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Mining capital projects

Are you ready for the next
CapEx investment cycle?

Capital Project Insights

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Capital Projects Insights is a series of papers bringing together the latest thinking from members of our global team on optimizing performance and value across the lifecycle of capital projects.

Note: In this report, capital expenditure (CapEx) comprises the cash outflow on purchases of property, plant and equipment, and intangible assets. Expenditure on exploration activity undertaken by mining companies is not capitalized.

Back to CapEx growth

Can mining companies successfully deliver the next wave of CapEx growth?

The mining sector has seen challenging ups and downs over the past ten years, set against a backdrop of declining ore body grades, decreasing availability of tier one assets, and a continued focus on shareholder returns.

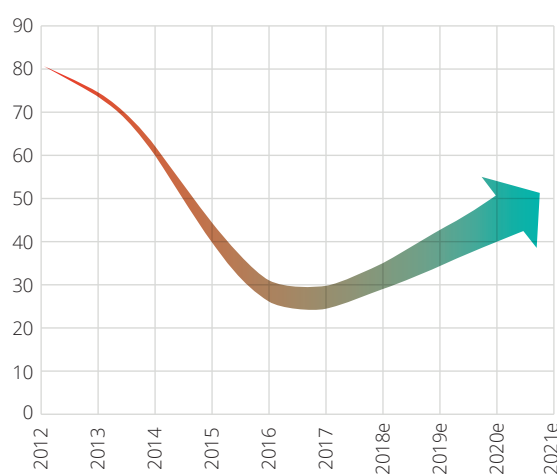
Following the collapse in commodity prices, margins were squeezed on capital investments. This was further exacerbated by the industry's weak capital project performance.

For mining companies, the focus has been on OpEx efficiencies and returning cash to investors, rather than investing in major greenfield developments. 2017 saw industry CapEx in new developments drop by close to two-thirds versus the US\$80B peak of 2012. Grassroots exploration spend is at historic lows¹, and headcount and internal project capacity have seen cutbacks as cost-reduction strategies have taken effect.

Now the cycle has turned, CapEx must increase significantly in order to offset production declines and meet emerging demand. With improved prices, mining companies will be under pressure to find and exploit resources along with delivering on their growth promises to the market.

This paper asks whether mining companies have learnt the lessons from the last cycle, and identifies the five biggest levers to deliver projects safely, on budget, and on time.

Figure 1: Mining industry greenfield CapEx



Note: Mining CapEx has declined heavily since the US\$80B+ peaks of 2012. Our analysis, based on company CapEx guidance and market sentiment, indicates that CapEx is increasing. Even with a modest growth rate, investment could exceed US\$40B in 2020.

Source: S&P Market Intelligence, Deloitte Analysis

“At some point, a new CapEx boom is going to come along to plug a supply shortfall.”

Simon Redmond, Sector Lead at S&P Global Ratings²

Projects to focus on commodities of the future:

Throughout 2017, there has been a revival in the price of most metals and minerals, spurred by better-than-expected economic growth and a focus on disruptive technologies such as electric vehicles (EV) and battery technology. In 2018, economic growth is expected to continue; China's One Belt, One Road project promises incremental demand for raw materials, and the International Monetary Fund (IMF) revised its global growth outlook upwards to 3.6 percent in 2017 and 3.7 percent in 2018.³

Traditional materials such as iron and copper will continue to make up the majority of production, supported by the strong macro-economic environment. The future presents an opportunity to explore more non-traditional, 'green' metals and minerals – mining companies must seize this opportunity by delivering capital projects effectively and growing sustainability in the long term.

Capital project delivery: What's changed?

Mining companies have improved delivery performance...

How have mining companies adapted?

Mining companies have taken several steps to improve on their project performance in the last cycle. Stricter capital-allocation frameworks mean that investment decisions are much more rigorous with heightened scrutiny on risks to the business case. Business models have also shifted to centric corporate governance mechanisms that facilitate greater command and control on CapEx, improving capital efficiency.

To expand their exploration pipeline, several mining companies have entered into strategic partnerships or joint ventures with junior explorers. The quid pro quo is typically to share intellectual property (IP), engineering resources, technical expertise, and exploration costs in exchange for first rights to new mineral discoveries.⁴

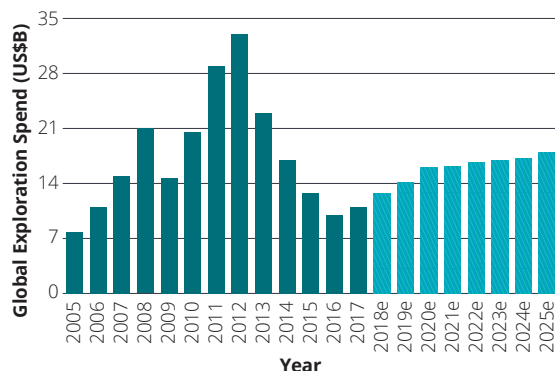
Further, as the demand for project investment has waned, mining companies have negotiated savings from tier one suppliers and the supply chain as a whole, bringing down project delivery costs. However, without the right controls, these costs will be hard to contain as project activity increases.

