

CRC for Transitions in Mining Economies

CRC - TiME

Purpose

The purpose of the CRC for Transitions in Mining Economies (CRC – TiME) is to enable the mining sector to achieve relinquishment and deliver sustainable regional benefits to society after mining activities cease.

To achieve this, CRC - TiME will deliver:

- A roadmap for greater policy clarity around residual risk to better enable mine closure and lease relinquishment
- Valuation methodologies and risk analytics that facilitate net value decision making in mining operations
- Technological solutions that enable early interventions to minimise and better manage risk
- Regional planning and economic development models that will deliver value post mining
- Innovative design solutions and at scale supply chain development in mining rehabilitation
- Global market development for Australian mine closure METS companies
- A national network of trial and demonstration sites on operational and legacy sites

This will deliver value to the Australian economy by:

- Minimising risk and liability in mine closure to best facilitate lease relinquishment;
- Growing levels of trust and social license for mining as a major Australian industry;
- Reducing uncertainty for companies, regulators and communities and driving great investor confidence;
- Reduce the future likelihood of mine abandonment;
- Building Australia's mine closure Mining, Engineering, Technology and Services (METS) industry as a national and international business opportunity ;
- Empowering regional economies to thrive during and post-mining and;
- Developing employment, skills and capability in a key industry sector

Context

Australia's economy has been built off the back of our mineral resources. Many regional economies rely on mining to generate jobs and opportunities, with the resources sector the largest employer of Indigenous people.

In February 2019, the Commonwealth Government published a National Resources Statement, which identified the need for:

- Regional environmental outcomes, and recognition of related export opportunities;
- Stronger, more engaged communities through mining transitions; and
- Long term mine rehabilitation and closure research and development.

At the same time, the 2018 EY annual *Ten Business Risks facing Mining and Metals* report identified

social license as the number one risk factor for mining. Society's expectations of the sector have never been higher, with a recent Senate Inquiry into Mining Rehabilitation highlighting a lack of capacity to close mines as a challenge to existing operations and future sector investment. Addressing these expectations is key to ensuring that the mining sector continues to contribute strongly to the national economy and the Australian people.

As the industry matures, a robust mining economy will have mining operations in development, operation and closure phases. A key issue for a healthy mining sector will be how mining operations and their communities transition through mine closure to a post-mining future, and how mining regions plan for and adapt to mining lifecycles. Numerous major Australian operations are scheduled for closure in the next two to ten years (eg Argyle, Ranger, East Weipa, Gove, Rosebery, Telfer, Stradbroke Island sand mine, several operations in the Pilbara, Hunter Valley and Bowen Basin). In addition, state and territory governments hold unfunded abandoned mine liabilities of multi-billions of dollars (\$7.4B in Queensland; \$3.0B in WA; and \$2.4B in NSW). Together, these factors place regional economies at risk in all States, but also offer the opportunity to grow a new globally competitive service and technology sector to address an emerging billion dollar market in mine closure and transitions. These mining services can be applied both nationally and internationally.

CRC – TiME aims to provide mining, METS companies, regions and the community with certainty and innovative solutions to better close mines once they reach the end of their life, and also to deliver positive outcomes for the communities that remain.

CRC - TiME will develop and commercialise solutions to industry-wide challenges such as waste rock and tailings management, and drive a rehabilitation and environmental management economy. It will encourage private sector investment and innovation, creating jobs that will service mining-facilitated sustainability outcomes in Australia and globally. Importantly, it will deliver stronger regional economies and indigenous livelihoods by exploring opportunities mine closure investment may present for local business development and employment and how the re-purposing of mined land and infrastructure can contribute to regional development opportunities. Greater clarity in regulatory and social processes to close, relinquish and/or repurpose mines will encourage greater confidence for new investment into Australia's resources.

The resources sector is more open to scrutiny than ever before with information (and misinformation) moving rapidly through communities and interest groups. CRC-TiME will support the industry and Governments with transparent processes and knowledge platforms to develop collaborative pathways for mine closure. This will include innovative re-purposing of mining land for post mining use and the development of interactive predictive models of social, economic and environmental impacts and potential opportunities for repurposing of land. In this way, the outputs of CRC-TiME will improve Australia's standing in the international community, as leading proponents in delivering successful mine closure and transitions for all stakeholders.

WHY A CRC?

