New Realities Facing the **Mining and Metals Industry**

The business of sustainability

ERM

Succeeding in a changing world

Changing global geo-political and economic conditions resulted in uncertainty for the resources sector over the last few years. There is now a better balance between the supply and demand of commodities. This said, the pressure remains for mining companies to find ways to be more competitive in an ever-changing world.

Building a competitive and sustainable enterprise is paramount for survival and growth. Companies remain focused on decreasing unit costs and improving operational efficiencies. Successful, sustainable enterprises:

- Understand the initial value of a mine project early on, and in order to extract the resources sustainably, find ways to protect that value and create additional value,
- Take a holistic view to mine planning and, integrate life cycle thinking into existing assets to optimize the overall return on investment for all stakeholders,
- Optimize the use of data and technology to better manage risks and opportunities,
- Leverage existing resources and nearby communities to build high-performance teams and partnerships,
- Have an overriding commitment to Health and Safety that is effectively integrated throughout the business.

ERM understands the challenges and implications mining companies face. Having been deeply involved in the sector for many decades, ERM has successfully assisted clients to navigate through and emerge quickly from multiple downturns.

As a result, we can help you develop a clear strategy and associated tactics for your operations at group, division and site levels so that you can protect and create value. ERM is in the business of sustainability. We enable faster, better, safer, cost-effective and more responsible mining.

Current trends

The outlook for the sector continues to improve. Close attention is still being paid to the lessons learned during the downturn. The convergence of technology advancement and lower levels of supply is leading to the creation of a new paradigm for the sector. This in turn is leading to:

- Realization that a lot has been done by the mining companies to fix some of the problems. Companies are thinking about capital allocation again, but with a continued focus on return on capital employed,
- Recognition of the need for different models of working, collaborating and thinking,
- An increase in mergers and acquisitions,
- The increased demand for battery metals (e.g. cobalt), limited geographies and potential value increases arise from the evolution of new technologies, and present a sustainability challenge for miners,
- Growing focus on studies and related activities.

Demonstrating value is a must for health, safety, environment and community (HSEC) management. Companies are embracing business excellence/ practices focused on:

- Compliance and robust risk management,
- Value protection and value creation,
- Building high-performance and integrated teams,
- Driving down costs (changing finance models),
- Implementing / leveraging technology across the life-cycle,
- Implementing innovative closure strategies to reduce long-term liabilities, and
- Managing with leaner teams and increased decentralization.

We continue to see major value opportunities across the life cycle

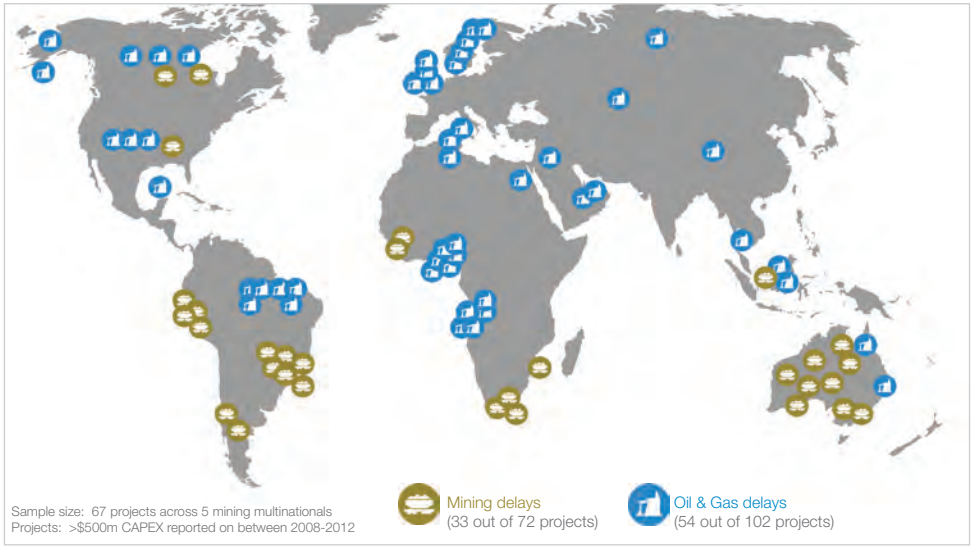
Case Study

ERM partnered with Anglo American to develop the Sustainability Valuation Approach© which identifies sustainability risks across the lifecycle and estimates their financial and reputational impact so that these can be fully incorporated into options analysis and decision making.

This approach brings together team members from all disciplines to identify constraints and assist in the early stages of mine design to avoid delays and costly changes later on.