The industry has invested heavily in digital innovation to drive operating efficiencies. As investment in projects recovers, embedding a data-centric delivery model and exploiting appropriate technology throughout the capital project lifecycle could yield further savings.

“Following the downturn, significant overruns and increased focus on costs, large mining companies often are requesting flexible contracting models where there is a more balanced allocation of risk with engineering, procurement, and construction (EPC)/ engineering, procurement, construction management (EPCM) providers ... There are also immense resource demands as large mining companies have downsized their technical and execution resources.”

**Dave Lawson, President,
Mining & Minerals at Wood⁵**

Figure 2: Global mining exploration spend



Exploration spend

Annualized exploration spend has started to rebound following a rapid decline since the peaks of 2012.⁶ With commodity prices continuing to improve over the past year, better conditions for exploration investments are expected in 2018.

Source: Bloomberg⁶

... but the goal posts have moved too

What's different about the project delivery landscape?

Although mining companies have made adjustments in the way they operate, external factors and the wider project ecosystem have also evolved.

Government expectations and resource nationalism mean the share of take from reserves has increased, not just in developing economies, but also in the developed world. Such changes put pressure on project margins and, ultimately, project viability, pushing out payback periods on the capital invested.

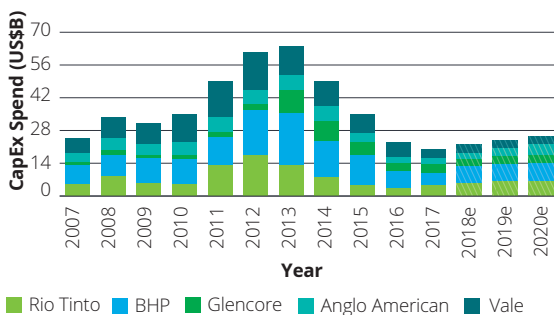
Stakeholder groups (partners, employees, community bodies) now expect more from mining companies. Continuous engagement, faithful delivery of commitments, and a focus on sustainability and the environment are now fundamental requirements. A long-term strategic approach must be developed accordingly.

Meanwhile, the major EPC and EPCM contractors opted for consolidation when demand for their services declined. Fewer suppliers, with less capacity, means that flexibility and competition in the market have reduced, and the ability of the supply chain to respond to increased demand is far from certain. This, combined with an increased focus on local content, signifies that effective supply chain management will be a key pillar of project success.

Elsewhere, project models have evolved. 'Turn-Key' projects, where more of the risks from design through to operation are carried by EPCM contractors, have become more common. Also, large processing original equipment manufacturers (OEM) have expanded their offerings significantly, moving into the engineering delivery space for smaller developments. Whereas the role of the traditional EPCM finishes at project completion, the OEM may be involved throughout the life of the asset. These new models change the risk balance and incentives for project delivery, and forge longer, mutually beneficial relationships.⁷

The head count reduction in owner project teams means a leaner, smarter approach is required for delivery partner engagement. Mining companies must strengthen their in-house project capabilities to ensure that they maintain the right control and risk balance with their supply chain. With investors low on trust, and a more challenging backdrop in which to develop capital projects, a step change in performance is essential.

