Digital Transformation:
Enabling successful initiatives in the mining industry

DIGITAL TRANSFORMATION:
Why projects fail and recommended practices for successful initiatives

ABSTRACT

The benefits of digital transformation are undeniable. The World Economic Forum predicts digital transformation initiatives will lead to more than $320 billion USD of value for the mining and metals industries in productivity gains, energy and fuel savings, and safety.

But no one is talking about the fact that most digital transformation initiatives fail before they're fully implemented. The problem isn't isolated to the heavy industries: a recent Gartner study showed that 85% of big data projects fail across all market segments.

This paper will examine the main roadblocks encountered in digital transformation projects and propose a strategic approach for executing and scaling digital initiatives.

STATE OF THE INDUSTRY

Like other cyclical industries, mining is recovering: driven by steady global economic growth and market fundamentals, and also by an increasing demand for materials to support new technologies like electric vehicles, renewable energy and mobile devices.

Despite the optimism, the industry still faces major operational challenges:

- Process efficiency (general costs pressures, grade decline)
- Cost control (specifically with equipment maintenance)
- Access to and effective use of land, energy and water
- Worker health and safety
- Skills gaps due to an aging workforce

Mining companies have faced these same challenges for decades, but the opportunity for addressing them has expanded with the addition of a new variable: digital transformation.

OPPORTUNITY WITH DIGITAL TRANSFORMATION

Digital transformation provides a major opportunity to address some of the greatest challenges in the mining industry. The World Economic Forum projects that digital transformation initiatives will result in more than $320 billion worth of value from 2016 to 2025. Most of that value will be realized through energy savings, increased productivity and enhanced safety. Enabling technologies will include:

- Connected worker
- Remote operations
- Autonomous operations and robotics
- Smart sensors
- Integrated platforms
- Asset cybersecurity
- Advanced analytics and simulation modeling

Despite the opportunity for growth, we're seeing an alarming disconnect between the potential for digital initiatives bringing value and successful project implementation. With nearly 85% of big data projects failing (Gartner), digital effectiveness has been identified as one of the biggest risks facing the mining industry in coming years.

So how do we realize the value of digital transformation, without taking on the risk? In this paper, we'll outline the most common pitfalls that companies face when undergoing digital transformation initiatives. We'll provide advice on how to avoid these pitfalls, and practical examples of how to secure quick digital wins.

Main roadblocks encountered in digital transformation projects and successful mitigation strategies

Below we will highlight commonly encountered roadblocks to digital transformation and share strategies we've seen mining companies use to address them.

RISK: LACK OF UNDERSTANDING OF DIGITIZATION

Fact: Salesforce interviewed 520 employees from various companies and roughly 70% say they wouldn't be confident explaining digital transformation to someone else. (Salesforce survey)

Pitfall: Technology can be seen as a panacea. It surrounds us in our daily lives, and it's often quickly pointed to as a solution to our personal and business problems. As important as defining what a digital transformation means to a company, is defining what it *doesn't* mean.

Best Practice: Mining companies must clearly define what digital transformation means to their business, in context of how their business serves the industry. As part of this definition, it's important to be clear and precise. *Digital transformation is not simply creating a website, developing a mobile app, going 'paperless', or adopting social media marketing.* Digital transformation is a composition of technology, processes, and people – and it must be positioned as an enabler of business transformation.

RISK: DIGITAL TRANSFORMATION AS A STANDALONE STRATEGY

Fact: Just 28% of executives and middle managers responsible for executing strategy can list three of their company's strategic priorities. (MIT Sloan)

Pitfall: In many companies, business strategy has not been clearly articulated company-wide so the digital strategy that evolves is not aligned with the overall company strategy. When digital transformation is not incorporated into overall business strategy and project goals are not woven into overall financial plans for the company, the project doesn't receive the level of prioritization and funding to find long-term success.