Transitioning through mine closure and beyond is a shared challenge with very few precedents. The CRC-TiME Program provides the long term funding, governance and robust structures to work alongside the mining and the METS industry and create the long term outcomes at a scale that can create a step-change in the sector. Unlike many other funding schemes, the CRC Program can build project by project toward an integrated solution to very big problems. Most importantly, CRCs are established to be industry-led. The CRC-TiME research shall be conducted to create solutions to real

industry issues; not just to deliver traditional academic papers and reports.

More specifically, the CRC-TiME will respond directly to the action plan outlined by the Federal Government in their 2019 National Resource Statement:

- Ensuring Australia has, and is seen to have, competitive business settings and clear closure frameworks to maintain Australia's position as a leading investment destination. CRC-TiME will work across states and territories to identify and streamline business settings that are inefficient, particularly where they cut across more than one level of government.
- Developing new exportable businesses by building a strategic and long-term capacity to address the tailing, rehabilitation and closure challenges that are key to economic and environmental sustainability. The International Council of Mining and Metals (ICMM) identified closure for the first time as a priority issue in its 2019 - 2021 strategy
- Collecting, integrating and using environmental, heritage, socio-economic and geoscience datasets to enable governments, industry and communities to make better informed decisions on regional transitions in mining regions – hence improving community trust in the sector.

RESEARCH PROGRAMS AND CHALLENGES

CRC-TiME has been designed to increase the certainty of mine closure and relinquishment, reduce the likelihood of abandonment and diversify mining dependent economies. It will achieve this by building trust between mining companies, regulators and communities, improving the business settings for closure and succession and defining and reducing residual risks.

The proposed framework for CRC-TiME will deliver an integrated approach to closure and post-mining economies research, and create national digital and physical infrastructure to enable more effective demonstration of mine closure innovation and technology transfer.

Three integrated programmes are proposed to better connect mine operations to long term regional and community opportunity by:

- facilitating the co-development of options for post mining futures;
- building long term residual risks into mine valuation and design and;
- delivering technology for early and effective interventions that will deliver fit for purpose, post mining land use.

CRC FOR TRANSITIONS IN MINING ECONOMIES (TIME)



Program 1: Regional Economic Development through Post Mining Futures

Key Challenge

The social and economic landscape for mining is increasingly complex, including the critical phase of mine closure. This program seeks to enable all stakeholders engaged in mining regions to develop proactive strategies to effectively plan for and manage mine transitions and closure. It will provide all parties with increased certainty and a shared understanding of each other's perspective, and build opportunities for local economies to develop long term strategies that capitalise on mine closure investment and infrastructure. This program will lead to greater clarity of closure regulations and policies within and across jurisdictions and provide a balanced approach to enable innovative rehabilitation and re-purposing of mining land to drive jobs growth within local and regional communities.

The specific industry issues this program will address are:

- Fragmented and unclear policy frameworks and siloed approaches regarding mine closure within government and industry organisations within and across Australian jurisdictions;
- Mechanisms to transfer residual risk between parties and enable relinquishment;
- Inadequate consideration of the socio-economic aspects of closure, including identifying and maximizing the opportunity for on-going asset utilization post mining;
- Inflexible policy settings for sustainable mining land re-purposing;
- Low public confidence in industry and government approaches to integrated land-use or relinquishment planning data;
- Poor integration of individual mine closure plans with local and regional development strategies, resulting in missed opportunities and lack of consideration of cumulative impacts.

Outputs

- **A roadmap for greater policy clarity:** There are a range of different approaches in terms of mine approval, rehabilitation and closure, creating a level of uncertainty and ambiguity for all parties. This output will assess policy settings at a state and national level that induce counter-productive outcomes for mine relinquishment. The program will develop mechanisms to transfer residual risk from one party to another and recommend policy amendments to enable industry and government across Australia to work together and better communicate stewardship frameworks, regulations and actions.
- **Regional land use planning systems:** The development of spatial decision support systems that will enable regions and local community members to make informed and effective decisions that integrate site-to-regional scale rehabilitation, repurposing, and post mining decisions. These models will incorporate qualitative and quantitative data regarding productive, aesthetic, cultural and heritage values, in addition to regional socio-economic data relating to local communities and infrastructure.
- **Integrated regional planning and community engagement tools for closure:** Challenges associated with mining are amplified at the local and regional levels making regional planning and community engagement regarding closure and relinquishment increasingly complex. This output will investigate how to more effectively integrate closure plans with regional development strategies and empower local stakeholders to plan for post-mining futures. New community engagement tools will build consensus with a broader range of stakeholders in a variety of temporal and spatial contexts.