Figure 3: Diversified miners' CapEx



CapEx spend

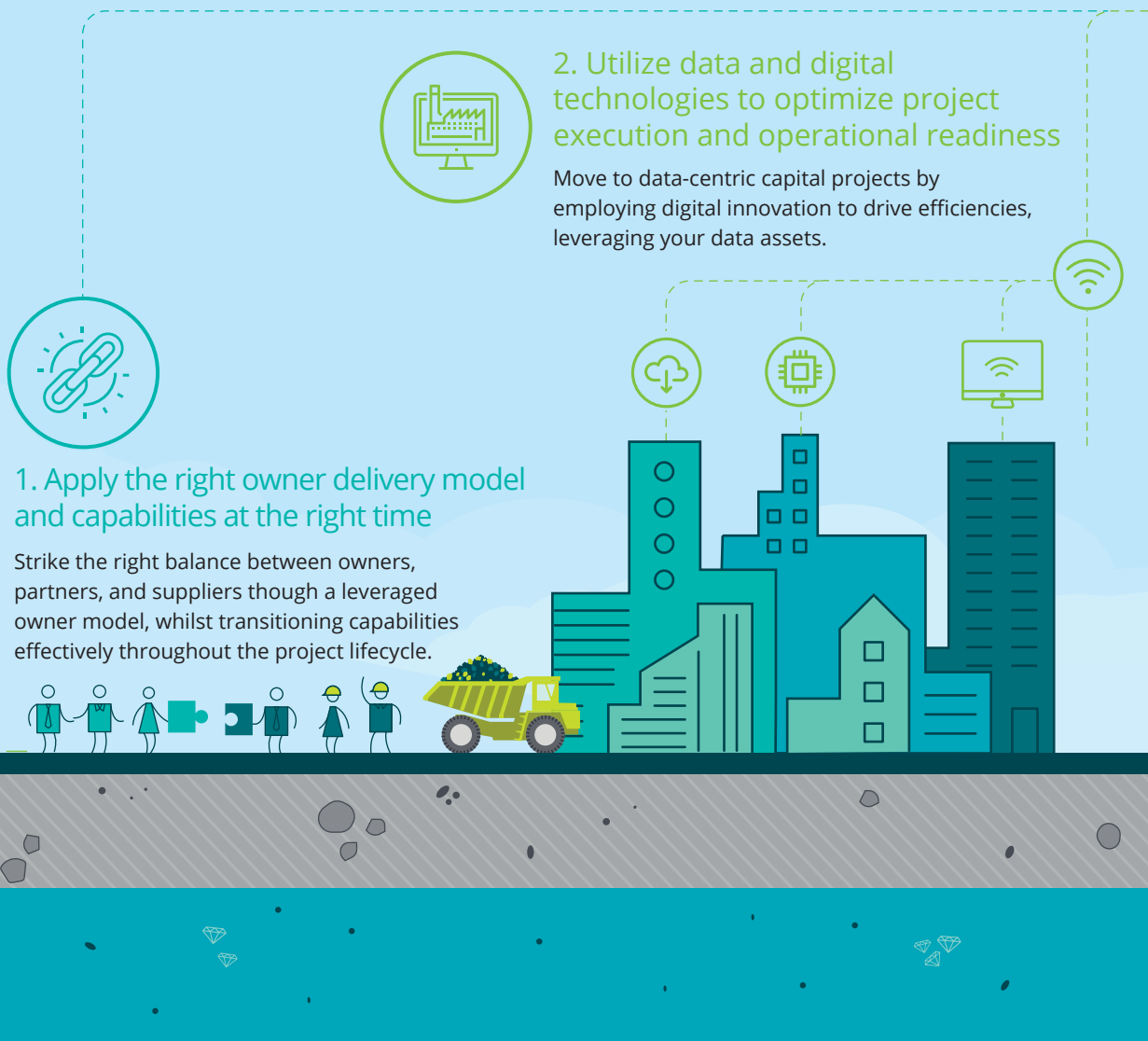
Capital guidance from five of the largest diversified mining companies suggests that capital spend is on the rise again. The focus now shifts to delivery confidence. How can mining companies ready themselves for the next wave of capital investment? The project delivery landscape has changed and the challenges during the next investment cycle are different to those faced before.⁸

Source: The Economist, S&P Global Market Intelligence, Deloitte Analysis

Getting match-fit for delivering capital projects

Building capital project delivery confidence requires maturity across multiple areas

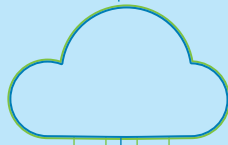
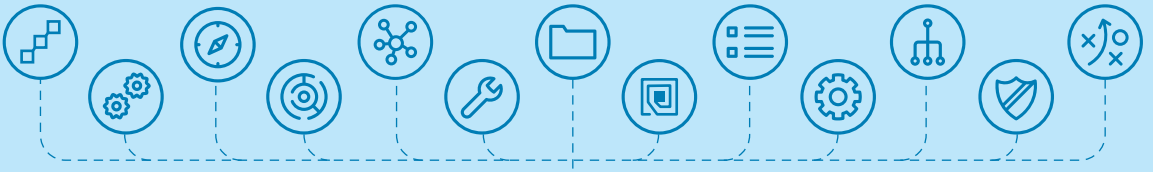
As mining companies prepare for the next uptick in the CapEx cycle, their focus should be on how to rebuild investor trust. They will achieve this through investment in innovation and digitization, strengthened government and community relations, and guiding their efforts to repair their public image. A more disciplined investment approach with strategic partners is expected, with much more effective project controls and transparency on progress and delivery – simply increasing the delivery contingency will not resolve the root cause of failures seen in the last cycle. Below, we outline the five most important levers to improve both project success and scalability throughout the next upcycle, and beyond.





3. Implement highly effective project controls to deliver confident decisions

Establish appropriate governance, processes and systems, supported by transparent, timely, and visible project information to guide decision making.



4. Have a customer mindset and invest in your license to operate

Create a new social contract with communities and governments, transparently aligning operational decisions with stated commitments, and working directly with stakeholders for long-term mutual benefits.



5. Balance the portfolio of investments and partner to win

Take a holistic approach to your project portfolio, continuously evaluating against a variety of dimensions, including; cost, complexity and risk exposure, and reacting to internal and external changes. Find the right partners to share project risk and expertise, gain access to new resources, forge new relationships and target growth.



Five levers for capital project delivery confidence



1. Apply the right owner delivery model and capabilities at the right time

The current state of play

Mining projects and the associated supply chain are multifaceted and often global in nature. Mining companies have heavily relied on EPCM and EPC companies to deliver major projects, but incentives have been misaligned with project goals. With smaller project teams and continued pressure to control costs, the delivery models adopted by mining companies in the last cycle need a rethink. An intelligent client capability with appropriate scale to provide expertise and the correct contractor oversight is now more critical than ever.

