MINING EQUIPMENT TECHNOLOGY SERVICES

SECTOR COMPETITIVENESS PLAN 2020 UPDATE

Australian Government
Department of Industry, Science, Energy and Resources

Industry Growth Centres

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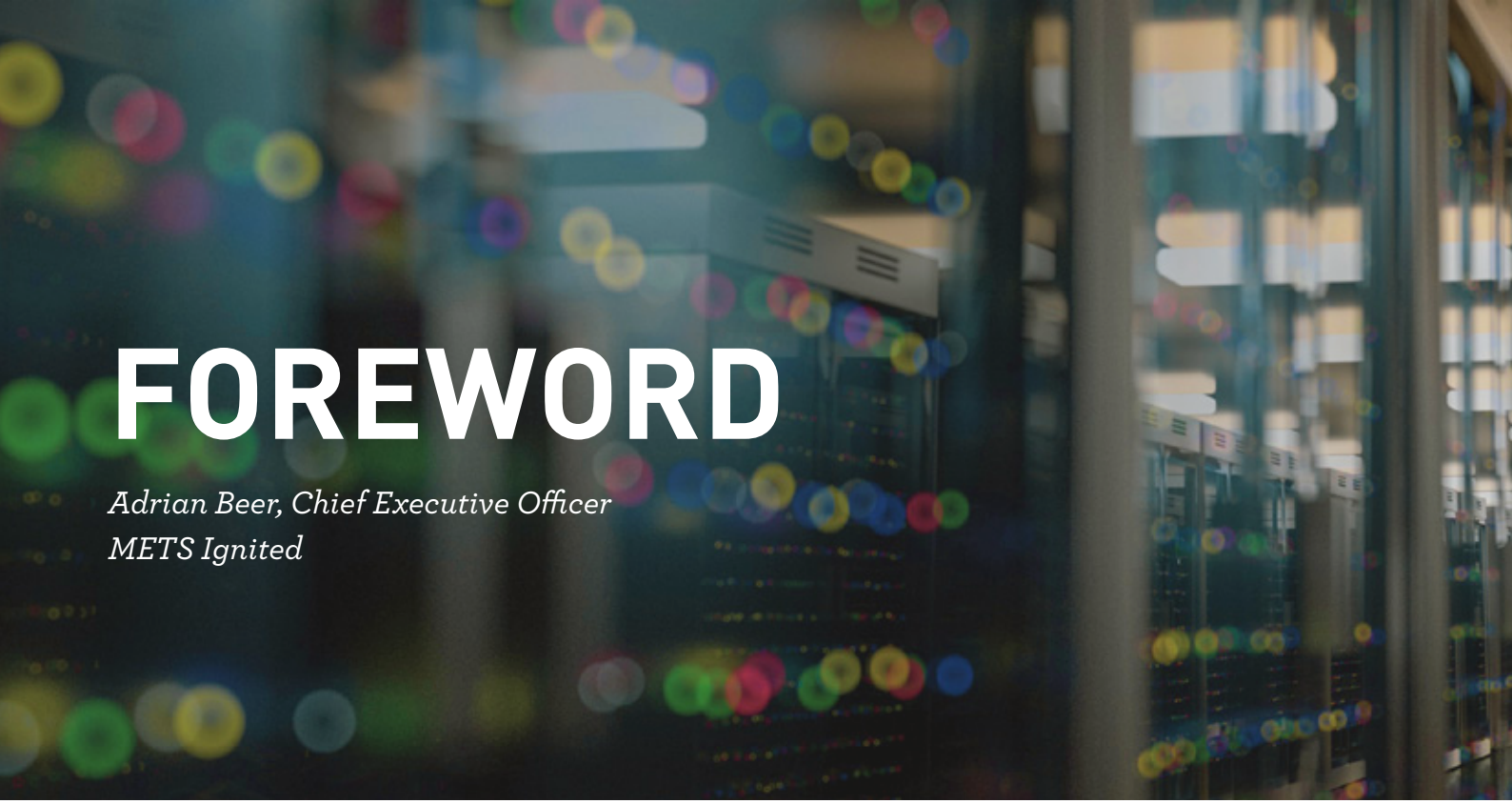


FOREWORD

Adrian Beer, Chief Executive Officer
METS Ignited

Australia is recognised globally as an industry leader in Mining Equipment, Technology and Services (METS) across a wide range of technology platforms and many commodity segments.

The combined METS-Mining sector in Australia contributes an estimated 15 per cent of Australia's GDP, supports more than one million jobs nationally, makes up almost 10 per cent of all of Australia's full time employment, and remains a major contributor to our regional communities and local economies.

When METS Ignited published its initial Sector Competitiveness Plan in 2016, it was clear that while the Australian METS sector had a global reputation as an industry leader— the local ecosystem was not well defined. Almost four years on we now see a thriving, highly competitive and well established METS community that is embedded right across the country.

The sector does not just consist of METS companies that support miners, but also comprises regional and national membership organisations, various professional standards associations, a broad range of academic and industry bodies of knowledge, as well as a number of Cooperative Research Centres (CRCs) and related research organisations, all supported by various industry groups, clusters and social networks.

> *Collaboration has increasingly become a central theme that has played a critical part in the success of the Australian METS sector.*

While relationships between miners and METS companies were often transactional, now we see collaborative partnerships, with multiple METS companies and mining organisations working together, addressing issues that were once considered too difficult to overcome; solutions are being developed into sustainable outcomes, achieving global recognition of examples of true innovation.

> *These collaborations are driving new ideas and concepts, continuing to build our reputation as an international leader in mining technology.*

In this Sector Competitiveness Plan 2020 Update, we step back to examine how the METS ecosystem has evolved over the past four years, we look at how the priorities have evolved for the sector, how the industry has evolved; and what steps must be taken to adapt and respond to those changing market needs.

We then look ahead at the emerging future technology trends, the ongoing transformative impact of automation, digitalisation, big data and analytics, look

at the increasing demands on our social licence to operate, and the ongoing impact of regulatory reform.