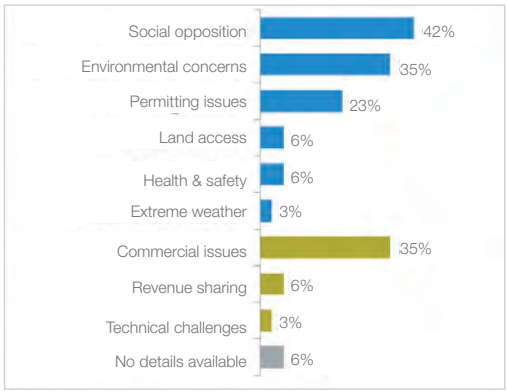
Recent ERM research looked at 72 mining projects and found that 46% of major capital projects missed their delivery date commitments between 2008 and 2016. This included projects from the last boom and through the downturn. The majority of these projects were delayed because of community opposition (42%), environmental concerns (35%), difficulty in obtaining permits (23%), and unfavorable commodity prices/capital shortages (35%). The delays had far reaching consequences including budget overruns, loss of trust from stakeholders, and negative shareholder sentiment.

Large mining and oil and gas projects delayed by sustainability issues



42% of large mining projects that were delayed from 2008-2016 were due to social opposition, while 35% were hindered due to environmental concerns

Causes of delays to mining projects



- *World-class mining project with capital expenditure of between US$ 3–5 billion will suffer roughly US$ 20 million per week of delayed production in Net Present Value (NPV) terms.*
- *The most frequently overlooked cost cited was the management time devoted to managing conflict, especially at senior management level*

Less than 9% of mine sites have been successfully reclaimed and relinquished.

In looking at mine closure, ERM research showed that mines were being required to monitor and manage water much longer than anticipated after final production representing a significant cost escalation.

ERM survey results demonstrated that post closure:

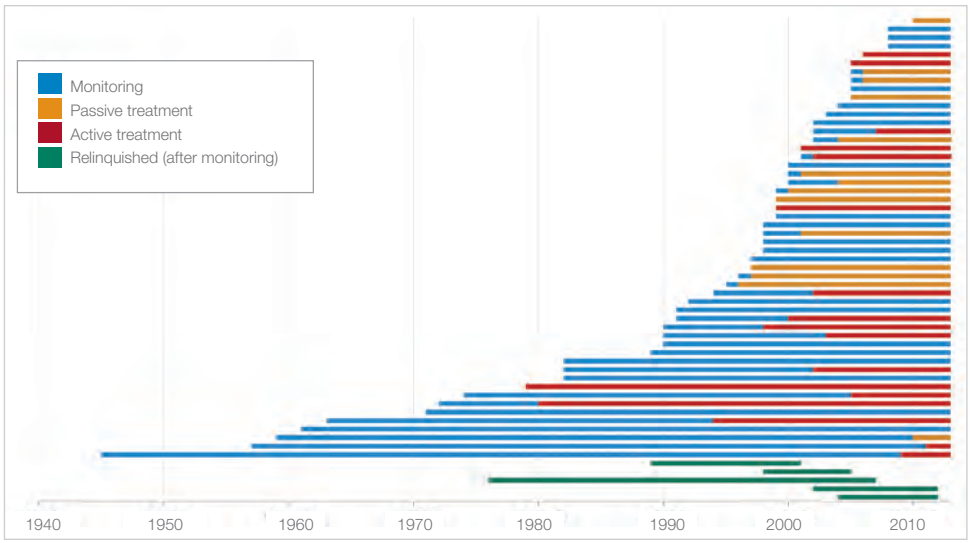
- 91% of mine sites still manage water.
- 51% are monitoring water.
- 33% are actively treating water.
- 27% are passively treating water.

Case Study

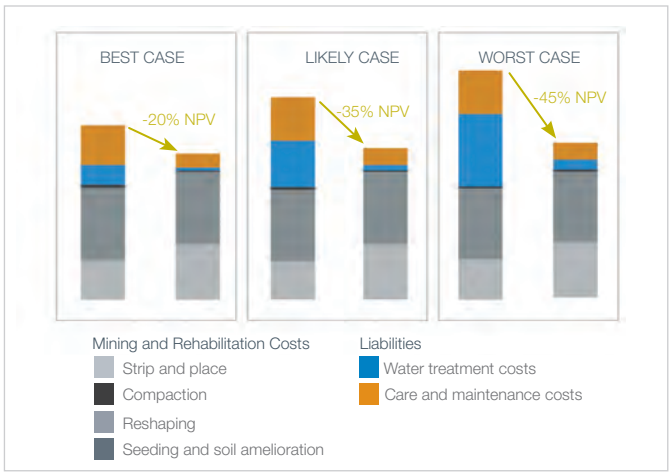
By integrating closure considerations in mine planning and operations, ERM has found that the total cost of closure can be reduced and the probability of relinquishment post closure can be increased.

By integrating closure considerations into early mine planning, one study into a coal mine showed that the mine Net Present Value could increase 20 to 40% by changing the stripping and backfill methods during the mining phase.

