

R&D Roadmaps in Mining and Water Management: A Design-Led Approach to Driving Sustainability and Innovation

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ABSTRACT

This paper underscores the crucial role of Research and Development (R&D) roadmaps as strategic tools to derive greater value from innovation resources and drive better long-term outcomes across the sector. This study employs a design-led methodology to address rapidly evolving challenges associated with sustainability and circular economy that focuses on stakeholder engagement through ideation workshops. The resulting R&D roadmaps follow an "ideate, incubate, and accelerate" approach, categorised across three temporal horizons.

Collaborative efforts between Isle, the mining industry and water utilities have produced tangible benefits. These roadmaps align research with strategic objectives, enhancing innovation to tackle pressing challenges. Notable outcomes include:

1. **Mining Influenced Water Remediation and Valorisation:** Rio Tinto's MIW roadmap steers the industry towards sustainable mine closure practices. Identifying remediation and valorisation opportunities minimises environmental impacts while recovering valuable resources.
2. **Accelerated Innovation:** Isle's crowdsourcing campaign expedites R&D project identification and implementation within the mining sector. This approach fosters collaboration, accelerating innovation through shared knowledge.
3. **Enhanced Resource Efficiency:** Water Corporation's "Circular Economy Integration in Wastewater and Desalination Plants" roadmap, centred on optimising resource use through circular economy principles, holds potential for the mining industry. Adopting these principles in mining operations could effectively reduce waste, minimise resource consumption, and generate cost savings.
4. **Tailored Research Initiatives:** The NSW Department of Planning and Environment's "Research, Technology, and Innovation Roadmap for Water Efficiency" tailors research to regional water efficiency challenges, fostering innovative local solutions.
5. **Strategic Direction Setting:** Gold Coast Water and Waste Business' "3-Year R&D Plan" designed to align research with strategic priorities, presents a versatile model applicable to the mining sector. This roadmap ensures research investments translate into tangible benefits for the business and local communities.

These R&D roadmaps exemplify strategic tools empowering the mining industry, aligning research with key goals, fostering innovation, and driving sustainable practices in water management.