DIAGRAM

Project 2.2: Exploring the issues in Mine Closure Planning

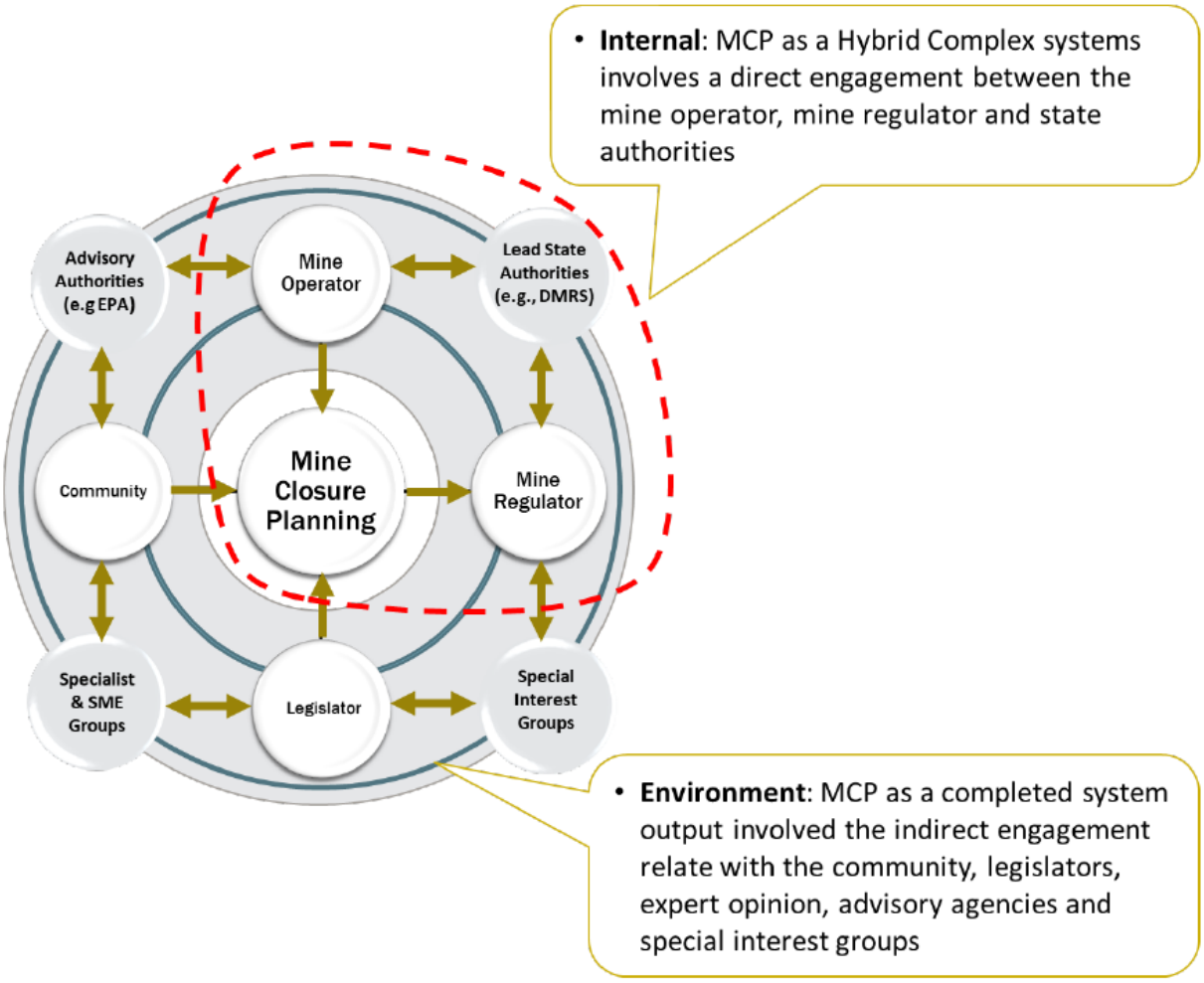
CRC TiME
Transformations in Mining Economies

