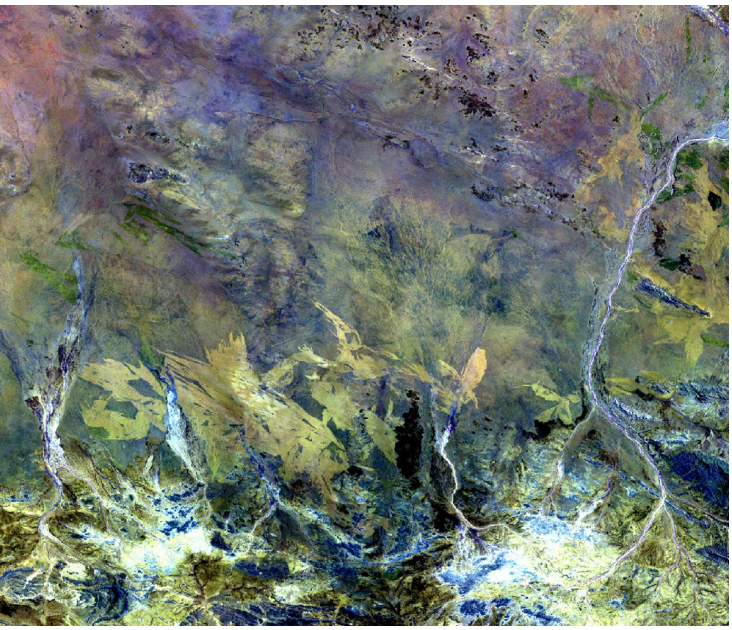
FACT SHEET

CRC TiME
Transformations in Mining Economies

# Foundation Project 3.2: A roadmap for adapting to technological change in remote sensing and monitoring capabilities



## INTRODUCTION

Remote sensing and monitoring tools are being more widely used in the mining industry. Despite this, there are no common or agreed industry or regulatory standards for the rigorous and reliable reporting of monitoring to stakeholders.

There is a strong desire for consistent approaches to acquiring, analysing and reporting outcomes, and to adapt to the rapid technological change in remote sensing and monitoring capabilities. Regulators also need confidence that remote sensing outputs are accurate and will sufficiently meet regulatory requirements.

This project aimed to identify technological gaps and other information that could transform current mine monitoring practices and establish a basis for developing standards based on best practice. It also aimed to articulate priorities that would lead to the development of a research roadmap.

## THE CHALLENGE

CRC TiME set out to tackle the challenge of:

- Determining what industry and regulators need or want to be monitored using remote sensing, through surveying and connecting user groups (mining companies, METS and government regulators).
- Determining what platforms/technologies are currently being used to achieve monitoring.
- Developing a research roadmap.

## KEY FINDINGS

**An important part of the research involved a survey of 53 stakeholders from across all sectors of mining (academic, consultant, industry, government), with 22 follow-up interviews. Survey participants responded as follows:**

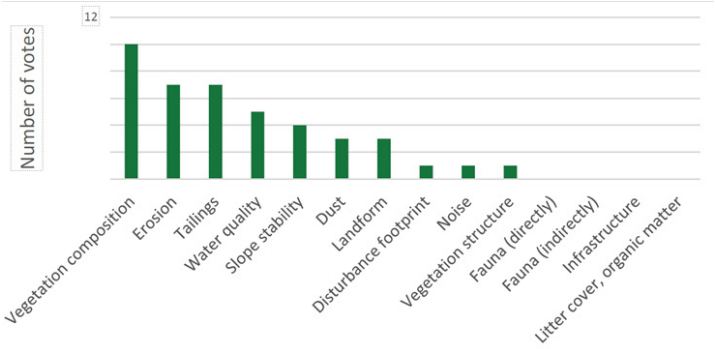
- **Most thought that infrastructure and disturbance footprint were monitored adequately.**
- **Over 50 per cent noted the monitoring of tailings as inadequate.**
- **Current inadequacies of monitoring that could be improved were flagged by 40 per cent of respondents for air pollution and 55 per cent for dust.**
- **Most believe noise should be monitored differently.**
- **Of those who monitor water quality, 33 per cent thought it should be done differently.**
- **Over 75 per cent of relevant respondents considered current practices of biodiversity monitoring to be inadequate.**
- **More than two-thirds considered current monitoring techniques for vegetation composition and structure to be inadequate.**
- **67 per cent believed that monitoring of litter cover and organic matter is inadequate.**
- **Most thought that most methods of fauna monitoring were inadequate.**
- **57 per cent considered the monitoring of topography inadequate.**

