
- ☐ Our operational data is structured, accessible and integrated across different systems.

## 2. Automation & process control

- ☐ Our operators run our plant primarily in automatic or cascade, with limited manual intervention.
- ☐ Our plant start-up and shut-down sequences are automatic with limited manual intervention.
- ☐ We utilise feed forward control to proactively respond to upstream disturbances.
- ☐ We use advanced process control (APC) to optimise throughput and efficiency.
- ☐ Our operation uses AI or machine learning for predictive control and optimisation.

## 3. Operational insights & decision-making

- ☐ Operator experience and historical peak performance are built into our control system.
- ☐ We have real-time dashboards and reports that support decision-making.
- ☐ We use data analytics to identify inefficiencies and optimise performance.
- ☐ Our maintenance strategy is based on predictive analytics rather than reactive or scheduled maintenance.
- ☐ Our system automatically provides actionable insights and recommendations to operators.

## 4. Workforce enablement & change management

- ☐ Our workforce is enabled with digital tools and we have eliminated paper-based processes.
- ☐ Employees are empowered with digital tools that provide guidance and support decision-making.
- ☐ We actively train employees to work with digital systems and leverage data insights.
- ☐ Digital transformation is supported by change leadership and clear communication.
- ☐ We have cross-functional teams working on digital transformation initiatives.

## 5. Business integration & ESG alignment

☐ Our operational technology (OT) and information technology (IT) tools and teams are tightly integrated.
☐ Our supply chain and business systems are digitally connected and integrated.
☐ ESG and sustainability data is tracked and reported digitally.
☐ We use digital technologies to optimise energy consumption and reduce emissions.
☐ We leverage digital tools to improve social and regulatory compliance.

## Assessing your results

To calculate your score, add up the number of ticks you made for each statement. Your total score reflects where your operation currently sits on the digital maturity curve:

0–5: Regressive – Your operation has minimal digitalisation and relies heavily on manual processes.

5–10: Reactive – Some digital tools are in place, but digitalisation is ad hoc and inconsistent.

10–15: Planned – Your operation is on the journey of digitalisation and has implemented foundational technologies.

15–20: Proactive – Digital systems are actively integrated, supporting optimisation and data-driven decision-making.

20–25: Predictive – Your mine is highly digitised, leveraging real-time analytics, AI and automation for maximum efficiency.

# Step 2:

# Identify the ‘quick wins’ and bottlenecks

Now that you’ve got some idea of where your operation sits on the digital maturity curve, you can start to identify your digital transformation ‘quick wins.’

Identifying where you can unlock value before you begin your digital transformation journey is crucial. As Paul Mitchell, EY Global Mining & Metals Leader writes, “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.”

The key to digital transformation then is to first assess your plant’s potential, find the bottlenecks and then develop a roadmap with clear actions that unlock value and engage the workforce.

## Case study: Teck Coal Greenhills Operation

Solving bottlenecks with smarter control

At Teck Coal's Greenhills Operations in British Columbia, plant throughput was limited by bottlenecks in the processing circuit. Instead of investing in new equipment, Teck partnered with Mipac to enhance performance using advanced process control.

By implementing a site-wide control strategy and fine-tuning key processes, Mipac helped stabilise operations, leading to a sustained 8% increase in throughput. Additionally, energy consumption per tonne was reduced by 5%, showcasing the efficiency gains made with existing infrastructure.

This project demonstrates how strategic digital tools can drive significant operational improvements without heavy capital investment.

**See the full story**

## The ‘thin slice’ approach

At Mipac, we prefer to take a ‘thin slice’ approach to unlocking value (see Figure 2).

Here’s what this looks like:

1. **Understand your limitations across your operational technology systems**: your control system, your network architecture, your historian, etc. For example, you might need to upgrade your control system to the latest version, or you may find that not all your operational data is being collected so you need to expand your historian.

2. **Shift to your unit operations to identify the bottleneck**. Perhaps that’s your flotation circuit. You know where it is by the red numbers that pile up in your morning production meeting. You can start to look at what small slithers of investment are required there.

3. **Determine the instrumentation and control requirements around the bottleneck:** the control philosophies around the flotation circuit. Do you have instrumentation installed? Do you have the right instrumentation installed? Is the instrumentation installed in the correct locations, calibrated, scaled and maintained? You could ask yourself whether you have appropriate feed-forward mass pull control in place.

By doing this, you’re taking a thin slice look at your unit operation. You’re investing a bit of capital to generate a return. That return is either distributed to your stakeholders, reinvested in that unit operation, or you move to your next bottleneck and invest it there.