Australian Government Department of Industry, Science and Resources | AusIndustry Cooperative Research Centres Program

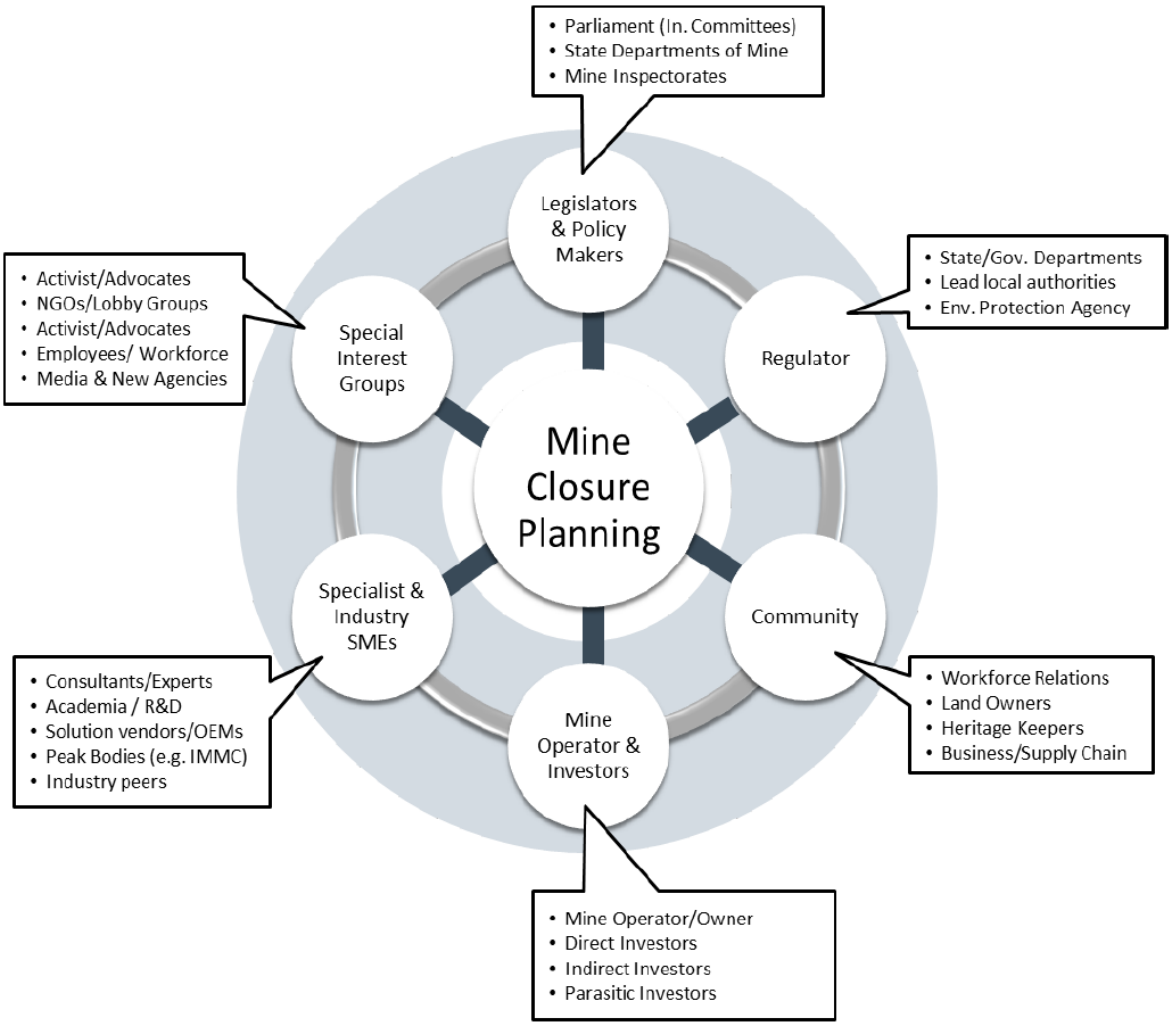
Extracted from: Dzakpata, I., Qureshi, M., Kizil, M. and Maybee, B. (2021). Exploring the Issues in Mine Closure Planning. CRC TiME Limited, Perth, Australia.