## THE OPPORTUNITY

Information and technology could transform mine monitoring practices. This project gave opportunity to assess these catalysts for change, using an online survey and conducting follow-up interviews of people across government, environment, and the mineral industry.

This information could then be used to articulate priorities for a CRC TiME research roadmap, with stakeholders identifying research questions and technological gaps that could help improve current mine monitoring practices.

Several different approaches to prioritisation were used. These included legal, social or ecological priorities, a ranking approach, and what stakeholders identified as areas that should be monitored differently.




*Priority of features that need improved monitoring*

## OUTCOMES

In many instances, stakeholders identified the need to standardise monitoring protocols that use best practice across a range of areas. Some areas of highest importance to monitor included tailings, vegetation composition, and landform, while areas that should be monitored differently were fauna, vegetation structure/composition and slope stability.

Specifically, in line with the key findings, respondents said that:

- current practices to monitor slope stability and erosion require improvements, as they are reactive in nature and need to have proactive (predictive) techniques to reduce risks faced by staff conducting field assessments
- current methods of landform monitoring are adequate, but improvements are needed for consistent reporting and standards, and remote sensing could help take this a step further
- there are issues with monitoring capability, the slow uptake of new technologies, and the importance of having a team with mixed backgrounds
- there is a need for training and education programs to allow better uptake of remote sensing and other new technologies
- there are issues with current regulation practices and compliance, in that current practices often involve reaching compliance. Also noted was that all sectors of mining need to conduct more monitoring, to ensure adequate progression of rehabilitation, and that importance needs to be placed on social responsibility and its relationship with successful rehabilitation
- over time, remote sensing techniques will be incorporated by all sectors of mining. Despite these techniques being flagged as having great potential to improve current monitoring practices for all categories, some highlighted the need to validate the data and to interpret results adequately, and the need to have a centralised agency to evaluate the suitability of different brands of platforms and sensors, as well as methods in remote sensing.

## NEXT STEPS

The following research goals were identified to enable the widespread adoption of remote sensing technologies:

- Effective standards for the use of remote sensing and monitoring, which will be enabled through establishing institutional frameworks, and based on exemplar sites and use cases. This includes systems and protocols to enable cross-region comparisons.
- Maximising the utility of data and cost in relation to closure criteria and management actions.
- Assessing environmental markets to apply tangibility to intangible assets (e.g. carbon markets).
- Building confidence in the products from remote sensing technologies through on-ground verification and well-designed sampling frameworks.

## PROJECT PARTNERS

The University of Queensland; Commonwealth Department of Climate Change, Energy, the Environment and Water; Curtain University; K2fly; FMG; Rio Tinto; Queensland Department of Resources; Geoscience Australia; South Australia Department for Energy and Mining; Newmont; Western Australia Department of Water and Environmental Regulation; OZIUS; emapper; Roy Hill

## PROJECT PUBLICATIONS

REVIEW FULL REPORT

Hernandez Santin, La., Erskine, P.D. & Bartolo, R.E. (2022). A roadmap for adapting to technological change in remote sensing and monitoring capabilities. CRC TiME Limited, Perth.

## ABOUT US

The Cooperative Research Centre for Transformations in Mining Economies is part of Australia's national innovation ecosystem. Our diverse partnership brings scale, collaboration and coordinated investment to tackle the most complex mine closure and post-mine transition challenges. Together we're rethinking what's possible to improve outcomes for people, communities, the environment and industry.

**We acknowledge the traditional custodians across all the lands on which we live and work, and we pay our respects to Elders both past and present.**



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