Best Practice: Technology and innovation strategy must be developed as a subset of overall company strategy – and created in response to market needs. The selection of technology to implement will be the last step in a project. Consider this example:
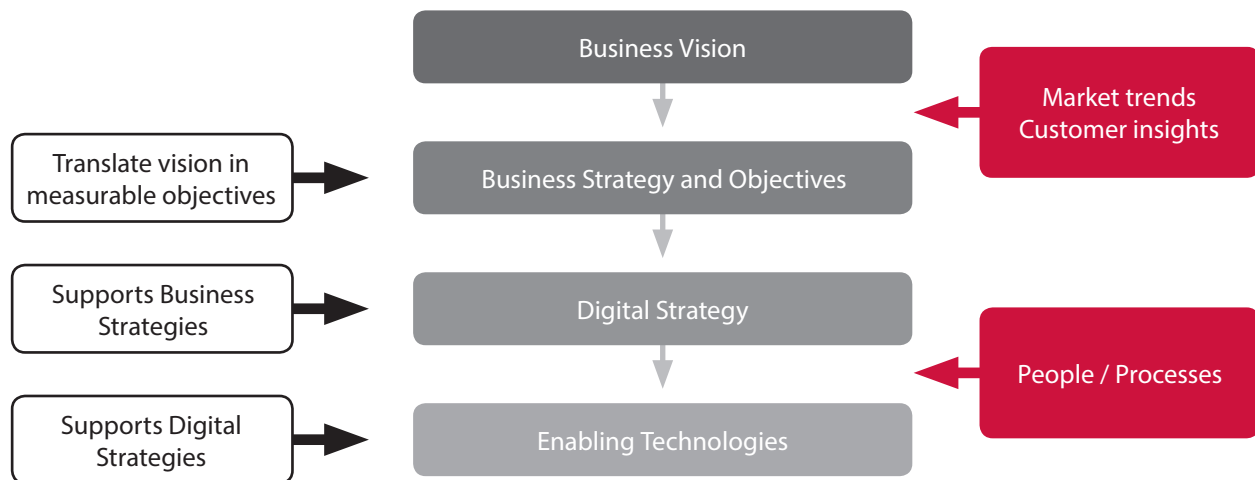
Picture 1 – Technology and digital strategy and adoption is a byproduct of the overall company strategy and vision

RISK: TECHNOLOGY-THINKING INSTEAD OF PROBLEM-THINKING

Fact: Consumers spend 85% of the time on smartphones on apps, but only five apps see heavy use. (Nielsen)

Pitfall: Today, we are inundated with technology. It can be tempting to adopt shiny new technologies without first identifying the business problem the technology can solve. As digital transformation initiatives progress, they often find additional technological solutions attached to them at the behest of executive sponsors or members of the project team. When it comes to technology: more does not necessarily mean better.

Best Practice: New technologies are not be tacked on to digital transformation initiatives unless it can be made clear that they are addressing a customer problem, an internal problem or a service challenge.

Use Case: A major iron ore mining company defined their business objectives before defining their innovation / digital technologies:

- Anticipate equipment failures rather than increase maintenance activities
- Reduce costs and provide better decisions through predictability
- Reduce operational costs (fuel, electricity, ...) by optimizing the use of equipment
- Minimize assets and resources required by adding predictable processes and better planning
- Protect people in operations and increase team productivity
- Manage operations and integrated chain in real time

As a result, the company was able to design 15 focused projects to address their challenges. Through these projects, the company has already begun to realize results in yield and value chain optimization.

We'll provide advice on how to avoid these pitfalls, and practical examples of how to secure quick digital wins.

RISK: WORKFORCE SKILLS CHALLENGE

Fact: Machine learning specialists topped a list of developers who said they were looking for a new job at 14.3%. Data scientists were a close second, at 13.2%. (FT / Stack Overflow)

Pitfall: Use of digital tools is often considered a technical endeavor. However, adopting and using digital solutions requires more than just technical skills. Workers must be digitally literate and show a propensity toward soft skills such as communication, curiosity and critical thinking.

Best Practice: Mining companies must focus hiring initiatives on finding employees who possess digital literacy and curiosity, not rule out candidates who lack technical expertise. Technological advances like embedded artificial intelligence (AI) at the device level can reduce the need for these special technical or data scientist skills. As an example, an embedded AI module will guide operators through configuration, identification of pertinent data, modeling and monitoring of a piece of equipment. With specific output generated from the embedded AI module, employees can optimize machine performance – no data scientist required.

Use Case: Many companies are beginning to outsource equipment maintenance expertise with remote monitoring and off-site support services. One leading equipment manufacturer in the mining sector has begun offering remote monitoring and predictive maintenance services for mining and minerals users. The equipment manufacturer is able to securely collect data from hundreds of sensors on their equipment, assesses process performance, and use this information to predict component wear and failure. Their expert teams analyze the data with the support of advanced machine learning algorithms. Since the equipment manufacturer has unique access to this data from their equipment around the world, and advanced analytics capabilities from in-house data scientists and AI, they can help customers set a new standard for equipment operation and maintenance.

RISK: CUSTOM AND IN-HOUSE APPLICATIONS

Fact: Seven out of 10 custom software projects fail. (PMI / Gartner)

Pitfall: The temptation of homegrown solutions can be difficult to ignore. Inevitably, at some point within large digital transformation projects, someone will ask, 'why don't we just make this ourselves?' However perfect a custom software solution seems initially, it's important to remember that custom applications are tied to their implementers: they often cannot be updated or altered by anyone other than the person who built them. This means they are hard to maintain over time, difficult to expand, and challenging to modify. Additionally, they often lack the crucial security standards that are built into more professional, robust applications.