These are extracts only. Each should be read in context of the full final report. Please refer to the full report for more information.

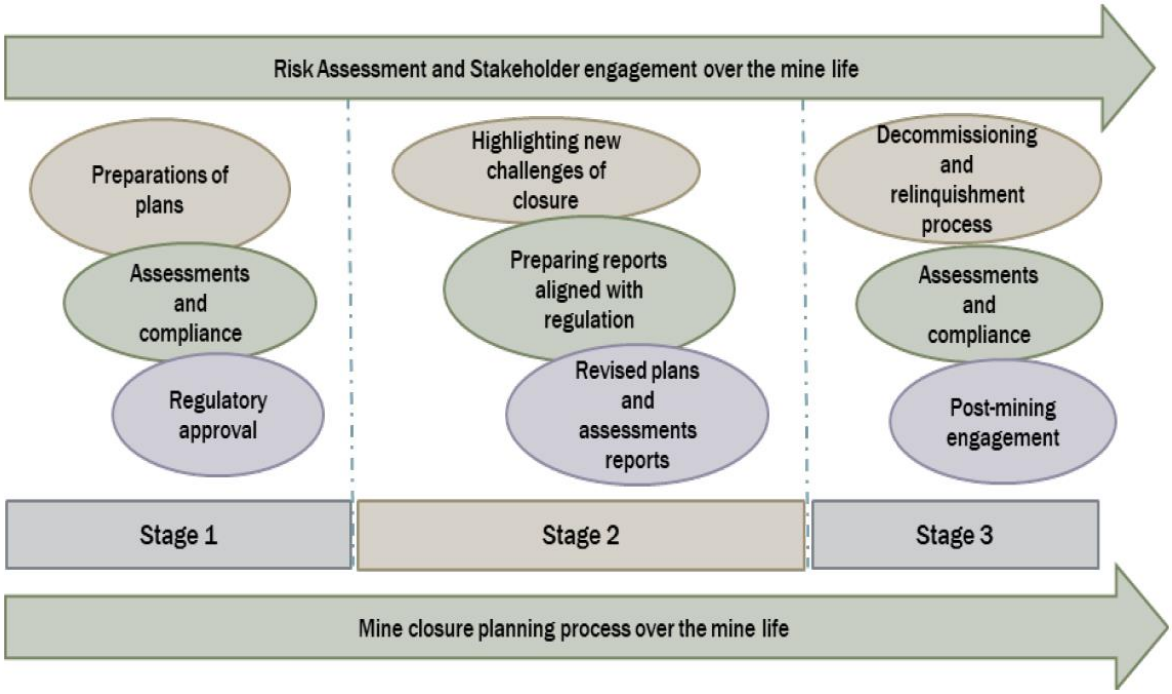
Complexity of internal and external stakeholder involved in MCP process



