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A Vision for Mining and Minerals: Applying Causal Layered Analysis and Art*

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Abstract

This report provides an overview of the futures workshop, 'Vision 2040: Innovation in Mining and Minerals', which used art and causal layered analysis to develop a shared vision for Australia's minerals industry future. Vision 2040, facilitated by Prof. Sohail Inayatullah and researchers from the Institute for Sustainable Futures at the University of Technology, Sydney, forms part of the Commodity Futures stream in a broader program of research supported by the CSIRO's Minerals Down Under Flagship. The workshop provided mining stakeholders with an opportunity to explore how Australia's minerals industry can deliver long-term national benefit.

Keywords: Mining, Causal Layered Analysis, Art, Visioning, Scenarios, Strategic Planning

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Introduction

For Australia's minerals to deliver long-term national benefit, an important step is to explore and analyse plausible future scenarios. These scenarios should reflect and provoke thought on the possible impacts of changing international and local drivers and constraints. They should also communicate how Australia's minerals can be coupled with more sustainable patterns of production and consumption and the potential for the monies from mining activities to be invested in innovations, which underpin long-term prosperity. Contemporary pressures on Australia's minerals industry include strong demand from China on the one hand, but then climate change and higher social and environmental impacts on the other. Additionally, developing new ore bodies is getting harder and productivity is declining, as higher quality ores are being depleted. Whilst this challenge has been masked recently by high commodity prices the risks presented by 'peak minerals' warrant further attention. 'Peak minerals' is a conceptual framework used to illustrate the finite nature of minerals and the increased effort over time required to obtain value - moving from 'cheaper and easier' extraction processes to confronting remaining stocks which are 'more difficult and expensive' to extract. These challenges are important for considering the future competitiveness of Australia's resources sector. They also call for an innovative, coordinated strategy and action, to increase the value and benefits derived from Australia's minerals.

The *Vision 2040: Innovation in Mining and Minerals Forum* (Vision 2040) aimed to provide an opportunity for mining stakeholders to explore and analyse plausible future scenarios as input to developing a preferred vision, in line with the 'iterarative backcasting' approach of Giurco and colleagues (Giurco, Cohen et al. 2011). Vision 2040 is part of the CSIRO Mineral Futures Collaboration Cluster, and brought together over 30 stakeholders from government, industry and the research community to develop key elements of a shared vision for Australia's mining and minerals future. The workshop, facilitated by Prof. Sohail Inayatullah and researchers from the Institute for Sustainable Futures (ISF) at the University of Technology, Sydney, gave participants an opportunity to engage in, and contribute to, a larger process of exploring how Australia's minerals can deliver long-term national benefit.

Vision 2040, ran over a day and a half (evening session, then full day) in Brisbane 14-15 November 2010. It began with presentations from industry experts and continued with a mix of activities – a range of popular futures methods, as well as a new technique that asked participants to analyse art works. The range and order of futures methods used generated valuable discussion, innovative ideas, and useful output to develop key elements of a mining and minerals vision and strategy.

Background to the Research and Workshop Objectives

Vision 2040 forms part of the Commodity Futures stream in a broader program of research supported by the CSIRO Mineral Futures Collaboration Cluster within the Minerals Down Under Flagship. This cluster unites five university research institutions in collaboration with CSIRO to address the future of sustainability challenges for Australia's minerals industry. 'Commodity Futures' is being led by ISF, UTS. Other

collaborators are exploring 'Technology Futures' and 'Regions in Transition' (CSIRO 2010).

Vision 2040 provided mining stakeholders with an opportunity to engage in a creative process that aimed to establish a shared vision for Australia's minerals future – one where Australia's minerals are delivering long-term national benefit. Specifically, the workshop aimed to answer the following questions:

- What should Australia be doing with its mineral endowment over the next 30 years to underpin long-term national benefit?
- What strategies can deliver on a shared vision for a minerals industry embedded within a more sustainable Australia?
- What will help us create such an industry and ensure that it has the necessary resilience when confronting a range of different future scenarios?

Building on two earlier workshops, (National Peak Minerals Forum held in Sydney in April 2010[1] and the World Economic Forum Australian Workshop on Mining and Minerals in Melbourne in September 2010[2]), together with the findings of two reviews[3], the workshop began with presentations on the future of innovation, mining sustainability and technology; communities of the future; and new understandings of long-term benefit.