We examine the consequences that the COVID-19 pandemic has already had on the economies of the world, the flow on effects to the mining industry and the impact on the METS sector. As an industry already resilient to the peaks and troughs of cycles, we examine how we can provide leadership and support to the local economy as we recover and re-invest in our future supply chain capabilities.

> *For many of the challenges we face, both legacy and emerging, technology will hold the key for an ongoing sustainable future outcome. As a recognised global technology leader, the Australian METS sector has a critical role to play in the future of the Australian economy.*

The METS sector has extended well beyond its traditional markets, as other industry segments look to gain insights from the success of the Australian METS sector. The challenge is balancing the needs between continued investment in existing technologies, and working with clients to realise the commercial benefits that come from investing in future technologies, all the while sharing our lessons learned and our knowledge with other segments to see what else they can achieve from bringing a much broader range of industry perspectives.

To maintain our global leadership position, we must focus on attracting and developing the future skills of our technology sector, particularly in our regional communities where we will need them most.

> *To continue to innovate, invent and create the solutions that the industry will need, we must engage the next generation of our best and brightest.*

This year will be one of the most challenging for the global economy in generations and being part of a world-leading technology sector will bring with it a very different mix of challenges and opportunities for all of us in the Australian METS sector.

Technology has always provided significant growth potential for the Australian economy—we have a great deal of responsibility and the METS sector has a critical role to play. As we focus on recovery and growth, there is a real urgency on future skills and attracting talent as a key priority for the years ahead, whilst providing the solid foundation needed for our national prosperity.

THE METS SECTOR TODAY

Traditionally, the Mining Equipment,Technology and Services (METS) sector had been heavily influenced by the cyclic nature of the mining and resources industry.

The mining boom/bust cycle was reflected in the rapid growth and contraction of mining equipment, services and mine-related engineering construction firms. During the recent boom cycle the growth was underpinned by automation within the mining companies and the services sector as the cycle progressed through the production phase. The focus was then on productivity and optimisation technologies which matured in response to the steep decline in commodity prices and volumes.

The most recent phase within the long run mining cycle coincided with the publication of METS Ignited's first Sector Competitiveness Plan in 2016. The Australian METS sector has always proved to be a resilient contributor to the economy, adapting to the different needs of the sector as it responds to these economic cycles that typify the mining industry.

At the time of our 2019 Sector Competitiveness Plan Update, it was clear there was an upturn in economic activity in the Australian METS sector. As the global mining sector was then moving back towards a steadier state, we observed:

- The recent upturn in the mining sector, its sustainability becoming apparent in mid-2018, and the impact of this on Australia's METS companies.
- The rapidly growing application of digital technologies including the Internet of Things (IoT), Data Analytics, Artificial Intelligence (AI) and Machine Learning, Automation and Autonomy, and Robotics development along the entire value chain from exploration through to shipping and rehabilitation.
- The increasing importance to the mining sector, especially the global miners, of social performance including safety, environmental stewardship and community licence.
- The continued and increasing importance of the minerals sector to Australia's economy.

Refer to Figure 1 - 2019 SCP Update

What is unique for the Australian METS sector, is that in 2020 the growth opportunity extends well beyond that of the mining industry alone.

Heading into 2020, the global mining and resources industry was in a strong position. For the Australian context, the forecasts for energy and resources exports were at continued record levels, with December 2019 estimated to reach over $280 billion, and the local mining industry to contribute almost 35 per cent of Australia's overall GDP growth[1].

For the Australian METS sector in 2020, the growth opportunity extends well beyond that of the mining industry alone. As we continue to see the drive for collaboration, it is clear there is significant transformation within the broader Australian technology sector across a wide range of industries. As a recognised global technology leader, Australia's METS sector is being called upon to support the growth ambition of Australia's technology sector more broadly.

As a resilient part of Australia's economy, the mining industry and the METS sector has a proven track record adapting to the cyclic nature of the commodity sector. However with the effects of the COVID-19 pandemic sweeping through economies across the globe, it is likely the resources industry will again be a core foundation that many will rely upon to help drive the recovery for years to come.

The historical success of Australia's METS sector has come from our industry knowledge, combined with our experience integrating and adapting technologies, providing Australia a unique set of skills and capabilities. We are now being called upon to build upon this experience, supporting the needs of many who will rely upon the resilience of our sector to help drive the recovery of our economy, while preparing the future skills and capabilities for Australia's technology sector .

[1] Resources and Energy Quarterly - December 2019 Report https://bit.ly/3ha8Ms8

WHAT ARE THE CHALLENGES FACING THE SECTOR?

Prior to COVID-19, the bushfire crisis and the impact of climate change had created significant public debate about the role of the mining industry in society. The public image of the industry had changed dramatically, calling into question the industry's social licence to operate, which had taken on an entirely new meaning as mining had become far more topical in mainstream public forums.

Perceptions of the industry around themes like coal production, both in terms of Australia's domestic power generation market and the understanding of export for global consumption in steel production or energy use, often trigger heated public debate, rarely with complete understanding of all the contributing factors impacting the industry. In 2019 PwC, in partnership with Jacobs, published a paper on the Future of Energy[2] in an attempt to bring clarity to the challenges facing local policy makers.

With the attempt to provide some unbiased direction for the energy sector, the report made a fundamental observation consistent with the overarching theme of the METS sector in Australia: "We must quickly provide the market and investors with certainty and direction". We are fortunate in Australia that our METS sector has a significant footprint with technologies to address complex issues, such as clean technology for coal generation, or those related to carbon capture, energy storage, the hydrogen economy, renewable and microgrid technology to the development of our future battery material production, downstream processing, recycling and re-use. The speed of innovation often moves faster than investment can keep pace with—and without a commercially viable marketplace including a vibrant technology investment segment, we will miss the opportunity to bring our innovation to the global market.

While we see protests and climate activists continuing to pursue behavioural change from the industry—the METS sector continues to deliver innovation and technology as quickly as practicable. What we need for our future is greater visibility of the work being done. The technical solutions to many of the social licence challenges facing the industry are already available today, or are in development in the METS sector—but without visibility or investment in this continued research and development, the public perceive that the industry is failing to act.