- **Leverage post-closure scenarios:** This will share, apply and test alternative post mine land uses and the viability of repurposing strategies in different settings. These will be supported with region specific frameworks that provide governments, industry and community confidence that rehabilitation meets the requirements of all stakeholders.
- **Wealth generation in regional and remote locations:** The development of more sophisticated, community-endorsed models using baseline and accurate evidence-based inputs to assess the long-term socio-economic, cultural and environmental value of a range of re-uses for mine sites, assets and infrastructure, will enhance transition and facilitate the attraction and retention of local business activity. These models will mitigate mine closure impacts through informed planning, with Aboriginal-owned businesses and local skills and capacity building in mind.

Impacts

The impact of this research will be greater continuity and alignment of mine closure policy and practice within and across all Australian jurisdictions. A robust, transparent approach to mine closure and land re-purposing will provide greater certainty for all stakeholders.

Early engagement and improved inclusive communication strategies will enhance transparent reporting mechanisms and engender greater community and regulator trust in mining company closure activities. Improved evidence-based citizen science will provide greater clarity regarding community hierarchy of trade-offs and tolerance for risk in re-purposed land prospects while also improving the mining sector's social license to operate.

Creating opportunities for productive and sustainable re-use of mining land and infrastructure will elicit wealth generation and livelihoods post mining through diversified regional economic development, such as Aboriginal economic development. The potential for Aboriginal economic development and the capture of new commercial opportunities through the METS industries from repurposed land and infrastructure will provide skills development and new business opportunities in remote locations.

Programme 2: Risk, Valuation and Decision Making for integrated long term outcomes.

Key Challenge

The interactions between the mining asset and regional outcomes run very deep, commencing at the start of the mining cycle and continuing beyond the life of mine through to relinquishment and reuse. Traditional valuation techniques based on discounted cash flow (DCF) analysis are used in the mining industry place a high level of importance on cash flows in the short-term, potentially leading to deferred progressive closure decisions and increasing liabilities that accrue in the long term. This programme will develop predictive models that align long term costs, value and risk to inform strategic decisions throughout the life of mine that facilitate more realistic closure costs into the future. The specific issues that this program will address are:

- Lack of integrated, long term risk assessment and mine planning technology solutions that facilitate closure planning
- Traditional valuation techniques based on discounted cash flows (DCF) do not accurately reflect the option values, intangible values and risks from closure, hence leading to long term and increasing liabilities. This results in high levels of uncertainty arising from long lead times and limited valuation assessment of subsequent land uses.
- Lack of transparency and uniformity in the way that closure costs and liabilities are assessed.
- Limited understanding on the level of residual risk that is acceptable to be transferred to a subsequent land user.
- Opportunities for upskilling. Development of training curriculum and certification process for mine closure professionals.

Outputs

- **Integrated risk metrics:** The development of frameworks for evaluating long life assets and a suite of integrated and standardised metrics for incorporating secondary, cumulative and progressive impacts over the life of mine
- **Predictive risk models:** The sensitivity of the region to alternative operational activity will be more accurately identified through nested (multi-scalar) and predictive models of residual risk (threats and opportunities) to water, ecosystems and people. This will provide progressive quantification of uncertainty in residual risk over and beyond the life of a mining project.
- **Real time risk monitoring standards and tools:** Integration of risk monitoring that provide mechanisms to effectively assess changing risk profiles, provide opportunity for transparent reporting and take advantage of emerging technology
- **Valuation methodology:** The true value proposition of the project based upon its unique characteristics (e.g. expected life, commodity, production levels, etc.), will be made more explicit with greater clarity of the benefits and acceptable level of residual risk that can be transferred for alternative subsequent uses. Tools to value residual risk, optionality and intangibles to support design decisions that deliver long term value and support progressive closure outcomes
- **Interoperable software:** The linking of accurate recognition of activities where the cost and benefit are separated by long lead times into mine design tools through new software will enhance accuracy of valuation and prescient decision making.
- **Development of mine closure professionals:** Growing capacity and capability in the fields of mine closure and post mining transition, as skills that can be applied nationally and internationally.

