

# Mining Equipment, Technology and Services

A Roadmap for unlocking future growth  
opportunities for Australia

EXECUTIVE SUMMARY

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# Executive Summary

## Australia’s Mining Equipment, Technology and Services (METS) sector has an important role to play in the continued success of Australia’s mining industry.

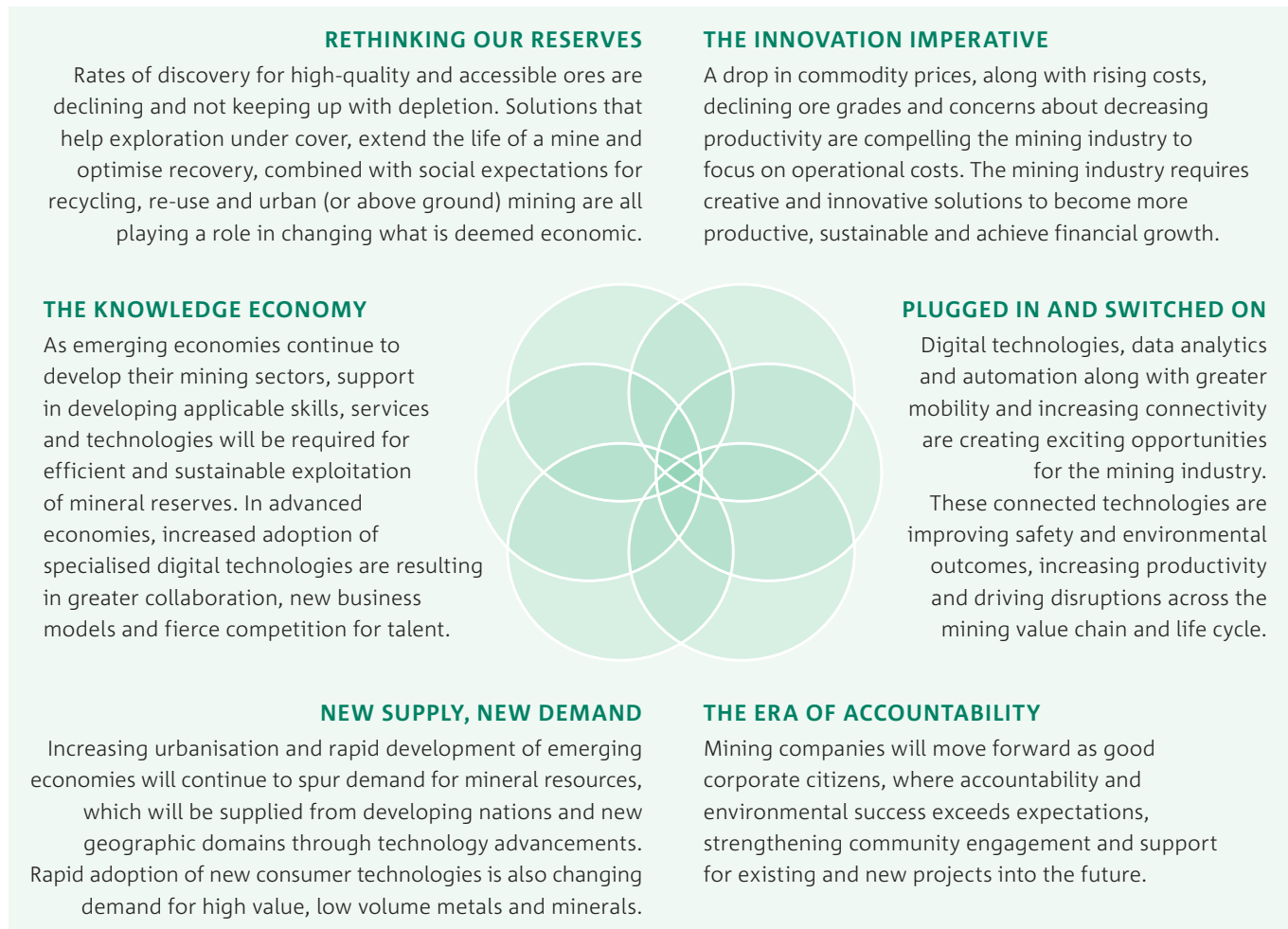
However, the mining industry’s increasing dependence on specialist technologies, combined with a changing global landscape is creating new opportunities and threats for the future of Australia’s METS sector.