One of the greatest challenges facing the technology

[2] https://www.pwc.com.au/power-utilities/future-of-energy/future-of-energy.pdf

We must quickly provide the market and investors with certainty and direction.

sector is the shortage of STEM students entering our universities and our workforce. This shortage affects all of our engineering sectors, but the social licence issues surrounding mining means the METS sector has been hit particularly hard. We need to attract the next generation of students who are key to the future technology needs of our sector. A strong supply of students and researchers will be needed to support the work that the industry is doing today to drive our sector's sustainability for the future.

Adapting to disruption in the mining industry is an area where Australia continues to lead the world. COVID-19 as a major disruptor has acted as a catalyst to drive adoption of digital technologies that were previously being implemented in a more gradual manner. As expected, there has already been a dramatic increase in demand for digital technologies, automation technology, robotics and remote operations capabilities in the early response to the pandemic.

Australia's leadership is our ability to integrate the multitude of different technologies from many of the world's leading vendors. Whilst many global technology vendors have developed open platforms, the move from mega projects by tier one mining companies to automate their supply chains to the industry building integrated operating systems has established the need for genuine interoperability. This is an area where the Australian market continues to lead, and we see multiple adjacent industries seeking to learn from the insights that the Australian METS sector has gained through its long history integrating technology into these remote and autonomous operations.

From a global perspective, Australia continues to be recognised as an industry leader in safety, reliability and environmental standards when it comes to the application of technology in mining operations.

Locally, the industry still has some work to do to take ownership and demonstrate its willingness to share this capability. The biggest challenge for 2020 will be to attract the best and brightest minds of our next generation and to actively participate in the development of the technology that will drive that future.

Case Study

COVID-19 AND INNOVATION: A SILVER LINING

Throughout history, swift advances in technology and changes to business models have been driven by big external events. Space travel was spurred by the Cold War, Fintech by the failures of institutional banking during the Global Financial Crisis, and now the COVID-19 pandemic is having the same impact on most industries including mining services industries.

As the pandemic restricts movement of goods and people, globalised service models and supply chains have broken down. Even internally, restrictions on travel have undermined long-standing operating models. In response, the industry has moved to be more flexible, virtual and local (see Figure 3). Miners have shifted workforces such that only those needing physical access to equipment are on-site, all others are working remotely. Services companies are adapting, pivoting to virtual models in lieu of physical travel. Once the pandemic is over, investment in remote work infrastructure and cultural acceptance is likely to cement this as an increasing feature of mining operating models.

As global supply chains are restricted, businesses are looking locally to source vital equipment and inputs. Governments are generally supportive on this front; developing local clusters of METS capabilities strengthens local economic development and insulates the industry against future disruption.

A key component of Australia's swift response to the virus has been the close collaboration between different levels of government and industry. This approach could be widened to tackle other complex challenges such as reducing environmental footprint and local economic development.

Internally, many businesses are now appreciating the true capability of their workforce to adapt to new operating circumstances. If this can be harnessed, the overall innovation potential of the industry is likely to increase, with the end result being a more nimble and opportunistic METS sector in Australia — silver linings indeed.