Opening Presentations

Presentations by Prof. Göran Roos (VTT International), Dr. Joe Herbertson (Crucible Carbon Pty. Ltd.) and Darryl Pearce (Lhere Artepe Aboriginal Corporation) set up a useful and energising platform to generate innovative and strategic thought for a vision of Australia's mining and minerals in 2040. The presentations addressed key areas for positioning Australia's minerals industry within a more sustainable Australian economy, including:

- technological advances as key factors in the future sustainability of the mining industry;
- the establishment of Australia as a minerals services hub, not simply a quarry for global mineral needs; and
- ensuring that the impacts from mining are balanced by better and more even distribution of wealth from minerals.

Göran Roos: The Future of Innovation

Professor Roos engaged with the notion that innovation is crucial for Australia to realise greater value from its mining and minerals industry. He discussed technology-based innovation, design-based innovation and business-model based innovation, and indicated that all three areas of innovation are significant for realising greater value. Particular interest centered on Professor Roos' assessment that successful international firms are using innovative business models to generate multiple revenue streams from their resources.

"For the minerals industry, this could mean we move beyond 'dig more, sell more' to 'dig once, and get paid three times' – once for the mineral, once for the know-how and technology we can develop and export and once for managing and recycling the metal and selling it again" – Professor Göran Roos.

Joe Herbertson: Mining Sustainability and Technology

Dr. Herbertson focused on technologies that have the potential to significantly reduce the negative environmental impacts of the mining industry. Dr Herberston acknowledged the challenge of 'peak minerals' in Australia (the depletion of Australia's high quality mineral resources); social inequity, climate change, biodiversity loss and ecological constraints; and the challenge of accessing the people, energy, water and social support needed to successfully operate a sustainable market. Participants engaged in considerable discussion around how to address the particular challenge that peak minerals presents for Australia.

Dr Herbertson addressed the potential for Australia's minerals industry to be a business success in the long-term and build a positive future legacy. Tools identified by Dr Herbertson include breakthrough pyrolysis technology, creating value from degraded resources, regenerative land practices, indigenous employment, regional business development and renewable energy. It was acknowledged that realising this potential requires the implementation of sustainable mining technologies and processes, further innovation, new business models and new perspectives. Discussion was generated around the difficulty of meeting these challenges in the institutional framework that Australia's minerals industry operates in today.

Darryl Pearce: Communities of the Future and Long-term Benefit

Darryl Pearce addressed the changing situation for indigenous people over the next few decades, and the impact that this is likely to have on the Australian mineral sector. Mr Pearce discussed the growing economic and political power of indigenous landholders, and the key position that these stakeholders are likely to occupy in the coming decades. Of particular interest was his view that indigenous political representatives at the state and federal level are going to be particularly powerful, in particular if the Northern Territory becomes a State where indigenous representatives hold the balance of power nationally.

All presentations formed significant inputs to further group-based discussions, which attempted to draw out the implications of the foreseeable changes identified over the next several decades. A question and answer session, which followed the presentations, generated interesting discussion around the need for a new business model for the minerals industry in Australia.

Workshop Process

The workshop was divided into three general sessions which involved a unique mix of futures methods to provide insight into foreseeable enablers and constraints

affecting potential visions. The collective outputs of these activities included an articulation of a vision and key elements of a strategy to achieve this vision. Table 1 provides a brief evaluation of the futures activities facilitated at the workshop by comparing the expected outcomes against the actual outcomes.

Table 1.
Evaluation of Futures Methods and Activities Used at the Vision 2040 Workshop