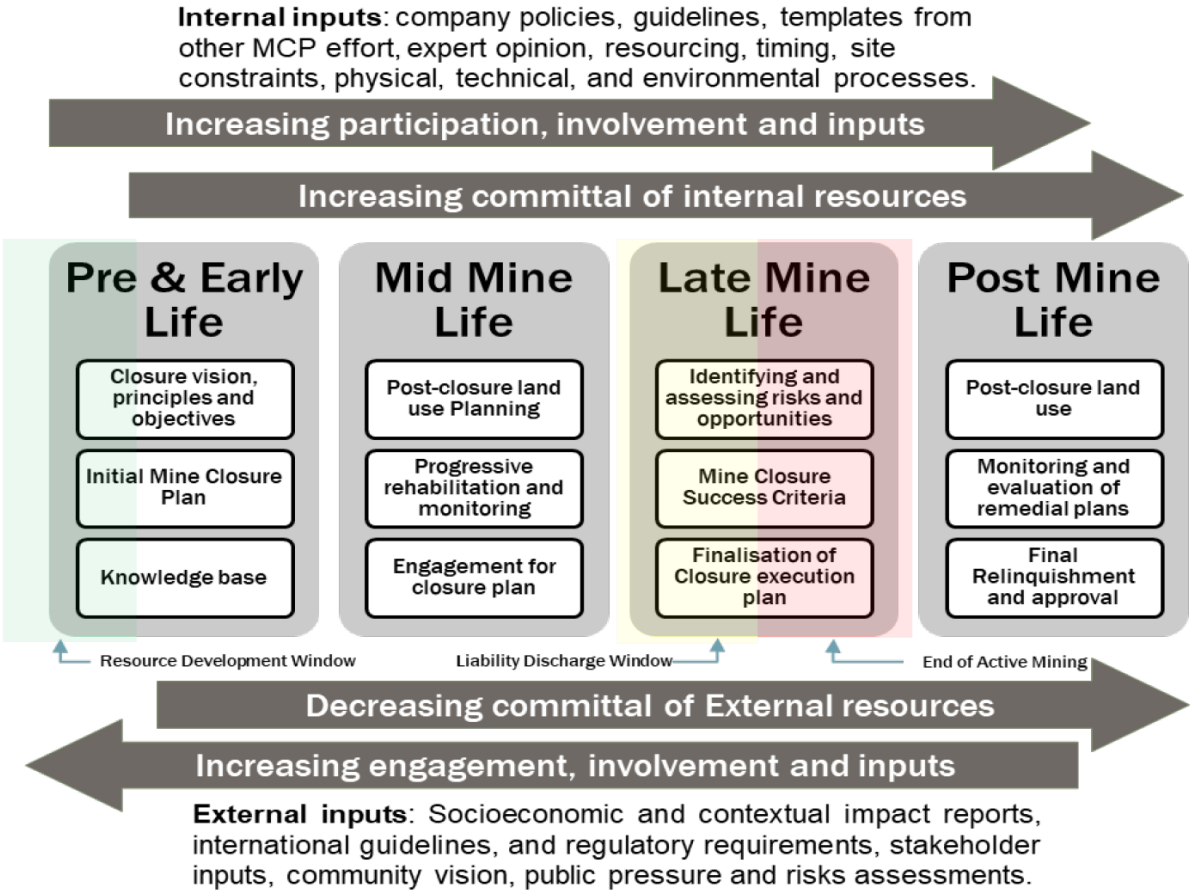
Sub-groupings of stakeholder groups involved in the MCP



Mine closure planning process along with the strategic mine planning



Mine closure planning output through different phases of mine lifecycle



Summary

Complex adaptive systems have been used to look at several parts of the mining value chain (Choi, Dooley, and Rungtusanatham, 2001; Komljenovic, Abdul-Nour, and Popovic, 2015; Pathak, Day, Nair, Sawaya, and Kristal, 2007). These are open systems with a number of elements (which can be basic) that interact nonlinearly and have multiple direct and indirect feedback loops. (Choi et al., 2001; Komljenovic et al., 2015). These interactions are often dynamic and spread throughout the system, causing it to operate at conditions that are far from equilibrium.

The memory in complex systems is considered to be dispersed across the system rather than in a single location. (Choi et al., 2001; Pathak et al., 2007). As a result, the system's history is so fundamental to its behaviour that the overall system behaviour cannot be predicted from an assessment of its components. The diagram on page 1 outlines the complexity of internal and external stakeholders involved in the Mine Closure Planning (MCP) process. When MCP is discussed, it is normally the internal process interactions that are described, with indirect environmental influences being disregarded or difficult to articulate.