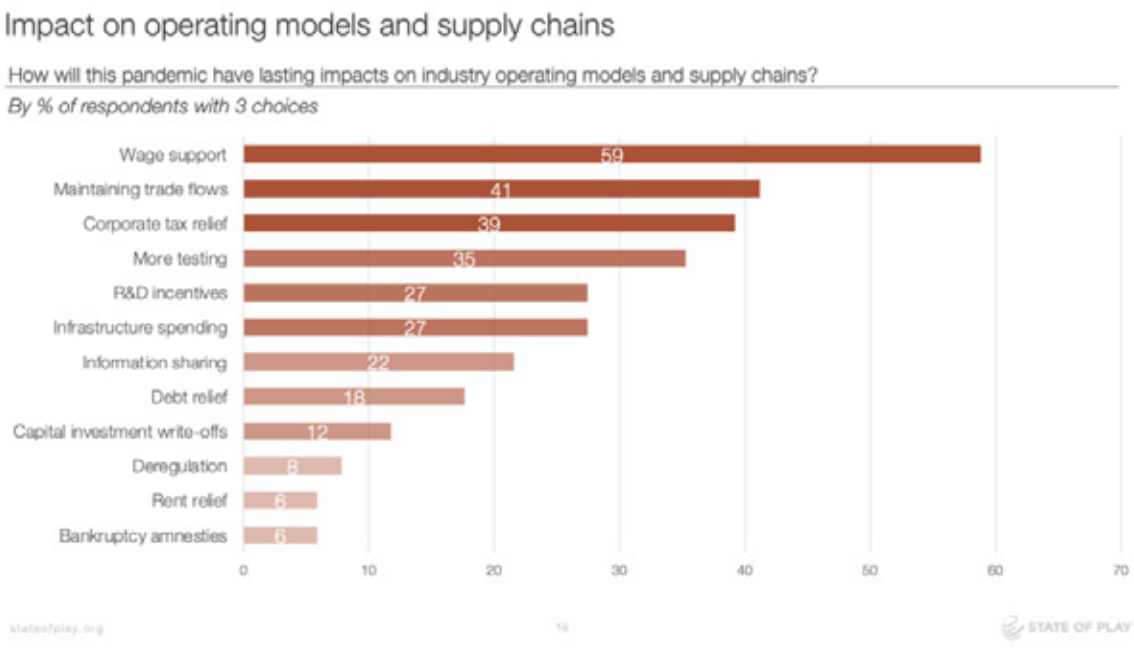
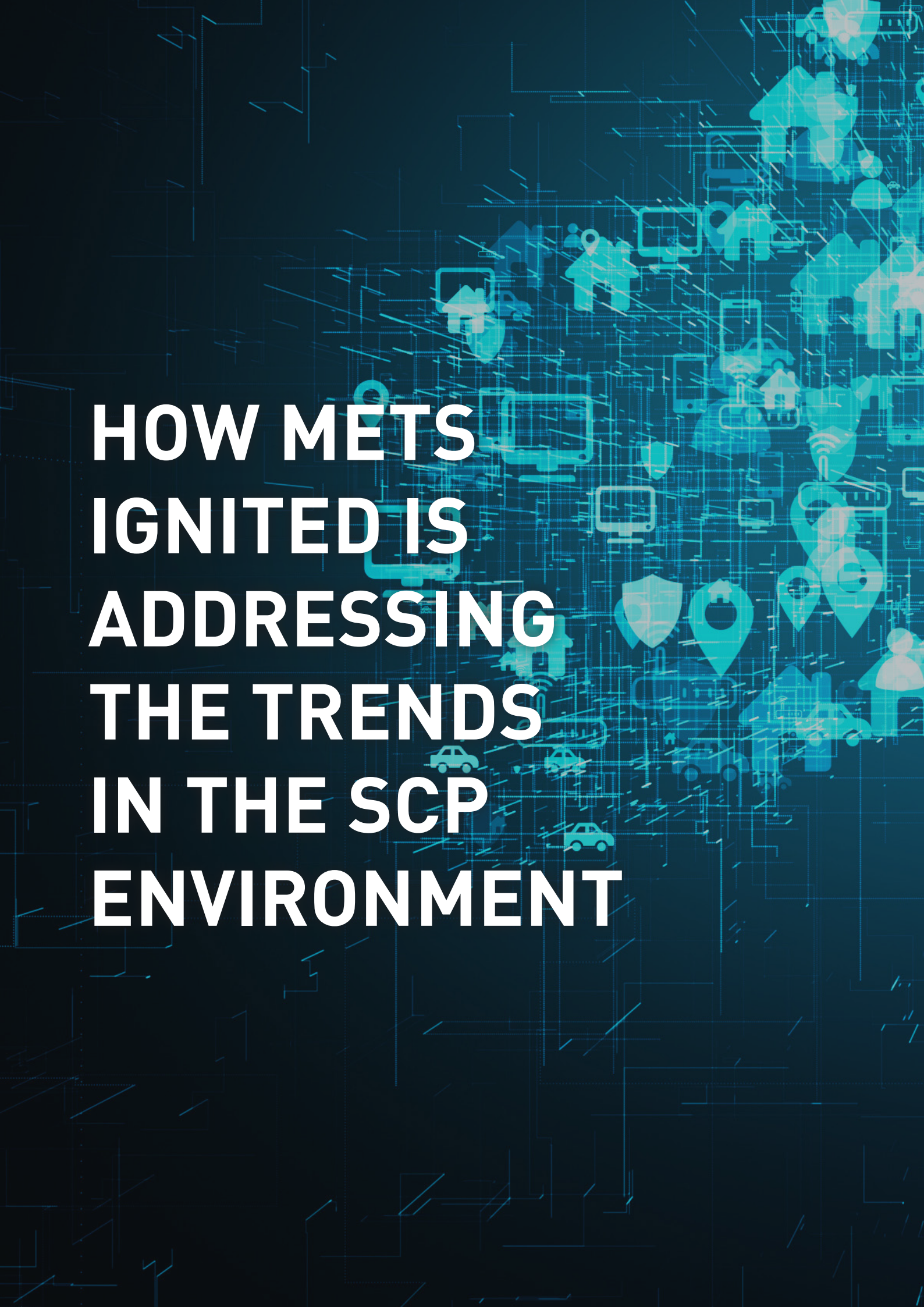


Figure 3: Flexible, virtual, local



HOW METS IGNITED IS ADDRESSING THE TRENDS IN THE SCP ENVIRONMENT

METS IGNITED SOLUTIONS TO CHALLENGES IN THE SCP ENVIRONMENT

IKP1

ACCELERATION THROUGH COLLABORATION

Accelerating commercial innovation through **collaborative business models** and techniques

IKP2

INCREASE EXPORTS & SUPPLY CHAINS

Increasing the **commercial maturity** and international supply chain development for both physical and knowledge-based solutions

IKP3

ENGAGE STEM SKILLS & CAPABILITIES

Engaging Australia's **STEM skills and capabilities**; supporting national **cross-sector strengths** in resources, energy, agriculture and transport

IKP4

LEADERSHIP IN SAFETY, ENVIROMENT

Global leadership in mining's **social performance** through safety, environmental and energy innovation

IKP5

RESPONSIBLY ADD VALUE LOCALLY

Increasing economic and technological strengths to responsibly find, extract, concentrate and **value add** to australia's resource endowment

IKP6

ROBOTICS & AUTOMATION & ANALYTICS

Unrivalled operational efficiency through integrated sensing, **interoperability**, automation, robotics and advanced data analytics

METS IGNITED RESPONSE / INITIATIVES

Cluster development and growth

Business capability development and accelerator programs

International market access

Future workforce

Accelerate technology adoption

Commercialisation of innovation

Global competitiveness

Industry research collaboration

Resource extraction value add

Collaborative Project Funds

Understanding regional product attractiveness

Support for multi-sector applicability

Engaging research community

Mine autonomy, equipment/process mechanisation and automation

Interoperability and technological integration

Cross-sector capability

Future workforce attraction through STEM

Advancing IP and transformative capabilities

ARC and CRC industry connection facilitation

Global mining standards

MINING REFERENCE GROUPS

TEST FACILITIES

INDUSTRY-DRIVEN RESEARCH

KNOWLEDGE PRIORITIES FOR WORLD-CLASS CAPABILITY & LEADERSHIP

The Industry Knowledge Priorities (IKPs) define the priorities of the METS sector for Australian research providers, innovators and technology leaders. These priorities evolve over time as the industry's needs evolve and change.

The IKPs are defined broadly into two categories. The first three IKPs address the industry management skills and competencies needed to make the Australian sector more competitive, while the second set of three IKPs focus on the technical elements required to ensure that the sector remains relevant to the changing technologies required for mining.