Other industries have led the way with regards to project delivery innovation, and there are many insights the mining sector should draw upon. For example, in the UK construction industry there is an increased use of alliancing and other collaborative contracting strategies. In such cases innovation is encouraged, risks are transparent and jointly managed.

It also remains a challenging environment to achieve project delivery success; as the industry emerges from the downturn, limitations in capacity and supplier capability must also be navigated effectively. Project leadership will be put in the spotlight, and management specialization, rather than pure engineering capabilities, must be nurtured accordingly.

Our view

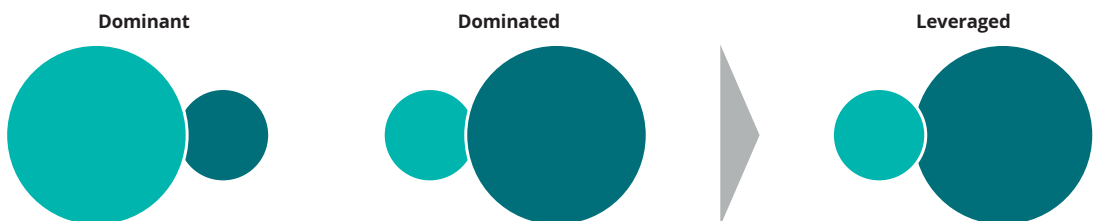
Set up for success: The project development strategy and owner organization is critical to success. In the next cycle, miners must move away from being dominated by their delivery partners, and maintain a control balance. This means equipping leaner project teams with the right insight and capabilities to make better decisions – a leveraged owner delivery model.

Transition through the project lifecycle:

For projects to progress effectively, the required capabilities need to evolve in line with the project so that value delivery doesn't diminish. Operating model scalability is critical throughout the project lifecycle, where all moving parts of the delivery environment must come together to work as a single delivery unit.

Think long-term: By taking a long-term view as to how to select, control, and share risk with delivery partners, value can be maximized, people allocated efficiently, and confidence in delivery increased. It is key to align incentives with project and operational outcomes, driving performance with collaborative, yet targeted, contractual mechanisms. Working together with the supply chain to drive continuous improvement and innovation by sharing in the resultant gains will forge long-term, mutually beneficial partnerships.

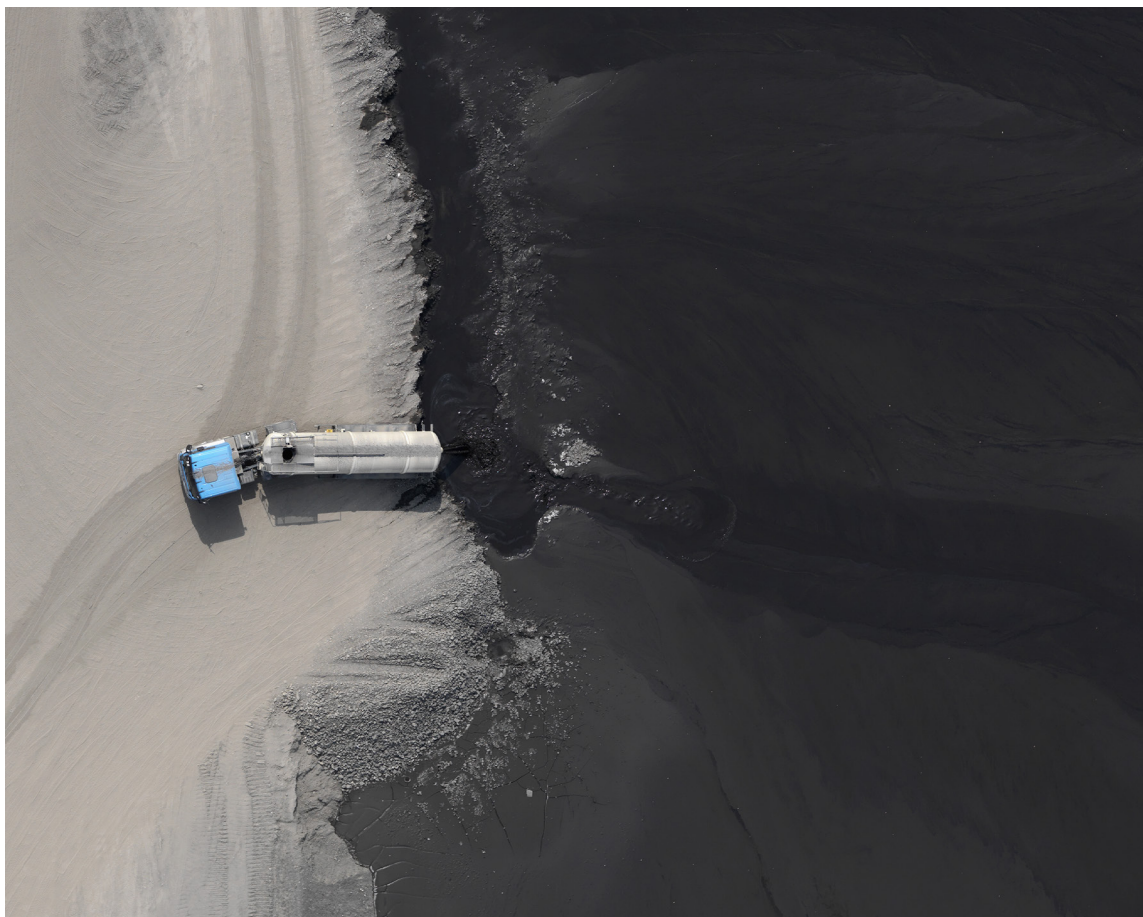
Figure 4: Capital projects delivery models