Post-closure status of 57 mines studied



Increased net present value of mines integrating closure considerations into planning



How ERM helps our clients

ERM and the mining and metals project life cycle

ERM offers complete lifecycle services to the mining and metals industry, from social risk management at the concept stage to closure implementation.

Our 4,500 employees combine strategic solutions with deep technical expertise to support your business objectives.

Concept

- Identify and engage with community stakeholders
- Build credibility with community and regulatory stakeholders
- Map potential fatal flaws and other project constraints
- Environment and social baseline studies
- Human factors requirements analysis

Feasibility

- Environmental, Social, Health Impact Assessments (ESHIAs)
- Plan and implement land acquisition and resettlement programs
- Sustainability master plans to improve socioeconomic performance across the lifecycle of the operation
- Adaptation issues to physical risks (e.g. water stress, climate change etc.)
- Human factors screening workshops
- Worker housing strategies
- Local economic participation strategies

HSEC due diligence for transaction support and public disclosure

Integration of environmental, social,

High-impact HSEC training program

Risk management strategies, catastrophic event and fatality prevention,

Closure planning and late life legacy

Construction	Operations	Closure
• Permitting • Design and implement detailed management plans to minimize sustainability risks and maximize opportunities • Manage community interactions with construction workforce • Human factors design specifications, safety critical task analysis • Establishing safety culture, leadership and training during construction	• Implement and monitor environmental, health and safety (EHS) management systems • Behavioral safety programs • Enhance productivity by improving sustainable performance • Assurance performance to improve EHS and social performance • Compliance management and permit renewals	• Risk based exit strategies • Develop sound closure goals • Manage long-term liabilities • Help ensure sustainable transition for post closure communities • Implement decontamination and demolition programs • Site planning for future use

GCP, health and safety considerations with life of mine plans and monitor performance

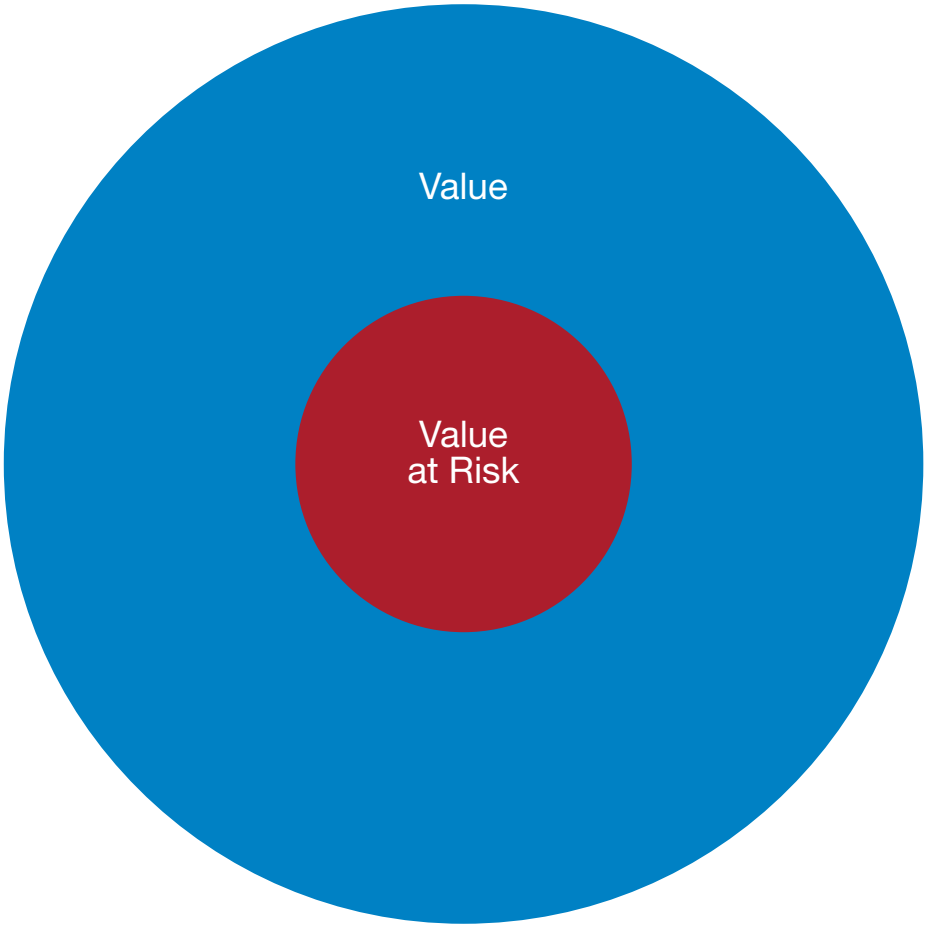
aimed at building internal capacity and achieving sustainable operational excellence