This Industry Roadmap, through a process of sector consultation and analysis, aims to support this decision making process. It explores global mining megatrends and Australia’s comparative advantages and identifies five opportunities where Australian METS companies can be internationally competitive. These opportunities are supported by a discussion of the underlying science and technology investments and management skills, culture, processes and business models required to unlock them.

## Global mining megatrends are reshaping the METS sector, requiring Australian companies to re-evaluate their role in the industry’s future.

The changes are challenging the viability of conventional practices and technologies, creating opportunities for new business models and reducing barriers to entry for new players. Australian METS companies need to ensure that their strategy is aligned with the trends that are set to drive change in the industry over the next 20 years.

FIGURE 1: GLOBAL MINING MEGATRENDS



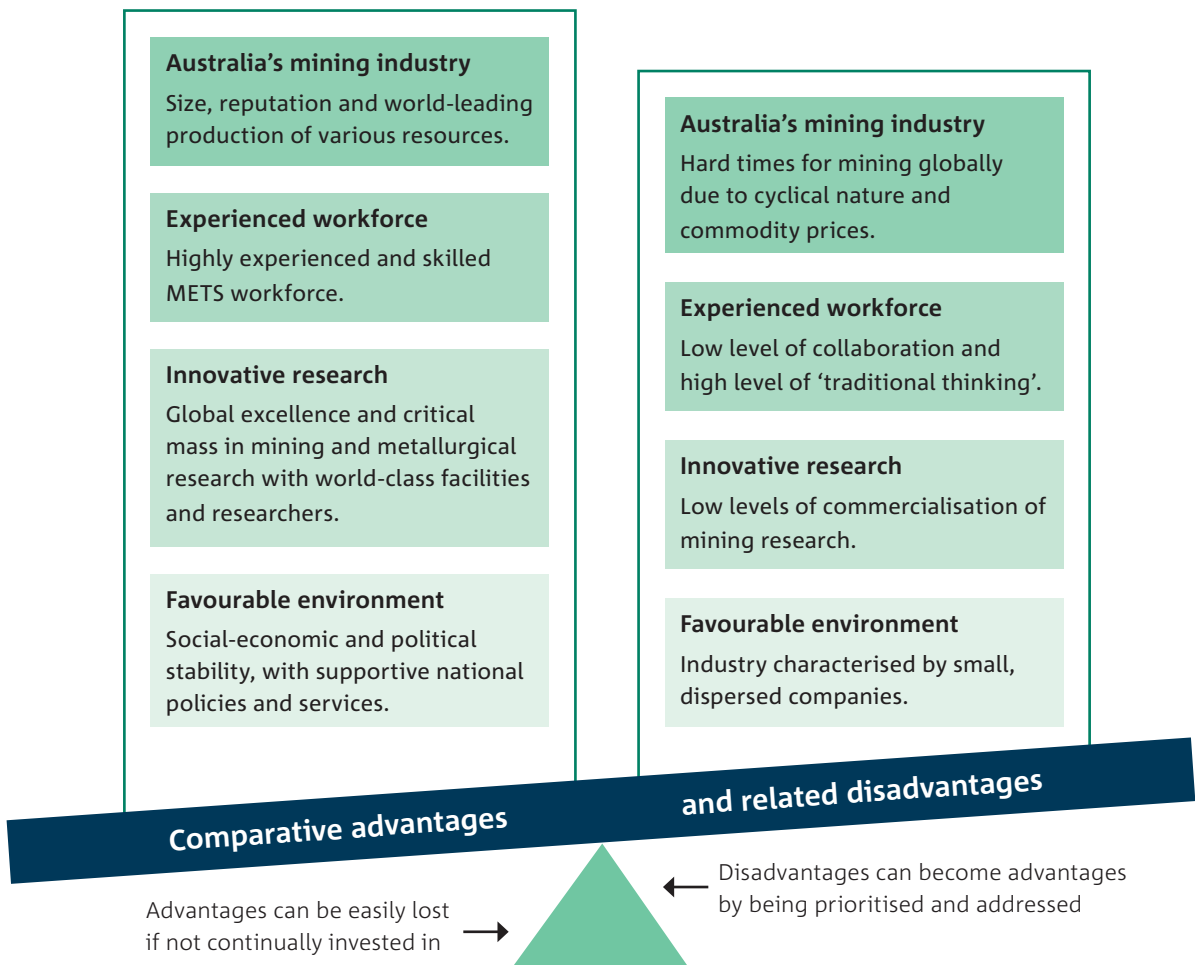


## The METS sector has comparative advantages that can be lost if not nurtured, and disadvantages that can become advantages if prioritised.

Australia's METS sector is underpinned by a number of unique comparative advantages that help improve its competitiveness on a world stage. These advantages have related disadvantages that the sector needs to be cognisant of because, despite not being uniquely Australian, they will impact the future competitiveness of the sector if not addressed.

Continued success for Australian METS companies is not guaranteed, as high rates of digital and technological change in the mining sector no longer create a strong barrier to entry. Observations of change and disruption from other industries, such as automotive and aerospace, are hard to ignore. As such, METS companies must prepare for increased competition from within and outside of the sector and focus on innovative and creative solutions to provide greater value and ensure continued success and future growth.