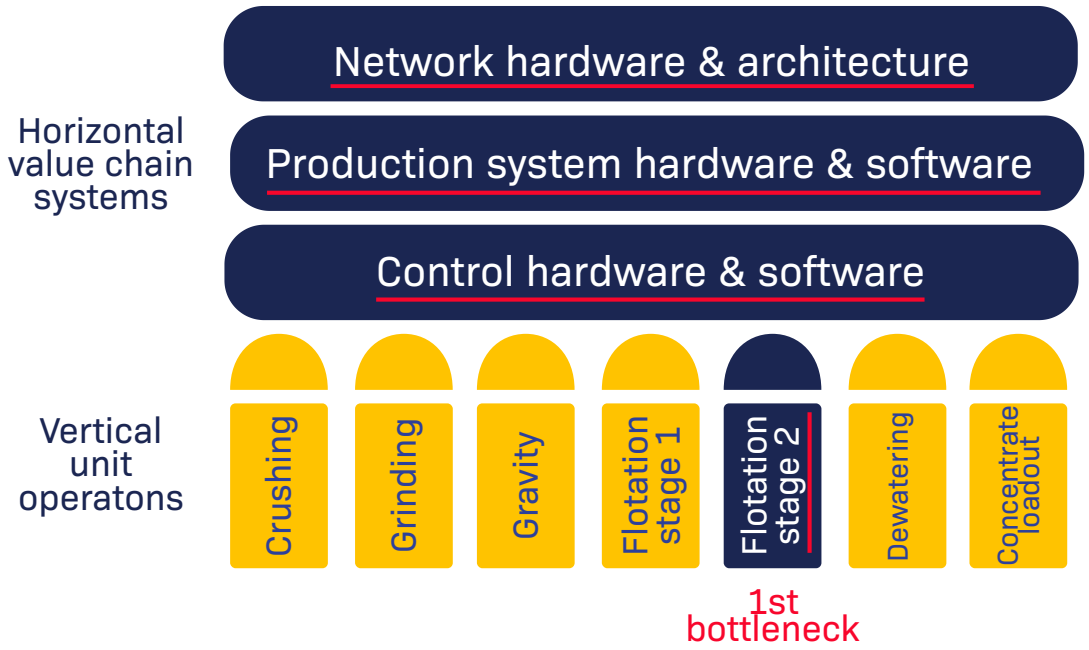
Once you’ve invested in and optimised a few unit operations, you can start to see interactions between them. From there, you can start optimising the system that makes up those unit operations.

Only then do advanced process control (APC) solutions make sense – with or without machine learning (AI). Importantly, applying an APC or AI solution too soon will waste time, energy and money for no return.

Furthermore, by investing the time and resources to resolving the worst-performing parts of the operation and always targeting the bottleneck first, rather than the whole operation all at once, digital solutions can deliver fast returns on investment to support ongoing transformation.

This also means that operations can transition through a digital maturity journey and shift to a predictive environment that leverages 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.) – in other words, ensuring that your staff aren't just monitoring the outputs of machines but continuing to undertake meaningful work.

*Figure 2 Sequencing digitalisation via 'thin slice' improvements*



# Step 3:
# Engage stakeholders

In digital transformation, human factors are at the heart of success. Indeed, failing to take your staff on the digital transformation journey is an oft quoted contributor to failure.

Furthermore, sustaining a transformation's impact typically requires a major reset in mindsets and behaviours – something that few leaders know how to achieve.

And the right leadership is key: Deloitte's 'Tracking the Trends' report (2025) stated the importance of mining leaders who are technically curious, who empower their teams to experiment with innovative technologies (including Generative AI) and who have a vision to transform traditional mining, minerals and metals systems and processes.

"This shift isn't about reinventing leadership but enhancing it," said Andrew Swart, Energy, Resources and Industrials Leader from Deloitte Canada. "Fostering a culture of innovation requires the ability to cut through the noise and create space for true leadership that brings courage, clarity and speed to problem-solving with the workforce. In this way, leaders can connect with their people, engage with technology teams and collaborate with peers."

In his analysis 'Turning Mining Performance Around: Moving From Efficiency to Effectiveness' Stratflow Australia's Hendrik Lourens reminded readers

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.”

There is little doubt that human factors – including both the right leaders and an empowered, skilled workforce that sees the value of digital technologies and harnesses them to make their work better – are a core success indicator for digital transformation initiatives.