Impacts

Greater certainty and confidence will emerge through early identification of the total anticipated residual risk from mining, along with the acceptable residual risk for a subsequent land use options. By accurately recognising the costs, benefits and risks of a project, better strategic decisions will be facilitated and the planning horizons that are commonly used for large projects will be extended by uncovering their whole-of-life value to all stakeholders.

Shared and transparent strategic decision-making practices will lead to optimal land use both during and beyond the stage of mining operations. This will drive greater Government and community confidence that closure objectives are achievable and that effective processes can provide more certainty in assessing progress towards relinquishment and the opportunities that will flow from that.

More accurate quantification of long term risks and liabilities will improve accuracy of financial provisioning and enable fiscal incentives can be set to promote desired behaviours knowing what the impact will be on their revenues. This will re-establish Australia as a leader in the risk based management of long life assets.

Programme 3: Operational intervention to reduce residual risks

Key Challenge

Mining Operations directly connect to to the environmental and socio-economic impact and long term residual risk. Environmental impacts are strongly correlated to the level of trust between the community and the mining company. This research program will demonstrate and test innovative operational solutions that reduce the long term post-closure risks to land, water, ecosystems and people and deliver fit for purpose post mining land use.

The specific issues that this theme will address are:

- Addressing closure in the design of mining assets and associated infrastructure
- Quantitative reductions in and improved management of the production of materials (waste rock and tailings) that impact land, water and ecosystems.
- Collaborative development and demonstration of options for safe, stable and sustainable post mining landscapes (landforms and living systems) in a dynamic environment.
- Lack of communication and a siloed approach to both technology deployment and data sharing across disciplines, companies and regulators.
- Capability and capacity building in supply chains and METS companies supporting closure and post-closure activities

Outputs

- **Closure in Design toolkits:** An options based toolkit which evaluates the operational and financial benefits of incorporating closure in design to optimize environmental, social and economic outcomes and support asset planning decision making.
- **Rock mass closure characteristics database:** A comprehensive, cross-company and growing database of rock mass chemical potential for key long terms risks: AMD, sponcom, liquefaction, toxicity, weathering and erosive potential.
- **Geometallurgical process interventions:** Technology solutions that can be implemented at mining, comminution and processing plant scale to reduce residual risk at and post closure.
- **Innovative new ecological engineering solutions:** New innovation in post mining landscape design and construction, including bioremediation and soil development, soil-plant cover systems and at scale restoration technology that minimise risk and support fit for purpose land use
- **Business solutions for scaling up ecological restoration:** To ensure Australia has adequate systems to deliver on future rehabilitation demand. This includes consideration of biodiversity supply chains and associated livelihoods as well as toxicity reduction, restoration monitoring and livelihood generation.

Impacts

The adoption of the technologies and personnel developed through this programme will lead a global industry to decrease escalating closure costs (conservative estimates of \$2 billion for a large scale operation), potentially saving \$billions in long term liabilities by demonstrably protecting the future of the environment and communities, hence minimising the risk of losing social confidence

The Mining, Equipment, Technology and Services sector participants provide the path to market for the technologies and services developed in this programme. The technologies will give these Australian SMEs a competitive edge for a growing billion dollar global market for mine closure solutions.

Implementation of the technology solutions at abandoned mines will reduce the risks and liabilities associated with those sites and deliver additional value back into the State economy. The demonstration of these solutions will increase the quality of discussion between regulators and mining companies, with a focus on delivering better environmental outcomes through early and progressive intervention, thereby increasing the likelihood of a successful relinquishment of mining leases.

CROSS CUTTING RESEARCH INFRASTRUCTURE

While each of the three programs will produce their own set of products, it is not sufficient for the CRC to simply deliver these outputs and assume implementation. Cross cutting programs and infrastructure will also be established to provide an integration of results, as well as a one-stop-shop portal for access to the many outputs produced by the CRC (such as documents, videos and datasets).

The Challenge: There is a lack of shared infrastructure to support the development and demonstration of integrated and collaborative approaches to residual risk reduction and post closure transitions. Specifically:

- There is a siloed approach to site based research with little sharing of data and a perception that most solutions are site specific. This has led to significant research investment that has limited transferable value or is not able to address the fundamental challenges facing mining rehabilitation and closure due to their interdisciplinary nature.
- Infrequent integration of closure related data from multiple site, the analysis of these aggregated datasets and transparent accessibility of this information has fostered mistrust between stakeholders.