Method/Activity	Expected Outcome	Perceived Outcome (from perspective of ISF researches)
Keynote Presentations & Q&A Session (Day 1 – evening)	• Set context • Introduce and provoke thought on significant issues • Flesh out significant issues • Create a list of *key issues* to be addressed in workshop activities.	• Generated significant discussion that demonstrated wide interest and innovative thought for opportunities to sustain wealth from Australia's minerals. • Six issues identified as key to address for the future of Australia's minerals.
Futures Wheel (Day 1 – evening; over pre-dinner drinks)	• Use *key issues* (identified during the Q&A session) to identify plausible challenges to existing views of the future for the Australian minerals industry. • Provoke creative thinking around how these challenges may play out in the future. • Use this expanded view to explore the implications of these challenges for Australia's minerals industry future (including opportunities and potential new stakeholder groups).	• 6 *key issues* were explored and continued to be the focal points for workshop discussion. • Continued conversations from keynote speakers. • Established good rapport amongst participants.
Art Analysis (Day 2 – morning)	• Reflect creatively on alternative futures (three plausible and one utopian) using art to reduce the risk of people getting stuck on debating the probability of the scenarios playing out. • Engage participants with the scenarios and generate discussions on alternative interpretations of key elements (to bring out different views of what each scenario might signify for stakeholders). • Identify areas of agreement or disagreement on the implications of the WEF Minerals Scenarios for Australia.	• Generated in-depth and creative discussion on key issues. • Participants shared alternative perspectives on the key elements within the scenarios and the implications of these. • Generated creative ideas for potential challenges and opportunities presented by the key elements (ideas were shared and widely

		discussed despite significant variation and sometimes conflicting ideas amongst participants). • Participants showed an appreciation of the role of decision-making and agency in long-term planning.
Causal Layered Analysis (CLA) (Day 2 – mid-day)	• Encourage participants to think very broadly about the roots of existing 'problems' and how this might affect the way in which solutions are developed. • Engage participants in reformulating their understanding of existing 'problems' • Identifying new opportunities that emerge from this reformulation.	• Took participants awhile to understand and engage in the process. • Participants articulated the worldviews that drive current discussions, and developed alternative views that might make future discussions more effective. • Generated discussion that reflected long-term thinking and an appreciation of long-term prosperity (beyond short-term economic thinking).
CLA – Scenario Drama (Day 2 – mid-day)	• Explore how different stakeholders might interpret new formulations of the problems, and how this might affect their decisions regarding solutions.	• Fast-pace of activity renewed momentum in the group • Acted out characters of the future with seriousness, which gave the issues of the future being considered a sense of reality and significance.
Futures Triangle (Day 2 – mid-day)	• Use concepts of drivers, barriers and vision to ground strategy development.	• Participants imagined what their vision may look like and identified key governance, environmental, social, economic and political

		pushes and pulls. • Began to create a picture of how to achieve the vision (what would be needed to overcome the key challenges and take advantage of the opportunities presented).
'Dot'mocracy (Day 2 – afternoon)	• Prioritising elements identified in earlier activities as key characteristics of a shared vision.	• 5 points were identified for inclusion in draft vision (these will form the foundation for strategy development).
Backcasting (Day 2 – afternoon)	• Engage participants in a detailed exploration of how initiatives and strategies might play out over time to arrive at the vision.	• Participants found this very difficult initially • A very limited exploration of future developments was achieved, but showed influence of sequential events.

Details on selected futures methods and activities used throughout the sessions are provided below.

First Session

Futures wheel

The 'futures wheel' activity aimed to gain insight into foreseeable implications and unintended consequences of plausible issues, new pathways and scenarios that may emerge from these issues and the opportunities that each present to Australia's minerals industry for achieving long-term national benefit. Following the presentations, participants were asked to identify plausible issues that would challenge the future of Australia's minerals industry in 2040. Issues identified included:

- 30% parliamentary representation of indigenous people and potentially an Aboriginal Prime Minister
- Pressures for mining to leave no harm
- Existing business models do not enable full value to be realised from the full life cycle of mined minerals
- Increased economic influence of indigenous stakeholders and the uncertainty as to the direction this will take Australia's mining and minerals industry
- Australia's existing business model is no longer competitive in the global mining and minerals industry
- Failure to respond to the changing mineral resource landscape (inertia continues)

Participants were then asked to choose one issue that they wanted to explore in smaller groups. Participants in five groups were asked to explore their chosen issue, to extrapolate possible future developments and to consider strategies for creating value from these developments. An example of what this process produced is presented in Figure 1, which represents the exploration of the issue: '30% parliamentary representation of indigenous people and potentially an Aboriginal Prime Minister.'