## Digital transformation to combat skills shortages

The issue of skills is an important one to note, as on-site experience shortages frequently place stress on operators and maintainers that can be relieved through automation and real-time decision enablement.

However, technology solutions must be designed, deployed and evolved to promote acceptance and avoid resentment.

Instead of ‘replacing’ people, digital technologies should leverage the skills already present in the organisation. Those workers who are most familiar with the plant and processes can provide valuable anecdotal support for inferences drawn from advanced analytics and augment real-time monitoring and analysis to decide on the biggest constraints impeding efficient operations.

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. A greater focus on technology adoption and a lesser focus on impact from technology will also provide greater long-term benefits.

## Communicating change

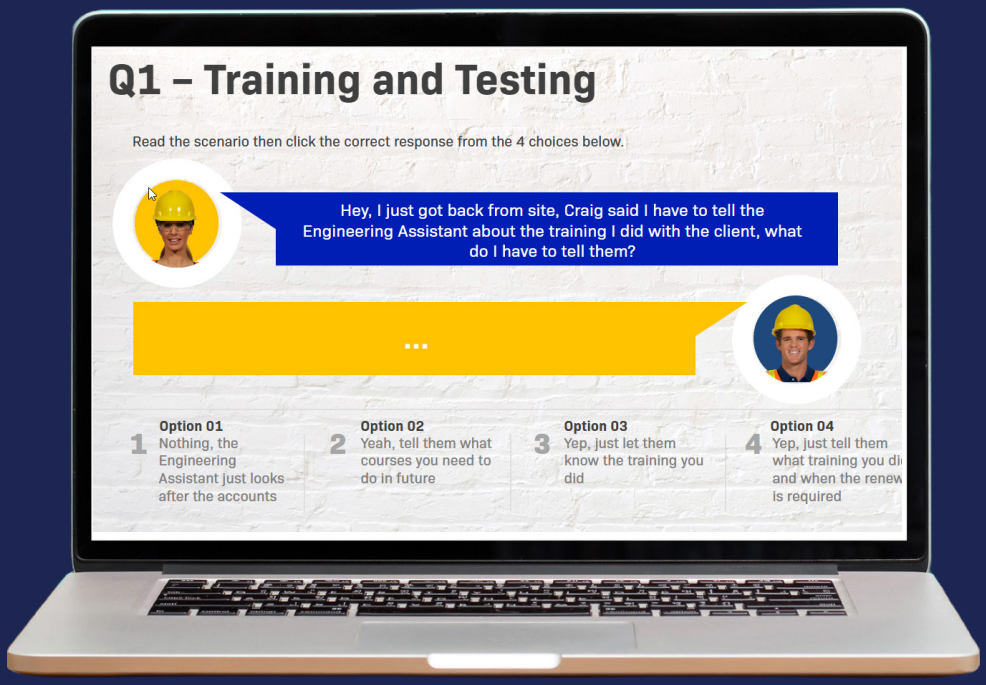
Another important people-related factor in the digital transformation journey is the communication of planned and scheduled changes.

As Deloitte says, effective change management related to digital transformation initiatives cannot be a one-size-fits-all approach. Instead, it requires customised communication strategies that address the unique needs and concerns of different segments of your workforce.

Engagement and consultation will also be key to ensuring technology is enabling and empowering rather than hindering or replacing human capability.

### Here are our top 5 tips on how to manage digital transformation related change and ensure you bring your people along on the journey:

1. **Clarify the vision and purpose, lead by example and show quick wins to build momentum.** Ensure your leadership is fully committed to the change, using the new technology and publicly supporting the transformation. Ensure everyone understands why the change is happening and how it aligns with the company's goals. Focus on delivering tangible, early results that demonstrate the value of the new technology and build confidence in the process.
2. **Engage key stakeholders early and empower champions and early adopters.** Involve key roles such as operators, engineers and HR early in the process to generate buy-in and identify potential challenges. Identify and support individuals who are enthusiastic about the change to influence others positively. Reward and recognise those who contribute to the success of the transformation, reinforcing positive behaviour.
3. **Communicate frequently and transparently and create feedback loops.** Provide regular updates through multiple channels to keep employees informed about changes and what's coming next. Gather and act on employee feedback regularly to ensure systems and processes are working effectively.
4. **Address job security concerns.** Reassure employees that technology will augment, not replace, jobs, and offer opportunities for reskilling and upskilling.
5. **Provide comprehensive training and support.** Offer hands-on training, resources and ongoing support to ensure confidence in using new technologies.