Networked demonstration sites.

By networking across a series of demonstration sites representing differing environments and including both abandoned and operational sites, the CRC TiME will develop solutions that are scalable, providing local, regional and nationally relevant knowledge and systems. Working on operational and abandoned sites provides further unique value through embedded experiments, living laboratories and shared learning, and mechanisms for more rapid technology testing and commercialisation opportunity.

The outcomes from these demonstration sites will include:

- Shared and accessible opportunities for communicating the science of mine closure research.
- More accessible opportunities for testing technology performance.
- Rapid pathways to market for innovative METS companies.
- Pilot scale trial and demonstration sites commenced on a network of living laboratories. A network of land restoration and risk mitigation projects will be initiated in different demonstration environments for long term assessment and monitoring.
- A decade of time series data monitoring restoration performance at demonstration sites and used to support probabilistic approaches to assessing the residual risk of closure.

Shared Data and Systems Integration

The data challenge is a fast moving target with technologies and expectations around transparency both increasing at an exponential rate. The CRC will create the data environment to ensure Industry's expectations around data management and access are adhered to, and to allow government and the public timely access to our work in an ongoing manner.

The integration challenge is significant but has a critically important role in delivering a step change in operational efficiency, predictive capability and transparent decision making for mine closure. This will require the co-development with industry and regulators of how to extract value from the complex data associated with mine closure. This will include data and information from individual enterprise actions across the life of mine; regional baselines that synthesize where we are now and; dynamic tracking of progress of acceptable outcomes across economic, social and environmental attributes. The science will extend current practices for natural capital accounting to include triple bottom line valuations that quantify the risks and values of each step in the mine closure to post-mining use chain.

BENEFITS OF PARTICIPATION

CRC end-user partners, which include industry and government participants, will share in a number of benefits, including:

- More cost effective solutions to mine closure
- Greater certainty around mine relinquishment and risk transfer
- Regional economic development
- New METS opportunities for a global market in mine site restoration
- Stronger and more trusted relationships within the industry.
- Lower cost of capital
- Increased corporate reputation and confidence in license to operate
- Leveraged funding for technology development
- Creating future leaders and talent
- Eligibility for R&D Tax Credits (seek independent advice on your organisation's eligibility)

EDUCATION AND TRAINING

CRC - TiME participants have extensive experience in delivering industry-driven education and training programs. The Mine Closure Planning Practitioners Association has recognized that the absence of mine closure planning and cost estimation training and qualifications has constrained the mine closure and rehabilitation professional development pipeline, and has led to a capability and capacity deficiency within the mine closure and rehabilitation industry. This in turn is impacting on the quality of mine closure outcomes.

CRC – TiME will facilitate education and training to address gaps in current and required capability and capacity within Australia and work with MCPA and key stakeholders to develop a competency framework for mine closure planning practitioners. Furthermore, the long-term success of CRC - TiME requires the uptake of innovations. Critical to this is building understanding and skills to accept, value and adopt these outputs.

To this end, CRC - TiME has devoted significant resources to the development of human capital across all stakeholder groups, ensuring that the benefits of the three thematic research programmes are realised. This will be achieved in the Education and Training Program across three essential integrated components:

- Educating Future Industry Professionals;
- Industry Dissemination and Skills Training; and
- Community education on the industry.

Educating Future Professionals

CRC - TiME will contribute to providing executive talent by developing future leaders in mine closure. These emerging executives will undertake leading research on industry defined problems and subsequently be in a position to contribute to building capacity within businesses to drive on-going commercial innovation.

These higher degree students will complete PhD or Master by research on an industry defined problem and be embedded within an industry participant organisation during their studies. To further enhance ongoing benefits for industry they will complete business focused training.

This approach will increase employability of CRC - TiME postgraduates by providing exposure to business culture and industry issues. Hence, they will not only have technical knowledge but also be proficient in effective teamwork, high level communication skills and the commercial acumen required to be successful in business. CRC - TiME graduates will be industry-ready employees, having completed their qualifications whilst working in industry, on industry problems and delivering solutions that are valuable to industry.

To assist recruitment of new PhD and master's students, an Honours program with internship scholarships for industry defined projects will be implemented amongst research organisations. The internship will be integrated in a flexible manner into relevant academic program at undergraduate student's university.