Industrial and regulatory stakeholders are directly or indirectly involved in the MCP process, as shown on the previous page. Stakeholders have traditionally included the mining corporation, mine regulators, communities, policy makers, and legislators. The interaction of the sub-elements (shown in callout boxes) of the key stakeholder groups has a considerable impact on the quality of involvement and MCP results. Even more crucially, during

discussions, the views of stakeholders who are opposed to the mine operation (typically in the minority) are simply disregarded or not considered. These minority stakeholder groups may naturally gravitate to special interest groups (SIGs), which can leverage the efforts of activists, lobby groups, and news organisations to spread their message, with stakeholder awareness being a crucial factor in determining stakeholder demographics (Svobodova, Yellishetty, and Vojar, 2019). Additionally, Communities, who are one of the primary stakeholders and direct beneficiaries of post-mining outcomes, are either unaware of legislation or are indifferent about a mine-life that spreads over decades that many do not bother contesting closure-related issues.

Based on a literature review, there appears to be a disconnect in stakeholder participation, or the participation is insufficient, as closure planning occurs at the conclusion of the mining life cycle, rather than planning for closure at an earlier stage. While lead state environmental experts at the regulator level have oversight of mine closure plans, external mining consultants are sometimes brought in to examine the dangers of mine closure plans or the progressive rehabilitation process – highlighting a knowledge gap in the regulator's ability to effectively assess, analyse and sign-off on novel alternative land-uses. Similarly, while closure planning and land reformation law exists, regulator audits are not fully compliant with these requirements.

According to the literature, there are three primary stages to the MCP process:

Stage 1: Pre-mine closure planning (Conceptual phase)
Stage 2: Progressive mine closure (Progressive rehabilitation)
Stage 3: Decommissioning and post-mining engagement (Final execution phase)

At each stage of the MCP process, risk assessment, monitoring, control, and stakeholder engagement are carried out with focus on different levels and granularity for the outputs. The MCP's financial forecast is included in the initial blueprints, which are modified as mining advances. The above diagram, "Mine closure planning process along with the strategic mine planning", shows the MCP process being undertaken along with the strategic mine planning process.

While much of the discussion around MCP revolves around the idea of a single document that is progressively reviewed, updated, and presented to a regulatory agency for sign-off or approval, the literature suggests that a variety of distinct outputs are generated for different customers or end-users throughout a mine's lifecycle. Some of these outcomes demand increased participation from some stakeholders, while others get organically reduced participation, involvement, and contributions from the same or even other categories of stakeholders.

As mining nears the end of its life cycle, the gravity or enormity of mine closure liability (cost, extent of damage, and potential market fluctuations) becomes more apparent, giving rise to a strong desire to transfer the liability to a new owner (often junior miners with limited capacity to deal with the closure liability at hand. In most cases this occurs near the conclusion of active mining operations, or when there is a large stockpile of low-grade ore that may be profitably recovered with modest overheads. All of this would be taking place against the backdrop of a shifting geopolitical landscape, a socially evolving culture, and a pro-industry regulatory climate that does not effectively empower the regulator to intervene if the MCP proponent abandons their closure obligations.

While the level of mining knowledge is considered to impact the approval of mining activities undertaken in mining areas, this factor has been overlooked (Svobodova et al., 2019) in many social engagements. Svobodova et al. (2019) based their argument on the fact that mining knowledge differs depending on socio-demographic variables, prior mining experience, and sources of mining information. Moreover, an increasing community's level of

knowledge has a favourable impact on the overall acceptability of development plans and decisions in its area (Getty and Morrison-Saunders, 2020; Monosky and Keeling, 2021; Svobodova et al., 2019). The above diagram, “Mine closure planning output through different phases of mine lifecycle”, illustrates the complex interaction of MCP outputs at various stages of the mine lifecycle.

REFERENCES

Dzakpata, I., Qureshi, M., Kizil, M. and Maybee, B. (2021). Exploring the Issues in Mine Closure Planning. CRC TiME Limited, Perth, Australia.

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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