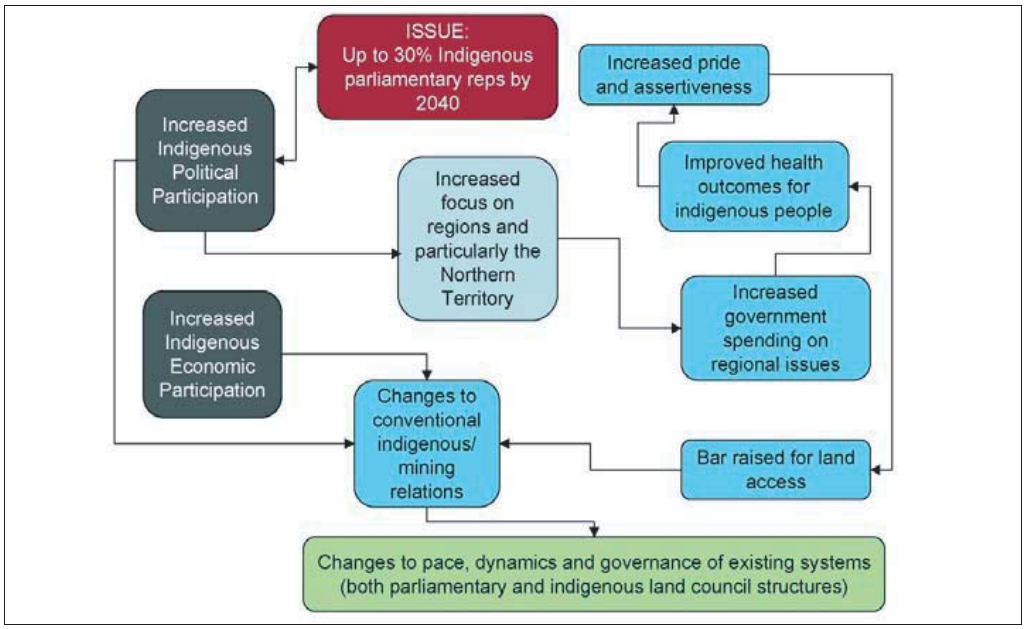


Figure 1. 'Futures Wheel' output – 'Up to 30% Indigenous Parliamentary Representatives by 2040'.

This group interpreted the impact of increased political and economic participation of indigenous people as a generator of change in existing power structures, both in indigenous organisations and in conventional parliamentary organisations. The increased participation of indigenous people in economic areas might change the way that indigenous people are involved in mining - perhaps as shareholders or owners.

Second Session

Exploring scenarios

The second session involved exploring four Australia-specific scenarios developed through analysis of three global scenarios developed by the World Economic Forum (WEF), and the Great Transitions scenario[4]. The WEF scenarios, as part of an international program, represent an opportunity to engage with an important global context for decisions made by individual nations, and were used to provide examples of long-term trends that require responses from Australian mining and mineral pro-

cessing industries. This international context is deemed to be highly significant given the export orientation of the Australian industry.

Art analysis

Artworks based on the Australia-specific scenarios were used to engage participants by providing a stimulating 'picture' of the opportunities and challenges that each presents for Australia's minerals future. Participants were divided into four groups, and each group was provided with an artwork, an explanation of the artworks and an explanation of the value of multiple and fresh interpretations of the works. With these materials as a common reference point, participants were able to point to specific aspects of the scenario that resonated with them and were able to discuss these elements. This exercise generated great discussion, stimulated creative thought around strategies for further value creation from Australia's minerals, and provided a deeper engagement with the scenarios as part of the groundwork for developing a preferred future and strategy.