Industry Dissemination and Skill Development

The complexity of mine closure means that the knowledge needs of the future workforce will be profoundly different from today. The ability to work within this complexity will require a continuous process of upskilling to solve new problems.

The outcomes of the research will be used to generate appropriate modules and curricula for existing programmes at partner Universities, offering the opportunity to create specific qualifications such as a Graduate Certificate in Closure Management, or appropriate micro-credentials requested by CRC participants.

The CRC - TiME will develop specialist short-courses for delivery to industry and as postgraduate coursework programs. These short courses will allow nationwide focused extension and communication of the latest developments in mine closure. In addition, CRC - TiME will work to integrate courses into existing VET offerings. Wider dissemination through Massive Open Online Courses hosted on public domain platforms such as edX represent another avenue.

Stakeholder Engagement and Education

CRC - TiME projects will involve the acceptance of new technologies and approaches – in essence the research outputs will require a social license from the community to be adopted and implemented. In this context, projects will include community engagement and promotion activities into their milestones.

Methods to reach the relevant stakeholders and communities will vary on a project-by-project basis and planned within the project inception process. It will also involve the use of communication tools to promote community awareness and capture of relevant feedback. This includes web and social media technologies, seminars, school and presentations.

The community-based education effort will promote awareness, consensus and understanding within a range of target stakeholder groups and communities. CRC - TiME will seek to maximise its impact (and minimise overlap) by evaluating and utilising existing communication channels and programs - as well as create its own based on the findings of its research.

CRC - TiME GOVERNANCE AND MANAGEMENT

Once established, CRC - TiME will be a company limited by guarantee with the CRC participants being its members. The collaborators in the CRC - TiME represent participants the entire mine closure process – approval, regulators, mining operations, environmental management and closure.

The governance and management structure of the CRC - TiME has been designed to deliver commercially driven and viable outputs that will solve industry identified challenges. At the same time, the structure will promote high levels of quality collaboration between the participants and achieve the highest standards of accountability. This will ensure that CRC - TiME can fully exploit the diversity of expertise and knowledge within the participant group.

The Board

The CRC - TiME company will have its own skills-based Board elected by the members of the company. The CRC - TiME Board will have seven directors, comprising:

- Chair (Independent).
- International (Independent)
- Research (Independent)
- Industry (Independent)
- Industry (Non-Independent)
- SME Industry (Non-independent)
- Government (Non-independent)

All Directors are elected by the members of the company weighted to their cumulative cash contributions and against a skills-matrix. The non-independent members and one independent director will be nominated and elected via electoral colleges, namely:

- **SME College** – independent businesses with fewer than 200 employees.
- **Industry College** – businesses that are part of a larger group or more than 200 employees.
- **Government College** – Government agencies or Departments.
- **Researcher College** - Research participants nominating an Independent Director.

The Board will be aided by Board sub-committees, namely:

- Audit, Risk & Finance
- Remuneration & Nominations
- Research & Commercialisation
- CRC impact

These subcommittees will be chaired by a Board member and established following ASX and AICD guidelines. They will be constituted by the Board, including expertise from both the CRC - TiME Participants and outside. Their role is to provide expert advice and recommendations to the Board.

Dr Bruce Kelly is the initial independent Chair of CRC - TiME. Dr Bruce Kelley has had 32 years in the mining industry with CRA and Rio Tinto. He was previously the Global Practice Leader – Environment for Rio Tinto (2006 – 2013), Executive Director of the Rio Tinto Sustainable Minerals Foundation (2005 - 2008) and Chair of the Board of the International Acid Rock Drainage Network (INAP) (2008 – 2013) which he also helped to establish in 1998. He is currently Senior Advisor to INAP. In addition he was Deputy Chair, National Executive Committee, Site Contamination Practitioners Australia (SCPA).

Dr Kelley has also had a long association with the translation of research into solutions, including as an Advisory Board member of the Australian Centre for Mining Environmental Research (ACMER) and The Julius Kruttschnitt Mineral Research Centre (JKMRC). He was also Chair of the Advisory Board of the Centre for Environmental Risk Assessment and Remediation (CERAR) at the University of South Australia (2006 to 2015).