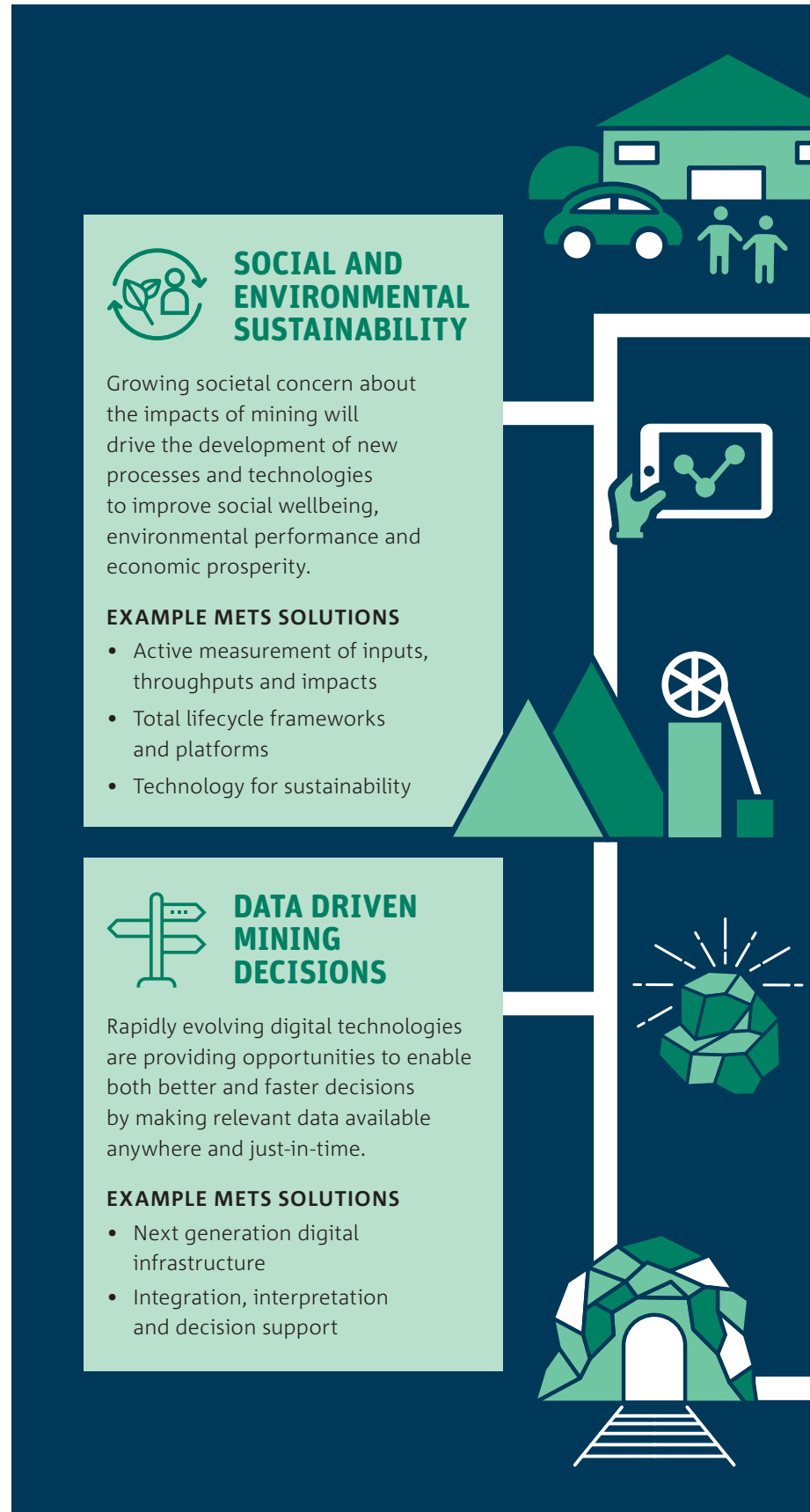
FIGURE 2: AUSTRALIA'S COMPARATIVE ADVANTAGES AND RELATED DISADVANTAGES



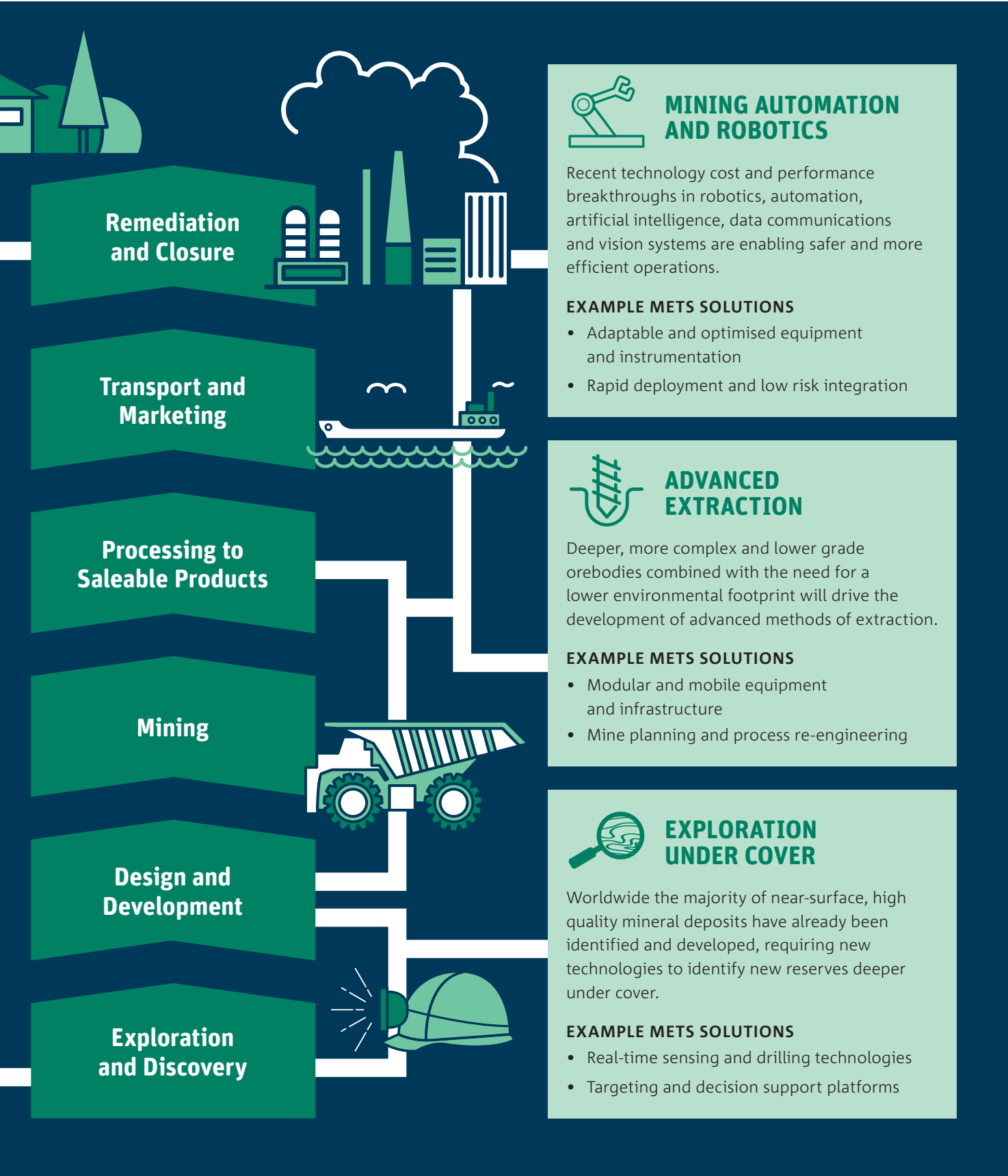
There are many opportunities, however Australian METS companies need to prioritise the right solutions to be internationally competitive.