Given the reduction in head count from the last cycle, owner teams need a rethink. Leaner teams, leveraged with the right capabilities and project information, will ensure a better risk balance between owner and contractor.

■ Client/Owner ■ Delivery supply chain (e.g. EPCM or EPC contractor)

Source: Deloitte



Setting the delivery model up for success:

Whichever project delivery model an organization chooses, and for all types of contractors and third parties engaged, it is vital that the following is established:

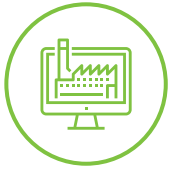
- Clarity on the client/owner's role(s)
- Definition of who is accountable for what
- A proactive approach to interface management
- Appropriate levels of collaboration between parties
- Correct incentivization for each layer of the delivery organization

Exploring best practice from other industries:

The Tideway project is a near US\$6B investment in the delivery of a 25km tunnel, 65m below the River Thames in central London. Deloitte supported the formation of a new, stand-alone entity: the Infrastructure Provider. This entity needed to not only have the capabilities to deliver the capital project, but also manage the needs of multiple external stakeholders, attract potential investors and preserve the client's existing operations.

The target operating model design considered the organization's capability requirements at key phases of the project's lifecycle, focusing on the optimal owner's team structure and core in-house capabilities needed. The operating model was subsequently implemented through a transition management plan, which supported the stand-up of the required capabilities across a number of areas such as technology selection, detailed supporting manuals, process maps, training materials and governance terms of reference. This innovative way to set up a project owner delivery model enabled the right capabilities to be in place, at the right time.

Five levers for capital project delivery confidence



2. Utilize data and digital technologies to optimize project execution and operational readiness

The current state of play

The good news is, mining companies have made significant advances in using technology, such as self-driving vehicles, drones, three-dimensional (3D) printing, and wearables, so as to optimize operational assets. Mining companies are now starting to rethink the way they generate, capture and process a wealth of project information throughout the project lifecycle, but must do more to make the most of the opportunity this data provides.

Such innovation still faces systematic barriers. Mining companies must attract and develop new skillsets and expertise not typically associated with the sector's workforce. There is a need to increase transparency and improve collaboration throughout the supply chain, with data and engineering information shared more freely, processes more closely aligned, and systems better integrated.

Our view

Become digital: Mining companies need to shift from 'doing digital' to 'being digital'. Achieving the right blend of digital technology, data, and advanced analytics in order to deliver data-centric capital projects.

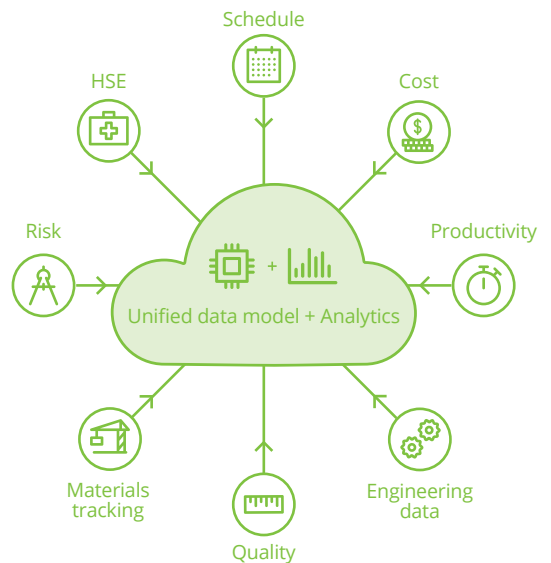
Invest in data standards: Codifying data requirements and specifications drives consistency between projects and operations, as well as ensuring data management costs are focused on information that adds the most value.

Embed a unified data model: Data needs to be fully optimized, standardized and collected consistently from a vast number of sources into a unified data model. This unified system enables consistent reporting and the leveraging of predictive

analytics, forming the foundation for data-driven decision making in a consistent, timely and visible manner. Based on our experience with technology delivery on multi-billion-dollar infrastructure programs, we expect to see CapEx savings of up to five percent from these technologies when complimented by an effective owner's team.

Data is an asset: View information as an asset to be managed throughout the project lifecycle, ultimately setting up a 'digital twin' to support success during the transition to operations. Building information management (BIM) can not only help with safety performance, design, modular construction and accurate budgeting, but can also facilitate smooth handover of data to enable a continuous maintenance regime pre and post first ore.