# How eLearning can be an effective way to upskill your workforce for digital transformation

Did you know that eLearning courses use 90% less energy and make 85% less CO2 than in-person classes? eLearning is also said to improve employee performance by 15-25% and increase retention rates to up to 60% (compared to 8-10% for face-to-face training).

When your operation is undergoing digital transformation initiatives, customisable eLearning is a tool that can be used to take your staff along on the journey.

It is:

- Flexible and convenient
- More accessible to more people
- Customisable
- Cost effective
- Interactive and engaging

When paired with an operator training simulator, eLearning has even been shown to accelerate commissioning, start up and ramp up times.

## Discover more

# Step 4:
# Implement and iterate

## Designing your digital roadmap

Once you've identified where your operation sits on the digital maturity spectrum, figured out your bottlenecks and considered your most important stakeholders, it's time to devise your digital transformation roadmap.

To do this, ask yourself (a) what the problem is that you're trying to solve, (b) what your objectives and desired results are and (c) whether you can find a clear link to productivity and cost benefits.

For example, you may be looking to:

- Enable inexperienced operators with automated alerts and recommendations,
- Improve decision-making through data capture and analysis,
- Improve process stability,
- Develop the capability of your onsite team,
- Or do something totally different.

Depending on your site, you may need a historian, improved instrumentation, additional or enhanced control strategies, integrations between PLC and SCADA, soft sensors, a digital twin, an APC system or training.

In any case, we recommend starting your roadmap at the beginning, by examining the Enabling Infrastructure level of your Digital Maturity Journey (see Figure 1). Only then can you move onto your Monitoring Systems and Intervention Systems.

Below is an example of what this kind of roadmap may look like. Keep in mind that every operation is unique, and your roadmap will look different to the one in this example.

*Figure 3 An example of what a digitalisation roadmap can look like*

# The Automation Pyramid

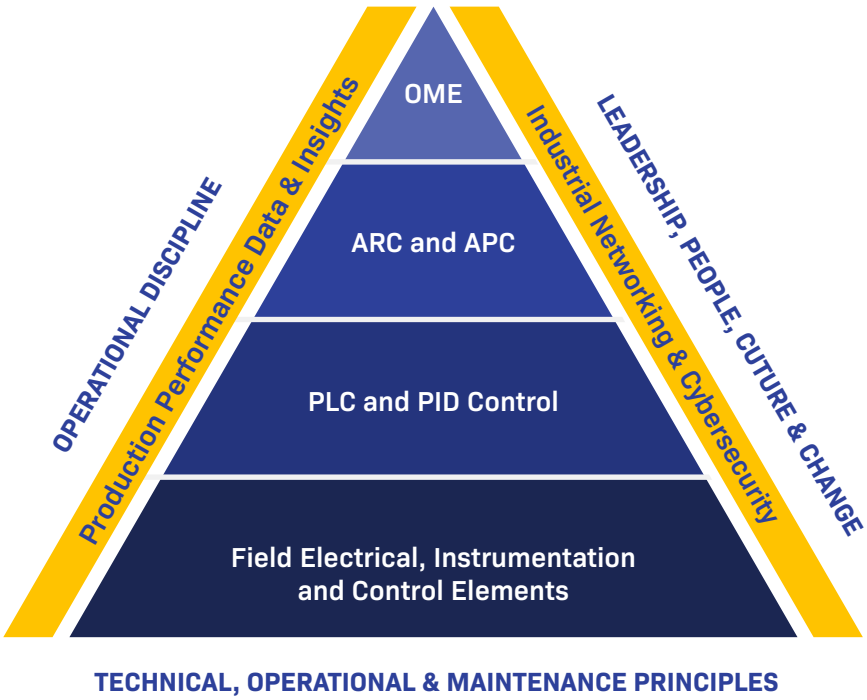
It's also important to remember that digitisation applies to every layer of the automation pyramid, from the field level to the management level.

*The Automation Pyramid – in mining – is a structured framework that defines the hierarchy of technology systems in industrial operations.*

*It consists of five levels: field-level devices (sensors and actuators), control systems (PLCs and DCS), supervisory systems (SCADA), execution and planning systems (OMEs), and enterprise-level systems (ERP).*

*This model ensures seamless communication and data flow across mining operations, enhancing efficiency, decision-making and digital transformation.*

*Figure 4 Mipac's approach to digital transformation - looking at every layer of the automation pyramid*



Ideally, the idea is to start with the bottom supporting layers of the pyramid and move your way up.