The culmination of the Roadmap process is the identification of five opportunities to support the continued growth of the Australian METS sector. These opportunities span the mining value chain with the Data Driven Mining Decisions and Social and Environmental Sustainability opportunities playing a pivotal and enabling role across the other opportunities. Each opportunity is supported by example METS solutions that could be taken to market, which aim to help businesses identify and prioritise potential areas of specialisation and differentiation within each opportunity.

FIGURE 3: IDENTIFIED OPPORTUNITIES FOR THE AUSTRALIAN METS SECTOR



\*The five opportunities for growth are not considered to be an exhaustive list of opportunities available to the METS sector.



## Businesses must take action to unlock opportunities, investing in business transformation and new science and technology capabilities.

In order to unlock the various growth opportunities, Australian METS companies should consider the following actions:

FIGURE 4: SUMMARY OF CHANGES PER GROWTH OPPORTUNITY

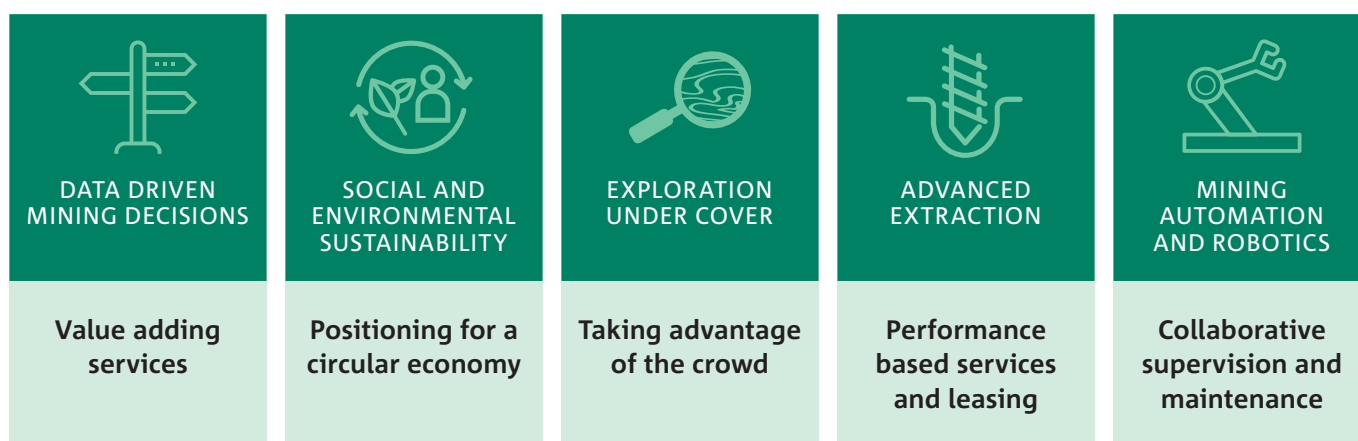
	BUSINESS ENABLERS			ENABLING SCIENCE AND TECHNOLOGY
	PEOPLE AND SKILLS	CULTURE AND COLLABORATION	PROCESS AND STANDARDS	
<b>Data driven mining decisions</b>	Foster skills to improve interpretation, modelling and decision making using big and small datasets.	Improve how the business uses and responds to data, moving from reactive to proactive.	Address interoperability and integration issues, working with industry and research to implement appropriate data standards.	<ul style="list-style-type: none"> <li>• Sensors and the Internet of Things</li> <li>• Analytics and optimisation</li> <li>• Visualisation</li> <li>• Cyber security</li> </ul>
<b>Social and environmental sustainability</b>	Establish cross-disciplinary skills – engineering, financial, social, environmental and economic – to better demonstrate the long-term value proposition of triple bottom line solutions.	Connect miner, government, social and environmental groups to support and improve technical and regulatory decision making processes.	Assess operational and regulatory barriers that may limit social and environmental monitoring and reporting, and the associated liabilities.	<ul style="list-style-type: none"> <li>• Monitoring and sensing</li> <li>• Decision support and stakeholder engagement</li> <li>• Site and equipment design</li> </ul>
<b>Exploration under cover</b>	Develop geophysical and geochemical knowledge, data analysis, modelling and geographic information system (GIS) skills.	Increase multidisciplinary collaboration and support activities that improve decision making and resource governance.	Identify and promote best practice in data acquisition, processing, sharing and integration to improve data quality and reduce issues with integrating large exploration datasets.	<ul style="list-style-type: none"> <li>• Next generation drilling technologies</li> <li>• Expanding exploration knowledge and processes</li> </ul>