Figure 5: The unified data system



Cloud-based, System-integrated, Secure

Source: Deloitte



Finding efficiencies through analytics:

Deloitte was engaged to apply advanced analytics to a global miner's rail infrastructure, optimizing maintenance costs and production processes for 900km of railway between a major mining complex and its port and logistics terminal.

Our team applied the latest technologies, such as image recognition, sensor data, text mining, machine learning and data visualization, to provide predictive maintenance capabilities for these critical assets. Identification of various failures ahead of full manifestation, allowed for controlled and planned maintenance activity, increased rolling stock availability, a reduced risk of accidents and increased confidence in asset condition.

Increasing information consistency and transparency through analytics:

Deloitte has developed an integrated tool for analytical monitoring of a portfolio of capital projects at the operational, tactical and strategic levels. It integrates information from planning systems, such as Oracle Primavera, and on a single platform provides insights into subcontractor productivity, analysis of interdependencies, health and safety performance, as well as the monitoring of physical and financial progress at a project and program level. Such insight allows for informed management decisions based on up-to-date, common data and information.

Five levers for capital project delivery confidence



3. Implement highly effective project controls to deliver confident decisions

The current state of play

Today's capital projects are more complex, with more partners, and increased internal and external scrutiny. Delivering projects whilst maintaining control of such complexity has been an ongoing challenge for all capital intensive industries – particularly when project controls capabilities are established too late.

Other sectors, such as aerospace and defense, have led the way when it comes to controlling cost, scope, schedule, and risk by investing in the right capabilities and technology, and putting project controls at the center of their approach to project delivery. Mining companies must follow suit in order to turn the tide of cost and schedule overruns seen in the past decade.

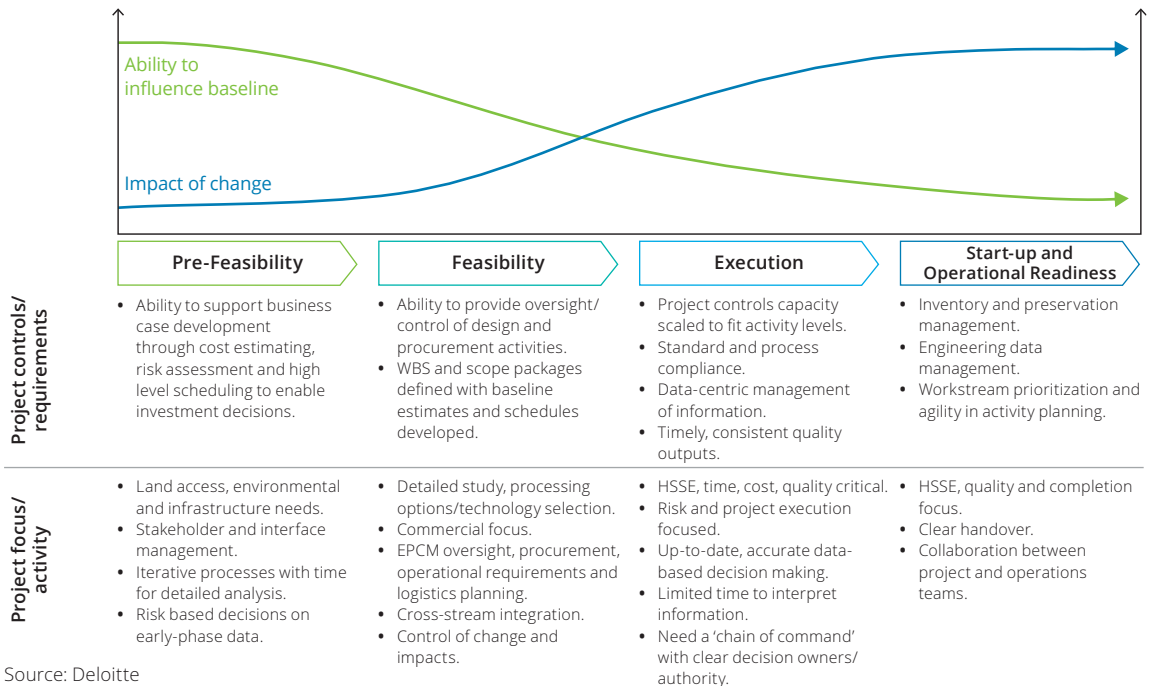
Our view

Define your project controls landscape: Establish an owner-led project controls strategy early in the project lifecycle, applied across all operating model layers: organization, process, technology, data, and governance. Success depends on integrated relationships and ways of working within the organization and supply chain being strictly adhered to.

Visualize your data: Invest in information technology that facilitates accurate, on-demand reporting and rigorous performance review. Visualizing centralized project information appropriately for each stakeholder informs insight-driven decision making.

Predictive project management: Optimizing cost and schedule requires continuous monitoring of project performance, tracking cost and schedule trends, and anticipating issues before they occur.

Figure 6: Decision pressures throughout the project lifecycle



Source: Deloitte



Exploring best practice from other industries:

As Europe's largest infrastructure project, Crossrail is complex; delivering 42km of rail tunnels and seven new central underground stations via 140 main works contracts. At a critical point in its lifecycle, the project secured investor confidence by establishing effective project controls, systems and capabilities. This enabled the project team to lead and control this US\$20B mega-project, driving better performance from delivery partners lowering costs and navigating a multifaceted range of interfaces, stakeholders and contracts.