and implementation techniques

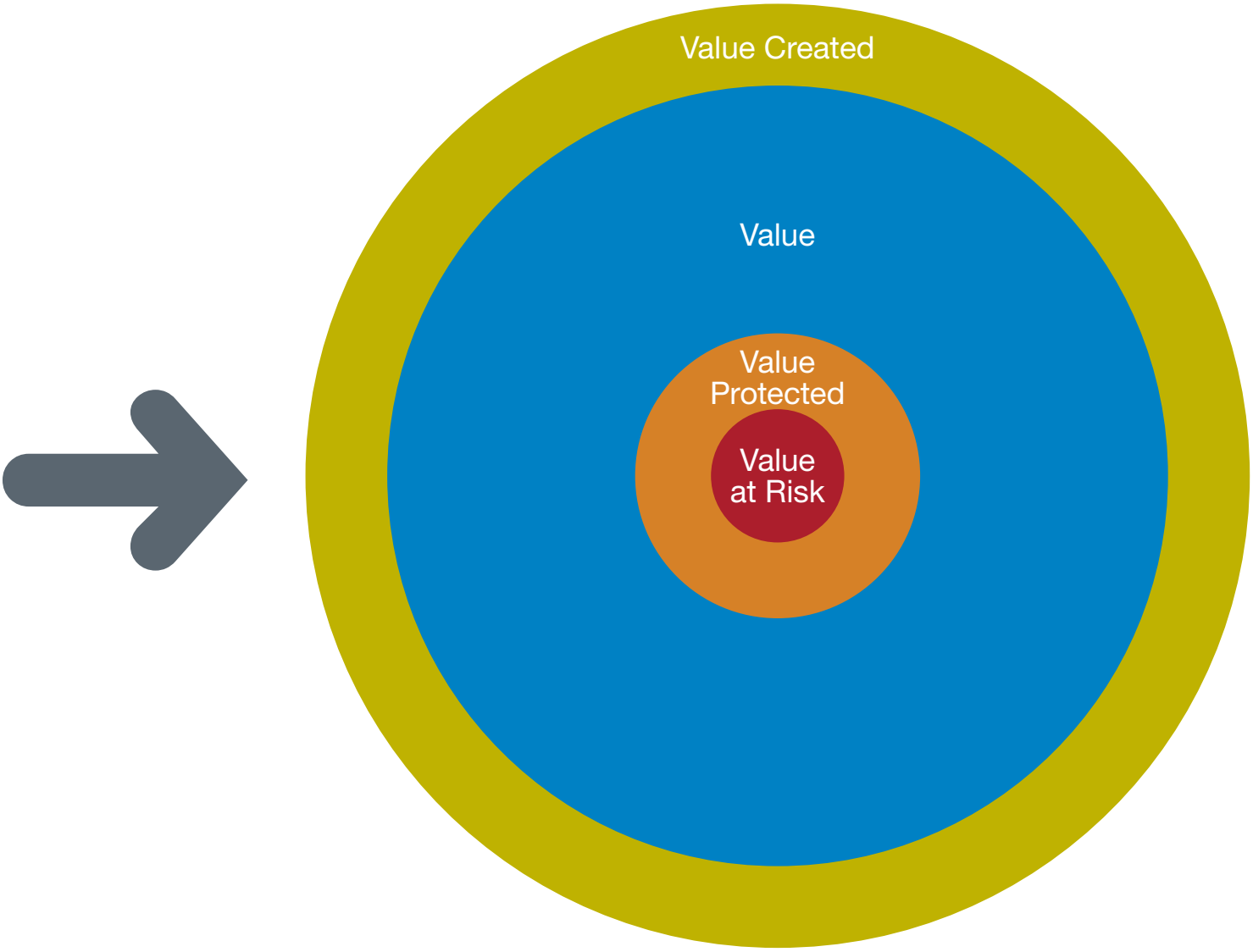
management

Value protection and value creation

Is your business enabled to understand your key risks and opportunities as well as interrelationships between these areas, in order to accelerate performance, and create and protect value?



Value at Risk represents non-technical risks that carry financial consequences for the viability of a project or operation, such as delays in planning, construction and operations, lawsuits or other unforeseen added costs, project cancellation or appropriation.



Value Protection is the value saved by mitigating risks through controls or investments. It is the value of successfully avoiding non-technical risks.

Value Creation is direct cost-benefit calculation of control or investments. The benefits can be the value from savings or productivity gains.

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About ERM

ERM is a leading global provider of environmental, health, safety, risk, social, and sustainability related consulting services. We have more than 160 offices in over 40 countries and territories employing more than 4,500 people who work on projects around the world. ERM is committed to providing a consistent, professional, and high quality service to create value for our clients. We have worked with many of the Global Fortune 500 companies delivering innovative solutions for business and selected government clients helping them understand and manage the sustainability challenges that the world is increasingly facing.