In the few years since the METS Industry Growth Centre was established, there has been considerable movement in the priorities of the industry including:

- The shift from direct investment in custom automation for the volume-based production priorities of the tier one mining operations, to the broader mining community working collaboratively with supply chain technology vendors to develop integrated and interoperable systems for assets and operations.
- The technical needs of the sector, to address harder to reach, harder to treat ore bodies and more complex mineral deposits, have driven a more highly-collaborative and digitally-driven ecosystem with a strong desire to accelerate innovative outcomes. The willingness to share lessons learned and work with end users across commodity groups is a significant new industry trend being led by METS Ignited.

As a consequence, METS Ignited's Industry Knowledge Priorities are being updated to reflect these changing needs. Here we outline our revised IKPs that are currently being developed in consultation with the METS-Mining industry. The outcome of this consultation will be published in the third quarter of 2020. More efficient and effective commercialisation of research activities remains an area of concern for the sector and is a priority focus for the growth centre in 2020.

The willingness to share lessons learned and work with end users across commodity groups is an exciting trend emerging in the sector.

Industry Knowledge Priority 1

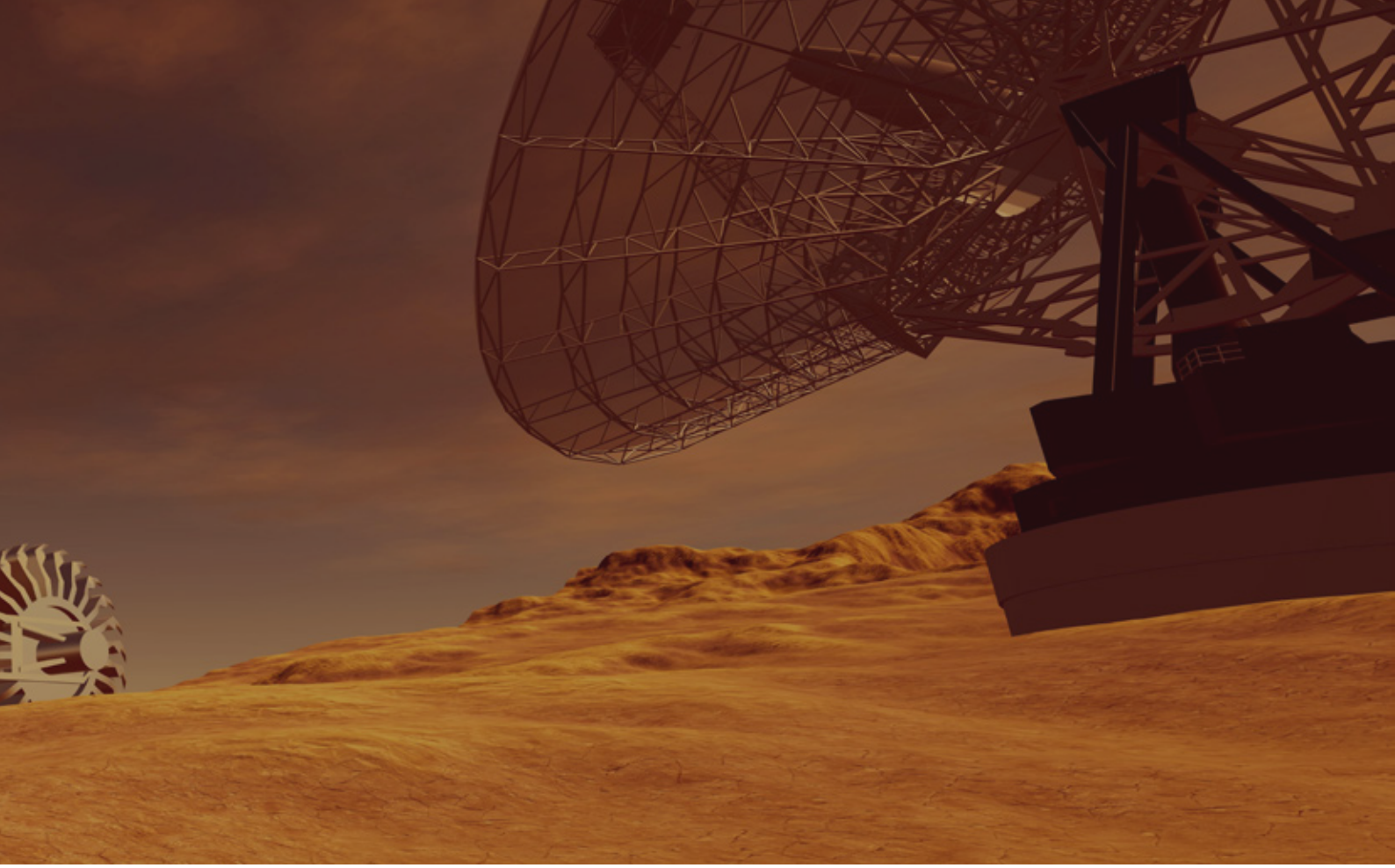
ACCELERATING COMMERCIAL INNOVATION THROUGH COLLABORATIVE BUSINESS MODELS AND TECHNIQUES

Australia's global leadership is built on our reputation to innovate and the quality of our sector's innovation. To accelerate the growth of the Australian METS sector requires greater commercialisation of innovation, reducing innovation cycle times and barriers, collaborating for mutual benefit, and adapting emerging business models which include closer alignment with capital markets.

METS Ignited's activities to date have successfully piloted business clusters of customers, companies and researchers providing the foundation to collaboratively identify and scope mining problems to feed to METS companies and researchers for solution development.

Priorities for improving the speed of innovation, collaboration and business models include:

- Enhancing cluster development and growth, both regional and technology-driven, including soft and hard infrastructure and linked to economic analysis and development as well as skills/jobs growth.
- Advancing knowledge and understanding of models and behaviours of successful systemic innovation and collaboration, and commercial business models in an Australian METS/Mining context including design-led innovation with customers and financiers intimately involved.
- Leading the collaboration of innovative mid-tier mining operators in Australia to focus research and innovation on industry problem definition and commercial solution development that will see Australian mining maintain its leadership in the global sense.