Deloitte was engaged as Crossrail's strategic partner, working as part of an integrated team to establish governance, processes and systems that enabled control of cost, schedule, risk and scope with a leaner organization. The integrated project controls solution incorporated enhanced analytics capabilities utilizing a single, integrated source of information. The executive suite of dashboards and reporting prioritized focus on material performance indicators, provided a clear line of sight on progress, as well as ensuring transparency internally and to the project sponsors.

Five levers for capital project delivery confidence



4. Have a customer mindset and invest in your license to operate

The current state of play

In recent years, the mining sector has moved to improve its reputation, but it nonetheless battles with a history of poor environmental performance, troubled community relations, as well as questions surrounding transparency and corruption. Recurrent events, such as local unrest, labor disputes and production stoppages, stem from a disconnect between stakeholder expectations and delivery. These negative perceptions can spill over into other jurisdictions and limit or restrict future relationships.

The environment within which mining companies operate has expanded to include far more complex challenges and proactive stakeholders. One such example is the increasing focus on energy management – continued legislative and community pressure to use energy responsibly and reduce greenhouse gas emissions is forcing mining companies to act.⁹ These challenges require more than a sustainability agenda, communications and external relations efforts to manage and resolve.

Our research indicates that over two thirds of license to operate incidents occurred in Latin America and Africa. As future growth opportunities move to more challenging environments in terms of access, geopolitical uncertainty, and business practices, the onus will be on mining companies to put strict control and governance regimes in place.

Mining companies must also manage a range of international treaties, complex local permitting legislation and diverse approval processes. Without a detailed understanding of such requirements throughout the full project lifecycle and a balance being struck between a wide range of stakeholders, project redesign and resultant stoppages can occur.

In order to manage such a complex web of requirements and interactions, mining companies must not only optimize their corporate relations capabilities, but also evolve their approach to engagement. Today's diverse stakeholders require a proactive, customer mindset to fully realize common benefits.

Our view

Embed a license to operate and customer culture: Adopt an approach that balances the need for strategic long-term planning and shorter-term budgeting with delivering shared value to local communities and the supply chain. This requires an organizational model that allows the coordination of capabilities across all of a mine's business areas, enabling effective relationship-building across the entire project lifecycle.

Deliver on your commitments: Build license to operate aspects into investment and stage-gate decision making, and build a long-term institutional capacity and strategy to nurture stakeholder relationships.

Setting Corporate Relations targets and measuring performance:

Deloitte supported a global mining company in developing its local content and community incident target program by co-baselining targets and preparing for pilot roll-out across projects and operations. The work enabled better performance management at a local level and allowed for development of standardized, integrated reporting of targets at a group level. The monitoring and transparent tracking of targets, fosters a regime of continuous improvement and allows focused action to ensure an economic dividend for local communities and suppliers.

Developing a detailed plan of commitment activities, integrated into the wider project scheme, is key. Technology can also play a part – customer relationship management (CRM) tools allow optimization of relationship management and can enable functions to actively manage commitments and communications.

Rethink local partnering: Move beyond the unilateral actions companies typically adopt (such as donations and philanthropy, preferential hiring, and legal compliance) to embrace more collaborative modes of engagement designed to get local communities more invested in mining operations. Investing in innovative local content programs is critical to ensuring sustainable engagement.

Understand your customer: Demonstrate a capacity to deliver greater value as understanding customer needs and delivering against them is now critical. Look beyond one cycle and one project, and try to build truly long-term relationships that benefit all parties.

“As the mining industry’s value proposition is increasingly called into question, mining companies are beginning to see that they cannot succeed into the future unless they change the way they operate. This is about more than enhancing efficiencies. It’s about re-establishing trust with stakeholders, and collaborating to devise better responses.”

Glenn Ives, Americas Mining Leader, Deloitte Canada

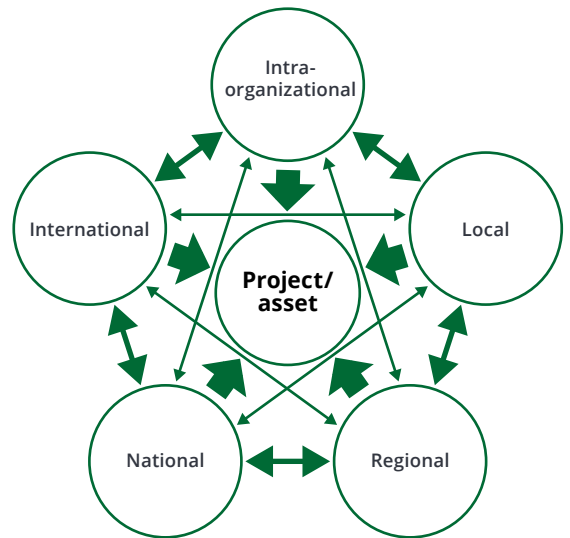
Stakeholder influence environment

Strengthening the business’s capability to manage and respond to its stakeholder environment will ensure a license to operate is maintained.