It also makes sense to start your digitalisation journey by addressing that which is going to bring the greatest value right now. Digitalisation requires initial financial outlays – no matter where you start – but you can minimise or right-size your investment. For example, focusing on a unit operation (typically the bottleneck) rather than the whole plant or enhancing existing control strategies instead of adding new equipment – and using the return on your investment from a smaller step change – may help you fund (and convince your superiors of the need for) the next stage of your digitalisation journey. Quick wins for the win!

### Quick win idea

Pinpoint the most significant bottleneck in your operations—such as a process or equipment issue slowing production. Launch a small-scale digital project (like control strategy enhancement or real-time monitoring/alerts/recommendations) to address it and track the results to demonstrate value.

## Some notes of caution

Remember: The job of a solutions salesperson is often to sell the Board and the CEO a vision that a comprehensive re-engineering project will deliver a satisfactory return on investment.

However, large scale re-engineering projects can lead to elaborate new solutions that do not represent a positive cost/benefit trade-off and can ignore 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. Smaller-scale digital transformation initiatives can help to address this, without the need for a complete overhaul of the business.

## Case study: OK Tedi

### Charting a path to full automation

Ok Tedi's processing plant had made steady gains with automation but lacked a clear roadmap to achieve full digital integration. To address this, Mipac partnered with Ok Tedi to develop a comprehensive automation roadmap, setting out a practical strategy for advancing over the next 10 years.

The roadmap began with a full audit of Ok Tedi's existing systems, processes and technology gaps. Mipac assessed the control system lifecycle, cybersecurity, standardisation of instrumentation and the maturity of existing automation infrastructure. From there, the team identified key focus areas—including system upgrades, enhanced data integration and improved process control—and mapped out staged priorities to guide investment and execution.

This roadmap has given Ok Tedi a clear, actionable plan to move from pockets of automation to a fully integrated, modern operation—highlighting how digital transformation is just as much about strategic planning as it is about technology.

Plus, the delivery of Ok Tedi's automation roadmap, together with related projects, resulted in increased gold recovery from 55 – 70% and increased copper recovery from 83 – 89%.

And that's just the beginning!

**See the full story**

# Step 5:
# Sustain the gains

Digital transformation does not succeed through one-off projects or flashy technology alone. It works like a flywheel: once you get it turning, each success feeds the next, building unstoppable momentum for continuous improvement.

Here's how the cycle works:

1. **Lay the groundwork with enabling infrastructure.**
   You need a solid foundation, like reliable sensors, data platforms and control systems, that give you real-time visibility into your processes.

2. **Empower your people.**
   Equip your staff with the tools and data they need and tap into their deep process knowledge. They are the ones who will spot inefficiencies and help design practical solutions.

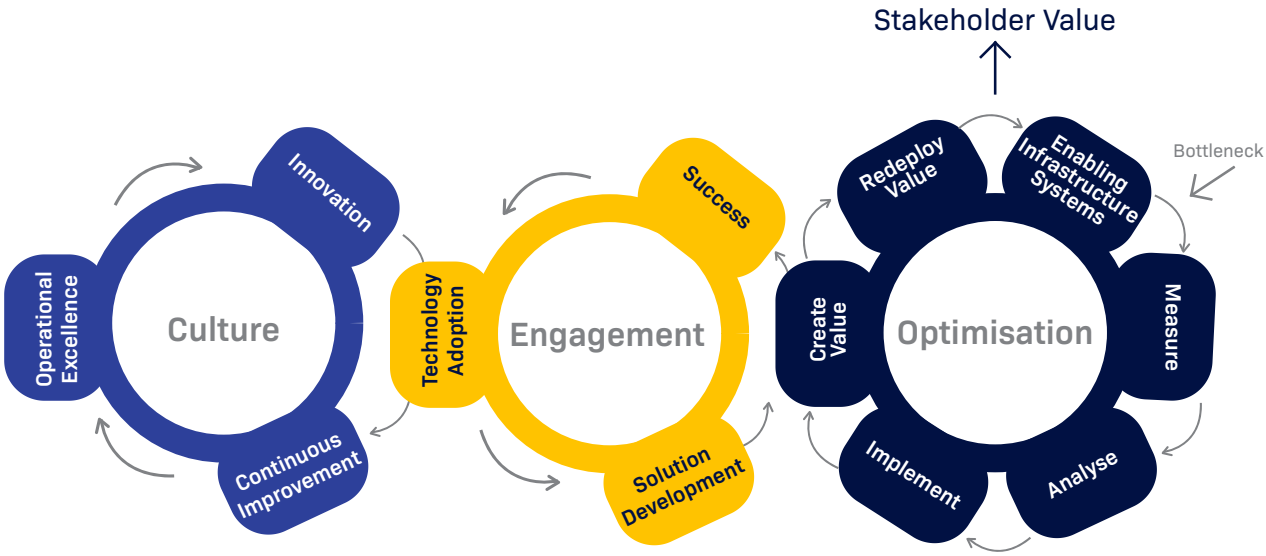
3. **Deliver and demonstrate value.**
   Early wins – like reducing downtime, cutting energy use, or improving recovery – build confidence and prove that digital tools aren't just hype.