Project Initiation and Approval

Projects are initiated by industry participants in consultation with the CRC senior management team, who will then facilitate the formation of the project agreement and delivery of the project objectives. The scope of each project is defined by the industry participant(s) within the project and the project details are set out in individual project agreements. These details include issues such as:

- Project objectives;
- Project leadership;
- Research team;
- Research plan and methodology;
- Budget and payment schedule;
- Total contributions by each party;
- Intellectual property; and
- Utilisation and commercialisation plan.

Projects are approved by the Board on advice from the Research and Commercialisation Committee, where they are assessed in terms of the:

- Project objectives alignment with the CRCs agreed outputs;
- Compliance with the Commonwealth and partnership agreement;
- Quality and appropriateness of the research plan and methodology to meet the objective; and
- Strength of the utilisation and commercialisation plan to maximise impact.

A project is approved once the agreement is signed by CRC - TiME and all project parties.

Intellectual Property

Intellectual Property (IP) generated in the CRC - TiME project remains for the benefit of the project parties in that project. Parties to a project will negotiate treatment of Project IP during project formation and this is captured in each project agreement. This includes ownership, access, licensing and utilisation. Any Background IP used in projects remains the property of the original owner, and access rights will be clarified in project agreements at the outset.

Responsibility for commercialisation of project outcomes is as per the project agreement with the lead Industry Participant normally taking that role. The decision to file for a patent over project IP will normally rest with the Industry Participant. The CRC - TiME will not typically seek any equity in project IP. It may in some cases seek on-going research rights and/or commercialisation rights in areas outside the scope of the Industry Participant.

Project Management

Management of each project will be the daily responsibility of the project leader designated in the project agreement. However, they will need to be in close consultation with the designated industry

leader(s). Once established, research activities will be monitored and kept on track through three levels of progress review:

- **Fortnightly Portfolio Review** - Conducted by the senior management team, this review will focus attention on reviewing responses to known problems and identifying emerging issues.
- **Quarterly Report** - The project leader will submit a written report to the lead industry participant quarterly. Acceptance by the industry participant is a key prerequisite for payment of project team members.
- **Annual Review** - Conducted by the CRC - TiME management team and the relevant theme and program leaders, each project will be thoroughly reviewed on an annual basis. This review will examine technical progress; roadblocks; IP and knowledge creation; publications rate and quality, patentability of discoveries; progress of any embedded PhD students.

Risk Management

The CRC - TiME recognises that managing risk plays a critical role in ensuring delivery of objectives. The CRC will have a risk management policy and implement a risk analysis and mitigation strategy at both an organisational and project level. Processes will be based on the current standard for risk management (AS/NZS ISO 31000:2009). At each level, risk analyses identify and address scenarios and events that might prevent the company from delivering its objectives.

CRC - TiME risk exposure will be reviewed on a quarterly basis by the CEO, by the Risk and Audit Committee and subsequently by the Board. The Research program will deploy a proactive risk management process.

POTENTIAL PARTICIPANTS

The CRC - TiME will target the following Participant groups:

- Mining companies;
- Mining equipment, technology and services companies;
- Federal, State and Local Governments; and
- Indigenous groups and communities.

PARTICIPANT INVESTMENT

There is no standard investment requirement for participants. The level of investment depends on the individual Participant and the amount of benefit it expects to derive from the CRC - TiME. Investment can consist of cash or in-kind resources. The more cash committed by our partners, the more competitive the CRC - TiME bid will be and the more Commonwealth funding that can be secured.

Based on our experience, typical contributions would be in the range of:

- **SME industry partners** – from \$10,000 to \$50,000 pa cash contribution;
- **Mid-tier to larger industry partners** – from \$100,000 to \$1,000,000 pa cash contribution;
- **Government departments and agencies** – from \$50,000 to \$200,000 p.a. cash contribution;
- **Research organisations** – from \$150,000 to \$300,000 p.a. cash contribution.

CRC TiME is focused on providing the innovation and collaborations to drive growth in Australian mining and the services industries that support it. To this ends, the CRC- TiME is encouraging SMEs to participate in the CRCs research agenda through clusters. These clusters can be through sponsoring peak bodies, growth centres, joint ventures or special purpose entities. In the case of a peak body, we would anticipate the peak body would secure small investment from a select group of companies, which would be managed by the peak body on behalf of the contributing members. The peak body would become a member of CRC-TiME.

Other mechanisms such as clusters managed by growth centres, joint ventures and special purpose entities (created to draw together a broad number of SMEs) will operate in a similar way to provide a united voice for smaller investors.

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