Industry Knowledge Priority 2

INCREASING COMMERCIAL MATURITY AND INTERNATIONAL SUPPLY CHAIN DEVELOPMENT FOR BOTH PHYSICAL AND KNOWLEDGE-BASED SOLUTIONS

Global competitiveness is a function of a broad range of complex factors and takes time to develop. Australian mining and its supply chains are considered to be globally-leading in the industry and our collective objective is to grow the commercial maturity of Australian METS SMEs to deliver these companies as globally competitive in their own right.

Priorities for developing competitive, commercially mature METS companies operating in the global marketplace include:

- Developing knowledge of known mining economies around the globe and assembling an understanding of the mining challenges in these jurisdictions in order to motivate METS innovators and to guide METS exporters. Fostering collaborative engagement with METS and miners in these regions, whether they are seen to be at similarly capable levels to Australia or are seeking help to enhance their productivity, social and environmental performance.
- Understanding how knowledge-based solutions, either embedded in physical products or as stand-alone virtual products, will influence the different regional markets round the world. This requires understanding of the attractiveness of different types of products to different regions, e.g. selling autonomy to regions with low-cost labour may not meet their objectives.
- Advancing knowledge and understanding of global supply chains and how they are best accessed by Australian METS firms. The commercial maturity to partner with appropriate agents and support organisations to find new customers, integrate into new supply chains and other channels to market is part of developing Australian METS international competitiveness.
- Advancing capabilities such as IP security (e.g. via modular design, automation and assembly) and transformative business models (e.g. via

design thinking, lean manufacturing, value chain management and theory of constraints) to deliver competitive advantage in Australia and internationally.

- Capitalising on the opportunities presented by the Covid19 pandemic to build virtual export activities in collaboration with key export organisations such as Austmine, Austrade, the various state-based export agencies and new export hubs. Export maturity includes understanding all aspects of commercial trading, including IP protection and trademarks, particularly for information services and knowledge-based export services.

These capabilities enhance Australian METS companies' existing global delivery models at a time when many international mining markets are beginning to seek support from the Australian METS sector to help establish their local mining industries with the responsible and regulated mining operations they see in Australia. The commercial maturity to partner with appropriate agents and support organisations to find new supply chains and other channels to market is part of the scope of this IKP.

Industry Knowledge Priority 3

ENGAGING AUSTRALIA'S STEM SKILLS AND CAPABILITIES; SUPPORTING NATIONAL CROSS SECTOR STRENGTHS IN RESOURCES, ENERGY, AGRICULTURE AND TRANSPORT

Technology is critical to the future of the resources sector. Attracting and engaging the next generation of STEM students to the sector is key to the future sustainability of Australia's global leadership position in the METS sector. Communication to the broader Australian community of the impact that METS technological development has had and will have on their changing social, environmental, energy and economic expectations is vital for Australian resources to be responsibly extracted and value-added.

Priorities to improve the environmental and social reputation of the sector and attract the next generation of STEM students to the industry include:

- Understanding how to raise awareness within the Australian education sector of the opportunities and benefits offered by a responsible METS-Mining industry whose social and environmental performance attracts the best and brightest.
- Engaging our research community in the concept of research as a service to industry in order to develop solutions to the problems which industry is keen to fund.

METS Ignited will continue to work with the Australian Research Council and the Cooperative Research Centre programs to ensure that research proposals incorporate these elements to directly and indirectly (e.g. via parents) attract Australia's youth to responsible mining.

Industry Knowledge Priority 4

GLOBAL LEADERSHIP IN MINING'S SOCIAL PERFORMANCE THROUGH SAFETY, ENVIRONMENTAL AND ENERGY INNOVATION

Communities around the world are becoming more active in their expectations for social responsibility in mining, especially as a result of recent events in climate change and tailings storage failures. Australia leads the mining world in safety, and was one of the first mining regions to quantify social licence in its operating communities, including the establishment of the world's first Not-for-Profit to help develop energy-efficient comminution (CEEC). Australia must continue to foster this industry research into selective mining to minimise waste, into new energy systems to reduce energy consumption, and into remediation and closure to return mining operations to responsible usage.

Australian standards are often used as the benchmark for national industry standards for emerging economies and METS Ignited facilitates this approach for transforming international mining standards, to establish best practice frameworks for defining operating standards for global mining communities.

Priorities for Australian METS involvement in improving mining's social, safety and environmental performance include:

- Adaption and application of leading practices in social licence with environmental and economic sustainability.
- Energy efficiency including closed energy loops, application of renewables, hybrids, and the "electric mine".
- Improving remediation and rehabilitation techniques for old, ongoing and future workings.
- Establishing a cohort(s) of academic and industry leaders to develop the economic, social and environmental performance associated with our industry's technological innovation.

Industry Knowledge Priority 5

INCREASING ECONOMIC AND TECHNOLOGICAL STRENGTHS TO RESPONSIBLY FIND, EXTRACT, CONCENTRATE AND VALUE ADD TO AUSTRALIA'S RESOURCE ENDOWMENT

Australia's mineral exploration research has led the way internationally to the discovery of major resources and defining their economic extraction through both open pit and underground methods. Australia also has a long and successful history in the advancement of comminution and beneficiation processes, as well as other downstream production technologies. Continued research is necessary to maintain progress in the light of the deep layer of weathered geological structures that are left covering much of the continent.

New, modular methods to extract our resources safely and efficiently are driving research into areas like in-situ recovery, small-scale robotics and continuous mining. In addition, the increasing availability of lower-cost alternative sustainable energy sources combined with automated mineral processing technologies will drive the return of a substantial amount of the value adding to our mineral resources which was an important part of Australia's technology sector in the past.