4. **Embed a culture of continuous improvement.**
   As people see real benefits, they start actively looking for new ways to optimise. Digital transformation becomes part of how your business operates every day.

5. **Reinvest and accelerate.**
   The more value you create, the more you can reinvest - whether that's into new technologies, expanded teams, or further innovation. The flywheel keeps gaining speed, driving higher performance and resilience.

Once in motion, this cycle becomes self-sustaining—pushing your operation towards greater efficiency, safety, and competitiveness.

*Figure 5 The digital transformation flywheel*




## Quick win idea

Digital transformation is a continuous process, not a one-time effort. Companies must regularly evaluate and adapt their strategies based on performance and evolving needs to stay competitive. To do this, set up a regular review process for your digital initiatives. Define success metrics (e.g., cost savings, productivity gains, or ESG improvements), establish a feedback loop and schedule quarterly or bi-annual reviews to assess progress and refine your roadmap.

# Conclusion:

# Start small, think big, keep going

The mining industry must keep up with digital transformation trends to remain competitive in the post-COVID world and take advantage of the many benefits that digital technologies can bring to the sector.
Whilst a high failure rate for digital transformation projects can result in wasted money and little improvement on the plant floor, digital transformation strategies that focus on enabling infrastructure and human factors – and which are approached in an iterative, bottom-up way – can be hugely successful.

Thus, to avoid failure, ensure you have a clear plan, focus on unlocking system bottlenecks and ensure your employees are engaged in the process.

## From Expertise to Innovation:

Need help with the next step of your digital transformation journey?

At Mipac, we have a proven track record of successfully navigating the complexities of digital transformation in the mining industry.

With over seven hundred projects delivered worldwide, we have consistently helped mining operations harness the power of technology to drive efficiency, improve safety and boost productivity.

From implementing advanced process control systems to integrating cutting-edge automation and data analytics solutions, Mipac's expertise ensures that digital investments deliver tangible, measurable results.

By aligning technology deployments with operational needs and providing the leadership and support necessary for success, Mipac stands as a trusted partner in shaping the future of mining.

**Count on Mipac as your trusted advisor, delivering proven solutions that make a difference – locally and globally.**

Get in touch

## Mipac Services

- Industrial Automation
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- Process Optimisation
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- Electrical & Instrumentation
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- Operations Support

## Mipac Software

- MPA
- TCard

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- CellView®
- ShortMeter®
- CopperMonitor®


# Let’s meet the team who worked on this whitepaper:

*Our technical expert*

**Dominic Stoll | Solutions Manager**

Dominic is an experienced minerals process engineer with more than 18 years’ global experience spanning plant operations, projects, commissioning, consulting and commercialisation. Known for his innovative thinking, he integrates people, business and technology across the mining value chain to deliver end-to-end solutions that unlock client value. With expertise in digital transformation and big-data analytics, Dominic has contributed to major projects with Glencore, First Quantum Minerals, Rio Tinto and JKTech, helping drive productivity, innovation and performance improvements across diverse environments.

*Our editor*

**Lina Cronin | Communications Specialist**

Lina Cronin is a multilingual, internationally awarded communications specialist with 15 years’ experience across industries including tourism and engineering. At Mipac, she pairs her passion for clear, human-centred communication with a talent for making complex technical topics accessible and engaging. Lina has written for global organisations (including the United Nations), led major rebrands and campaigns, and champions authenticity, humour and inclusion in every aspect of her work.

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# Operational technology and control systems to **transform** the mining value chain

**28+ yrs**
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> We are very pleased with the performance of the smelter. The achievement of over 100% of nameplate capacity in just three months from startup is unprecedented. It is a credit to the design and project teams, and illustrates the strong capabilities of the whole Mipac team.
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Brisbane | Perth
Vancouver I Tucson

+61 7 3212 5600
sales@mipac.global

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