<b>Advanced extraction</b>	Develop skills in installing, operating and manufacturing advanced extraction technologies as well as advanced drilling, sensing, sorting and processing technologies.	Improve alignment of performance drivers and foster interdisciplinary collaboration across mining, metallurgical and geological personnel.	Support development of regulatory frameworks for advanced extraction technologies, including standards for interoperability of technologies.	<ul style="list-style-type: none"> <li>• Advanced drilling and cutting technologies</li> <li>• Sensors and ore sorting</li> <li>• Integrated beneficiation technologies</li> </ul>
<b>Mining automation and robotics</b>	Foster skills in the operation and maintenance of autonomous and robotic equipment; develop technical expertise in material sciences and nanotechnology.	Challenge the role of automation and robotics in mining, and use change management to address cultural acceptance of technologies.	Support sector wide actions to address interoperability issues, leveraging existing initiatives – e.g. AMIRA (P1025), EMESRT and GMSG projects.	<ul style="list-style-type: none"> <li>• Machine vision, materials and robotics</li> <li>• Control systems and algorithms</li> <li>• Virtual and augmented reality</li> </ul>



## A changing business environment and evolving market creates support for a range of new business models within the METS sector.

Each opportunity identified within this report is supported by example business models that may be leveraged across a range of solutions and opportunities.

**FIGURE 5: BUSINESS MODEL EXAMPLES PER GROWTH OPPORTUNITY**



## Long term success will be achieved by increasing collaboration across the entire Australian mining and METS innovation ecosystem.

While the identified growth opportunities and enablers largely focus on actions for individual METS businesses, long-term success requires collaboration across the entire Australian innovation ecosystem – including miners, METS, government, investors, educators and the research community.

From a science and technology perspective, the research community will need to ensure projects are well aligned to industry needs and that technologies are developed from market pull rather than technology push. This includes streamlining and improving the approach to industry partnership, ensuring the research engagement process is efficient and not overly complicated or onerous on industry.