Best Practice: New tools require customization to fit customer needs. However, we are starting to see fewer products that require actual coding, and more products that are configuration-based. Tools that are configuration-based enable companies to develop and deploy experiences like augmented reality and supply chain simulation without spending an excessive amount of time and resources engineering a custom solution. These configuration-based tools also allow companies to leverage a 'standard' version of a product and realize the customized level of functionality they desire, which makes future scalability and modification much simpler.

Use Case: An iron mine company was able to use an off-the-shelf simulation tool to simulate their barge iron ore transport activities (the facility is located an island) including variables for speed, weather and other factors. This application allowed them to save $1-3 million USD per year.

RISK: LACK OF SCALABILITY PLAN

Fact: 78% of enterprises today fail to scale their digital transformation initiative. (New Everest Group)

Pitfall: Digital transformation often happens in silos where companies don't plan for scalability across the organization. With no scalability plan, companies end up with innovation islands.

Best Practice: Scalable analytics allow the development of analytics experiences in unit operations, but with the ability to multiply to different areas of the company.

RISK: NO CLEAR BUSINESS CASE OR RETURN OF INVESTMENT (ROI)

Fact: 53% of executives believe that 'quantifying ROI and providing a clear use case' is the #1 IoT challenge. Security came in second. (Canonical)

Pitfall: The value of digital transformation is so obvious that projects are sometimes pushed forward without taking the time to define each project initiative and note the value and risk associated with it. By forgoing the process of building a complete business case for the project, it's easy to lose sight of the opportunity cost of investing in one option, but not another.

Best Practice: At the onset of a project, initiative prioritization is a critical step when selecting which project components to start, continue or stop. There are various strategies for prioritizing digital initiatives. Successful projects are comprised of initiatives that have high value and low risk. It can be tempting to chase initiatives that have high value, but are also risky to implement. Mapping project initiatives on a grid, or using a similar prioritization technique, can remove the emotion involved in project definition. It allows for the best initiatives to be selected, the next best set to be monitored as strategic, and the set with the weakest business case to be scrapped.

Picture 2 – Project prioritization tools are critical in selecting which initiatives to start, continue, or stop.

RISK: WRONG SUPPLIERS AND PARTNERSHIPS

Fact: More than 1,000 vendors with applications and platforms describe themselves as artificial intelligence (AI) vendors, or say they employ AI in their products. (Gartner)

Pitfall: We're surrounded with technology solutions from a myriad of vendors. Often times, these vendors are so focused on selling their solutions, they bypass confirming the solution is meeting a legitimate business need for the buyer. These same vendors are often lacking digital transformation knowledge and implementation skills. They aren't able to educate buyers on how their solution will fit into overall operations, or how it can best be implemented for the unique situation of the buyer.

Best Practice: Mining companies must seek suppliers who understand the latest enabling digital technologies, and are experienced at tying these technologies back to business needs.

Use Case: A nickel producer teamed up with an automation provider and an IT network supplier to design and validate their entire Ethernet network for an underground mine. This included connecting underground fixed plant systems (dewatering, loading, portable substations), surface systems (hosts, vent fans, water supply), underground and surface operation centers (U/G control, ventilation on demand, remote control) and management information systems.

The network was tested for performance, availability, repeatability, scalability and security.

RISK: CHALLENGES IN INTEGRATING LEGACY INFRASTRUCTURE

Fact: Only 50% of all manufacturers have business systems that adequately manage their business processes. (Manufacturing Performance Institute)

Pitfall: The Internet of Things (IoT) is growing in many different directions and encompasses a myriad of technologies. Deploying new hardware and software, and achieving connectivity between existing systems and new ones, can be challenging. Adding to this challenge, many companies are using legacy ERP systems that lack access to necessary information and functionalities.