Priorities for excellence in responsibly finding, extracting, concentrating and value adding to Australia's mineral resources include:

- Advancing on and off-earth exploration knowledge, tools and technologies, including for deep and unconventional resources.
- Advancing knowledge and understanding of modular solutions, standardisation and interchangeability (e.g. for provision of mobile or incremental processing and materials handling capacity, plug and play capability, etc.).
- Advancing resource engineering and beneficiation technologies (e.g. selective mining, comminution, classification, reducing tailings/reject streams, in-situ recovery, small scale robotics for continuous mining, bio-leaching and nano-technology).

Industry Knowledge Priority 6

UNRIVALLED OPERATIONAL EFFICIENCY THROUGH INTEGRATED SENSING, INTEROPERABILITY, AUTOMATION, ROBOTICS AND ADVANCED DATA ANALYTICS

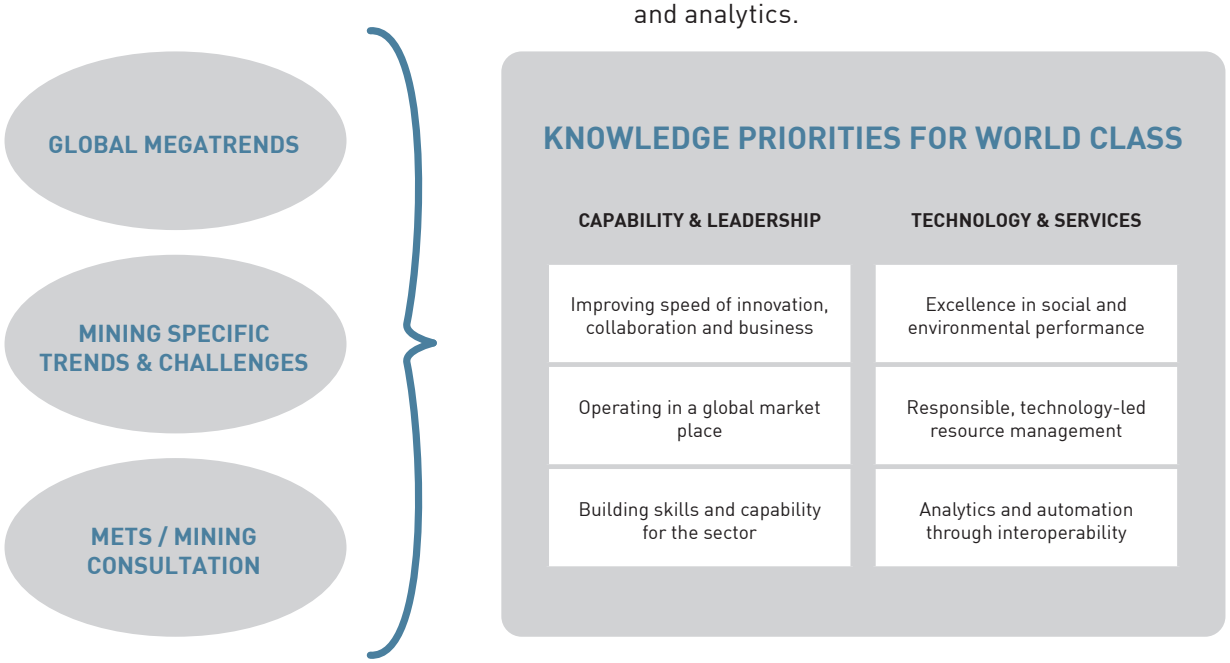
Australia's mining DNA has been built by over a century of persistent, innovative technicians and entrepreneurs who learned to adopt and adapt technologies from all over the globe to deliver the world's most efficient, effective integrated mining operations. This DNA still exists and provides the foundation for taking mining operations into adaptive and efficient economic, environmental and socially responsible outcomes. The complexity of the mining technology sector presents considerable opportunities to the mining companies and their METS suppliers and offers corresponding challenges to researchers who are willing to tackle these mixed technological, economic and social complexities.

This IKP is focussed on addressing the complexity through addressing the need for information access across an integrated value chain beyond that of a single site or mining company, where solutions must deliver sustained commercial benefit for the sector beyond just production benefits at the operational level.

Priorities for progressing the objective of unrivalled operational efficiency include:

- Advancing sensors and connectedness, e.g. for improving asset health, productivity, environmental and safety performance.
- Advancing data/information/systems interoperability.
- Advances in data analytics applied within and across the mining value chain (e.g. predictive/prescriptive asset health monitoring, numerical optimisation, etc.) towards truly integrated operations including addressing cultural, organisational and educational challenges.
- Developing more effective human/ machine interfaces and systems for providing remote presence, augmented reality, and situational awareness.
- Advancing mine autonomy, equipment/process mechanisation and automation, including operator-assist systems, and maintenance.

METS Ignited continues to play a lead role in supporting both industry and research organisations, including roles on research advisory boards to ensure that the IKPs are being addressed. METS Ignited also plays a lead role co-ordinating the global tier one technology providers and global original equipment manufacturers (OEMs) in their investment in mining technology, and in co-ordinating their technology partnerships, providing guidance and support for digitalisation to ensure that the broader METS sector is able to capitalise on global investment in digitalisation and analytics.




Deep Learning
Input Layer
Hidden Layer

METS IGNITED COMPETITIVE DRIVERS

METS Ignited is driving the competitive growth of the Australian METS sector through a number of priority actions grouped under three categories; industry clusters, regional skills development and commercialisation for growth. These activities are being delivered through our core delivery programs of Strategic Initiatives and Collaborative Project Funds, as well as through our thought leadership program Transformative Automation in METS and Mining (TAMM).

The priority actions are designed to drive activities in the market where gaps occur that are not covered by normal operating activities of the market. The Australian mining industry covers a large portion of our sparsely populated country, with an increasingly critical need for highly orchestrated technical activities to occur in remote locations.

These activities require highly skilled resources, both technically and commercially capable individuals and organisations, to be able to work collaboratively across complex interoperable systems in remote operating environments. METS Ignited's goal is to provide these regional communities with the frameworks they need to facilitate these operating environments, as well as supporting the expansion of these collaborations beyond mining into other relevant industry sectors.