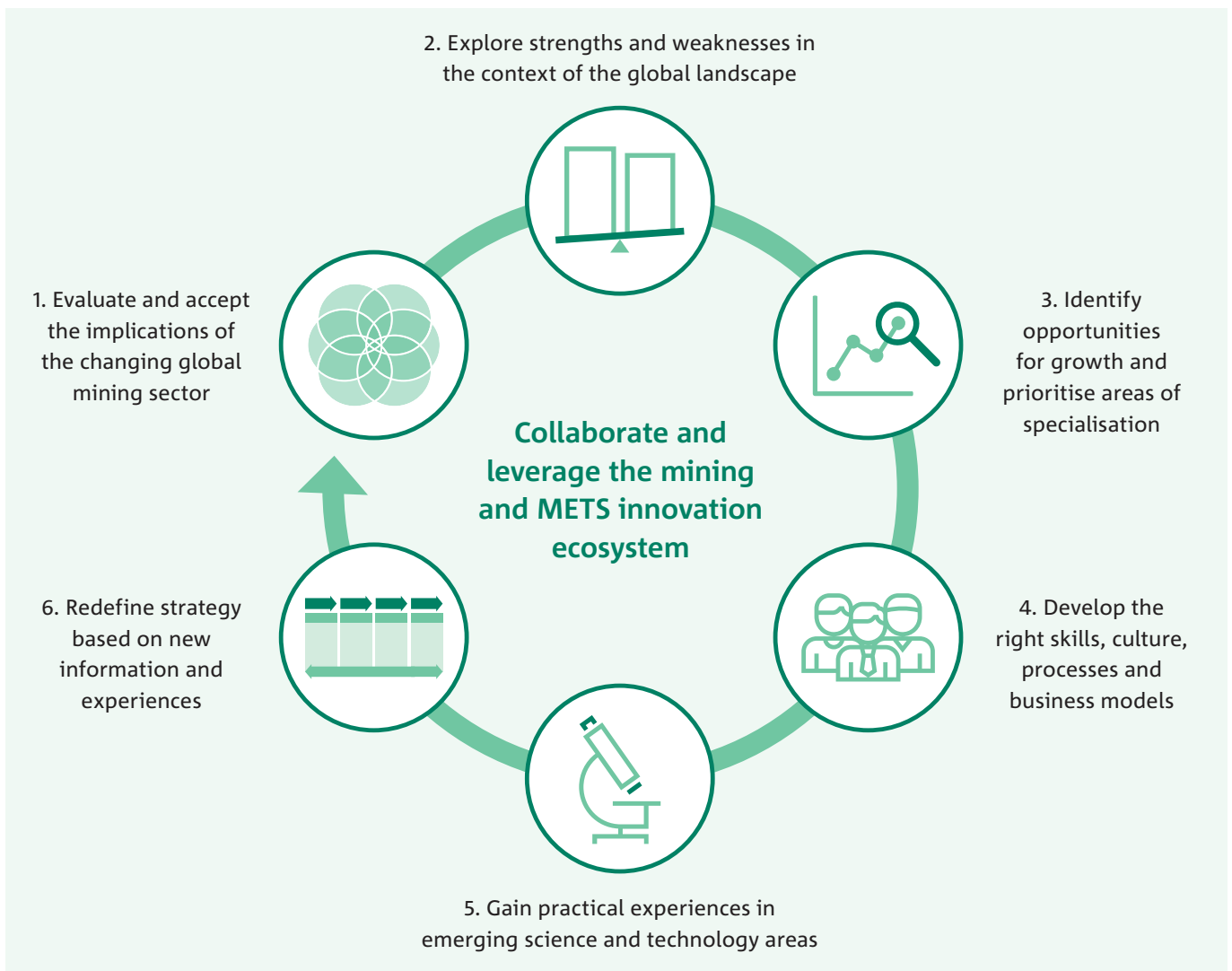
A key vehicle for achieving this is the METS Ignited 10 Year Sector Competitiveness Plan (SCP) and the key programs of work and industry knowledge priorities (IKPs) that have been identified. This Roadmap seeks to complement the SCP and the sector's broader vision providing input into current and future IKPs. Given the cyclical nature of the industry, the report structure also provides a narrative and key questions that can be continuously applied at a company level to inform the strategic decision making process.

## Call to action

Working together, the Australian METS sector is well placed to succeed. METS businesses will need to take calculated risks and invest in the future, and can use this Roadmap and the SCP as a tool for sustained competitive advantage (Figure 6).

**METS SECTOR VISION**  
 The Australian METS industry is an aligned, efficient and agile industry ecosystem with a high degree of collaboration, global leadership in innovation, and a growing share of the global market.<sup>1</sup>

FIGURE 6: USING THE METS ROADMAP



<sup>1</sup> METS Ignited (2016). *Industry-led Growth Centre for METS*. [Online] Available from: [http://www.metsignited.org/Category?Action=View&Category\\_id=72](http://www.metsignited.org/Category?Action=View&Category_id=72) Accessed 19/12/2016





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