Best Practice: New IoT platforms can facilitate the integration of legacy systems, without requiring a complete overhaul. These platforms also enable the integration of other sources beyond automation systems, such as IoT sensors, laboratory systems and web portals with relevant industry information.
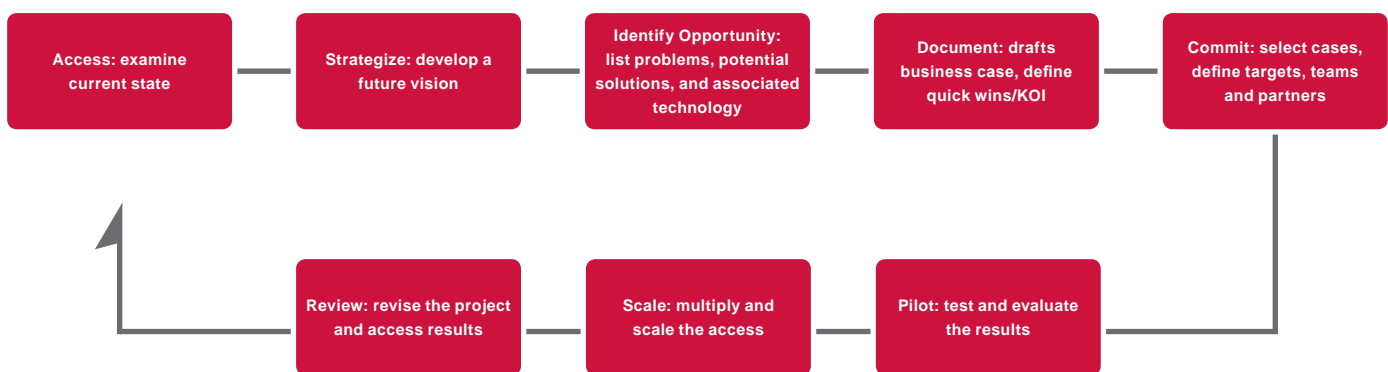
Use Case: A major global miner has gained full visibility of their operations by integrating legacy and separate mining information systems (laboratory, maintenance, inventory) into a unified platform.
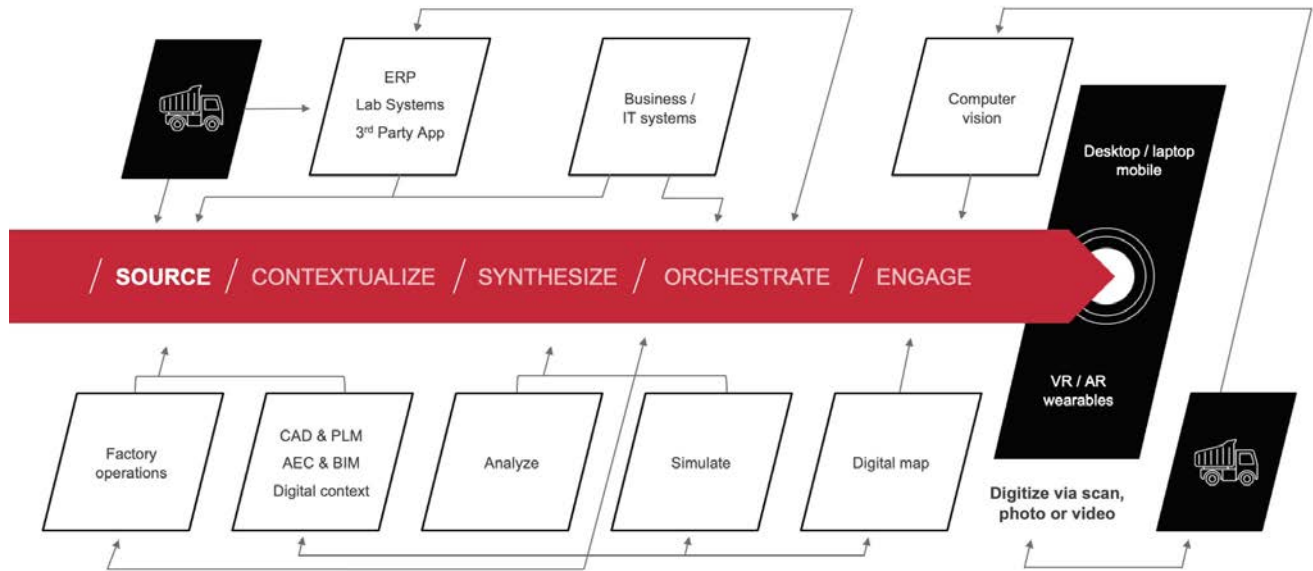
Picture 3 – New platform technologies aim to facilitate the integration of legacy systems.

CONCLUSION

The value of digital transformation is undeniable. However, digital change must be intentional and well-planned. Any mining company that is undertaking a digital transformation must define a strategy and outline a clear roadmap. It's important to approach digital transformation as a journey, not one destination to reach.

Access: examine current state	Strategize: develop a future vision	Identify Opportunity: list problems, potential solutions, and associated technology	Document: drafts business case, define quick wins/KOI	Commit: select cases, define targets, teams and partners
Review: revise the project and access results	Scale: multiply and scale the access	Pilot: test and evaluate the results		

Picture 4 – Digital Transformation Roadmap

With proper project definition and planning, an upgrade of worker skills, and company-wide integration of digital initiatives – digital transformation can deliver incredible results.