The Robotics and Automation Cluster has quickly become an international collaboration

PRIORITY ACTIONS

Industry Clusters - Driving the Industry Ecosystem

Initially a series of 15 events delivered over a 9-month period, the industry clusters are now achieving attendances of over 600 individuals including representations from world leading mining companies, researchers, and METS organisations, today there are an increasing number of emerging clusters forming across the Australian METS sector.

The cluster initiative is expanded beyond the Queensland network to include national participation with groups forming in Western Australia, Victoria, South Australia and New South Wales. The Robotics and Automation Cluster has quickly become an international collaboration and has been embraced by both the AROSE (Australian Remote Operations in Space and on Earth) initiative and supported through CRCs and the Quantum TX forums. The Tailings and Mine Affected Water Cluster has also expanded to Western Australia and has a number of international participants.

The program is now working directly with many other state governments to expand additional cluster opportunities—and is expanding outside the METS sector with a number of cross-industry technology initiatives and technology centres.

Masterclasses - Regional Skills Development

The Future Skills program provides a range of industry skills with a mix of different delivery models, from online content, remote facilitation and group training sessions. The focus of the coursework has been to deliver practical skills in data, analytics, machine learning and artificial intelligence, and business skills to enhance the commercial maturity of METS.

Programs are continuing to expand across our sector and are now also working with global technology partners to develop cross-industry courses with the resources and energy sector. In addition, the program is looking at collaborations with CSIRO on ED Toolbox (a product of Digital Business Insights) for training and development. We are investing to bring the best entrepreneurial minds to regional and remote communities to expand the pool of talent available to address future industry skills and sector performance.

Furthermore, by working with research institutions and state governments to develop regional skills, we are building digital skills in regional communities.

Our programs deliver future skills training in regional centres with partners such as Central Queensland University (CQU) and National Institute of Energy Research (NIER) to deliver vocational training for data and analytics. In doing so, METS Ignited is supporting the next generation of technical skills at a practical level and ensuring the regions can support the local community in these critically important future industry skills.

Commercialisation and Growth

The Australian METS sector is a globally recognised leader at integrating multiple technologies from across the globe. With a high degree of technical competency, METS Ignited is working with the leading technology vendors and mining industry leaders to further develop the commercial capability to scale and grow.

Additionally, there remains an opportunity to enhance the linkage between research and commercialisation maturity. Industry-driven research is often end-user driven, which results in the commercialisation of projects for the benefit of the end user of the research.

METS Ignited is working with the technology sector to commercialise capabilities and integrate technology across a productisation model for the reseller—shifting the delivery of research outcomes to a commercial organisation—a 'middle layer' where the research outcome can be resold to many including the expansion of an export market for research outcomes.

AUSTRALIA'S TECHNOLOGY FUTURE

METS Ignited's goal is to strengthen Australia's position as a global hub for mining innovation and enhance the global competitive advantage of the Australian METS sector.

We see extraordinary potential for the Australian technology sector that is emerging from the success of the Australian METS sector – as a result of our experience from implementing some of the world's most complex systems in remote autonomous operating environments. It is clear Australia's leadership position in the mining industry provides a national position of strength, that is a point of leverage for the broader technology sector.

As an industry leader, it is our responsibilty to drive the simplification and harmonisation of critical industry standards to improve the health, safety, and environmental outcomes for our industry. Regulatory reform remains a priority for METS Ignited as Australia's national standards and regulatory frameworks set the global benchmark and upholds international expectations.

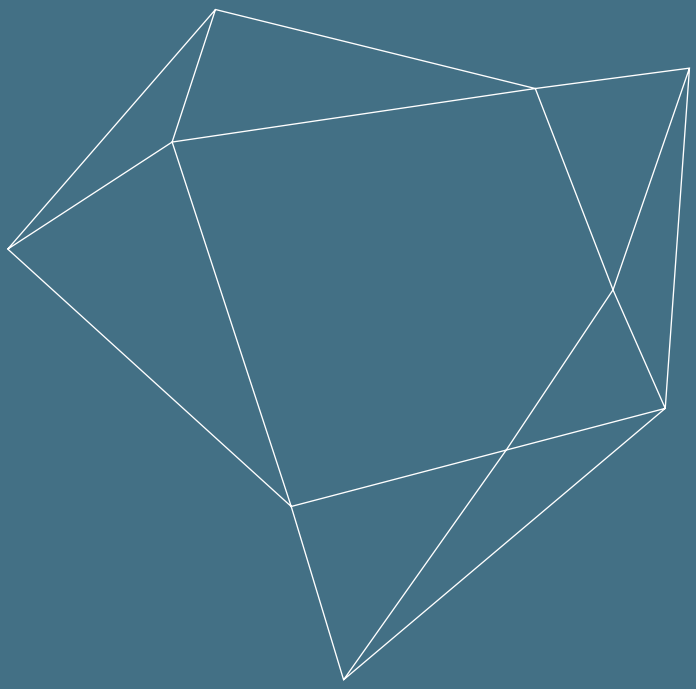
With a shortage of skills in the technology sector, the opportunity for METS Ignited is to leverage our recognised position as a global leader in the mining industry to build our capabilities across a broader range of technology sectors to support the local economy.

The benefits to the local METS sector are the strengthening of the skills base, the creation of further industry capabilities, as well as addressing many of the perception issues around the social licence challenges facing the sector.

> *Technology is the answer to many of the sustainability challenges facing the mining industry, and for the METS sector to continue to thrive and prosper for the next century, we will need to continue to attract the best and brightest from every corner of the country to participate in every aspect of the industry. The Mining Equipment, Technology and Services Growth Centre is uniquely placed as a true technology growth centre to drive the next generation of innovation and technology for Australia.*

METS Ignited is moving quickly to ensure the broader technology sectors capitalise on this opportunity, and recognises that education, skills and the innovation ecosystem have to develop both from an industry specific domain capability as well as across multiple technology sectors. We are working in collaboration with the other Industry Growth Centres to balance the specific needs against the broader skills challenge facing the country.

Technology is the answer to many of the sustainability challenges facing the mining industry.



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Industry Growth Centres