Improving processes, systems and governance will allow the business to proactively influence key stakeholders, and mitigate critical issues.

Understanding the influence of local, regional and national stakeholders is critical to the long-term relationships with these parties. Gone are the days where promises were made to be broken. For the relationships with these stakeholders to be beneficial to all parties, the license to operate must become part of the core organizational model.

Figure 7: Complexity of stakeholder influence



Complex, ever-changing interactions between different stakeholders, as well as the project, mean that a clear strategy and plan for engagement is required.

Source: Deloitte

Five levers for capital project delivery confidence



5. Balance the portfolio of investments and partner to win

The current state of play

Although it's true that mining companies have taken significant steps to optimize their portfolios, commodity prices are notoriously hard to predict, and disruptive technologies are continuously changing the market landscape.

The uptake of stringent capital allocation frameworks is a step forward in ensuring investments are made on only the best projects, but when sanctioning long-term investments and strategic deals, mining companies have not been able to react as the macro environment shifted. Further, investments must be assessed with a whole-lifecycle view. Often the true implications of deal exit or mine rehabilitation are not considered, and the additional costs prove prohibitive.

Due to a distrust of collaboration, concerns about intellectual property rights and competitive advantage, mining companies have in many cases preferred to take a lead role, bearing the burden of risk. This has meant that more capital is tied up over the long term, more shouldering of risk, and missed opportunities. Other industries, most notably oil and gas, have leveraged partnering to their advantage by diversifying their portfolios, sharing the risks of large investment, gaining access to new technologies and geographies, and fostering new relationships.

Our view

Learn from other sectors: To reduce the risk of long-cycle megaprojects, oil and gas companies often engage in shorter-cycle projects designed to rapidly generate a positive cash flow. In addition to reducing capital expenditures, these short-cycle investments help to preserve production capacity and help ensure portfolio agility. For mining companies, a phased approach to the largest investments could spread the risk in a similar fashion.

Optimize your portfolio: Early-stage projects should be continuously evaluated. Flexible, driver-based modeling gives visibility of multiple 'what if' scenarios to support decision making in line with the overarching strategic vision. Rolling this information into a single, consolidated view helps mining companies make decisions that properly assess macro and project risks at a portfolio level.

Partner strategically: Be selective, and optimize your partnering landscape. Define what drives partnering decisions and develop your partnering ecosystem. Mining companies should pursue grassroots partnerships with Juniors, enter into joint ventures to uncover new deposits, better share risk and drive innovation.

Develop the right internal capabilities: Manage partnerships and joint ventures (JV) effectively. This includes establishing partnering frameworks and operational controls, and embedding the right behaviors throughout the deal and project lifecycles.

Use analytics to optimize portfolios

One of the greatest difficulties organizations face when trying to structure optimal portfolios is making informed choices about which assets to buy or sell, and when. Too often, these decisions hinge on subjective factors that cannot be effectively measured or improved. To remove some of that subjectivity, leading organizations are increasingly relying on data analytics to rank and score potential investment opportunities. Properly implemented, these analytical tools can help mining companies improve their financial models, uncover new business opportunities, and make better investment and divestment decisions.



New approaches in action:

To position itself for future growth and gain a competitive advantage, Rio Tinto has committed to managing its asset portfolio more actively. To this end, it set up Rio Tinto Ventures to gain access to commodities that are set to benefit from megatrends, such as industrialization and urbanization, technological disruption, and the interconnection of global markets. Rio Tinto Ventures aims to enter joint ventures and partnerships with asset owners where its engineering excellence, sales and marketing channels, and technical expertise allow it to add value. The company hopes these investments will position it to uncover new greenfield opportunities in partnership with junior mining companies.

Finding sustainable growth

The winners in the next cycle will be those that create repeatable value through effective project development

After the challenges faced during the last downcycle, there is a palpable sense of optimism for mining companies. Global economic activity is improving, and new industries and technologies are providing opportunities for commodities growth.

But before launching into the next wave of investment, the lessons of the last cycle must be learnt, and the industry needs to rebuild trust with stakeholders in its ability to deliver value in the longer term.

Finding the right balance between in-house exploration, joint ventures and acquisitions, and developing your own projects will be key.

There are multiple barriers to overcome, not least operating in challenging geographies, constrained budgets, complex supply chains and a shortage of skills. Those who navigate these challenges first will reap the richest rewards.

By ensuring the right capabilities are in place, and through transforming traditional operating models, mining companies can select the right investments, find the best partners and deliver capital projects with confidence, to the benefit of investors, employees, local communities, and suppliers alike.



How Deloitte can help

Deloitte has advised on many of the world's largest and most complex capital projects, both within the mining sector and other capital intensive industries. Our global team brings together leading best practice, in-depth knowledge and market-leading expertise to provide end-to-end service across the entire lifecycle of mining assets.

For more information, or to discuss any of the topics raised in this paper, please contact a Deloitte projects or mining professional.

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