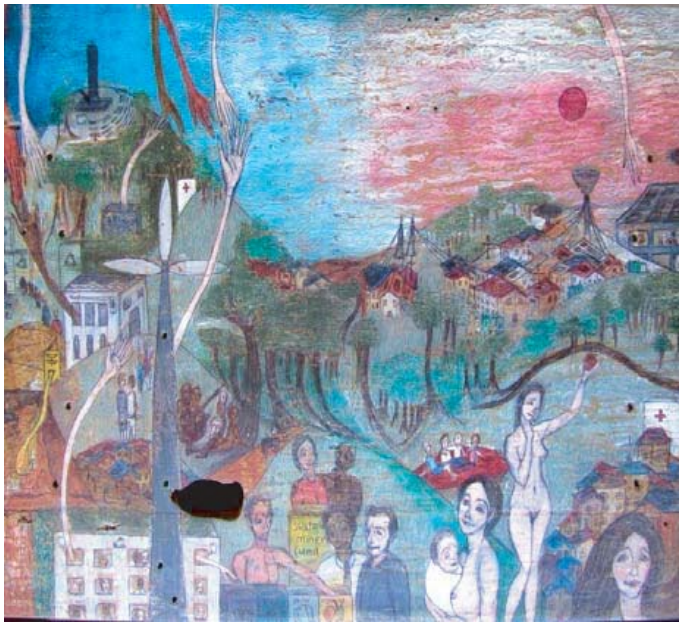
The use of creative stimulus, such as visual art, created a space that encouraged different approaches to analysis and evaluation, and innovative responses to issues. The artworks provided an ability for participants to readily access and engage with each future scenario in their own way. This contrasted the experience of presenting the same scenarios in a plenary session using a corporate video format at the earlier World Economic Forum workshop (Sept 2010). On this occasion, there was much more discussion of whether each scenario were in fact plausible or not, rather than on exploring the implications of the scenario. Being an unfamiliar activity for all participants, this art analysis technique enabled participants to break away from familiar short-term responses towards creative, long-term and strategic thinking. The use of artwork as a focus for discussion allowed for multiple interpretations to be brought forward and increased the willingness of participants to consider a broader range of perspectives on the opportunities and challenges each scenario presented. A summary of the art analysis output of two groups is provided in Figures 2 and 3.

Figures 2. Artwork of the Green Trade Alliance Scenario

Green Trade Alliance (GTA) Scenario

Opportunities: Expanding downstream processing and production of finished goods; adoption of reuse and recycling processes; mining contributes to Australia's increase in renewable energy use and exportation; enhance corporate image/gain community support; jobs created through expansion of mining services.

Challenges: Shareholder responsibilities; obtaining necessary capital to start up recycling facilities; obtaining necessary capital to expand downstream – manufacturing; managing multi-national companies threatening to move to non-GTA states.



Figures 3. Artwork of the Great Transition Scenario

The Great Transition Scenario

Opportunities: Indigenous empowerment - learning from Indigenous Australian's knowledge of the land – working with Indigenous people to value add, e.g. re-generation techniques; development of sustainable business models – recycling and expansion of mineral services such as exporting mining expertise; sovereign wealth fund may lead to greater industry support if equitable distribution of wealth across Australian stakeholders and generations; self-sufficiency.

Challenges: Resolving land use issues – who gets what and for how long is especially significant at regional levels; sustaining the Australian economy – creating value from social and cultural services; determining how to measure and distribute this value.

Causal layered analysis (CLA)

CLA is another futures method that enables issues to be viewed from different perspectives. This technique was used to identify root causes of issues and expose underlying worldviews and myths on which these are based. Whilst CLA can be applied in a variety of ways, its aim is to analyse issues at four levels. Table 2 provides definitions of the four CLA levels as provided by Inayatullah (2008).

Table 2.
Definitions of Causal Layered Analysis Levels

CLA Level	Definition
Litany/Headline	Events, issues and trends – assumptions are rarely questioned.
Systemic causes	Economic, political and historical factors – analysis usually articulated in editorials, newspapers.
Worldview	Identifies the discourse or worldview that supports and legitimizes the first two levels.
Myth/metaphor	Deep stories, collective archetypes.

Participants conducted a CLA (Inayatullah 1998) on issues that they (as a group) identified as key for deriving long-term national benefit from Australia's minerals. Identifying existing metaphors underlying the issues being explored, allows participants to identify the limits of existing ways of thinking, and to evaluate what becomes possible when the metaphor and worldview underlying the first two levels of analysis is shifted. Moving up and down these levels encouraged an appreciation of different ways of knowing and alternative responses.

Whilst it was originally planned that CLA be done for each scenario, a simpler approach that allowed participants to address key issues while becoming more familiar with CLA was taken. Previous sessions provided considerable recognition of the need to diversify services and products and evaluate the appropriateness of current governance structures (both within government and industry) in light of new and changing economic, social and natural environments. Consequently, the following topics were chosen for the CLA activity:

- The resource curse and long-term benefit (Table 3),
- Understanding the minerals industry's contribution to Australia's long-term benefit (Table 4), and
- Distribution of mineral wealth for long-term benefits/equity across society (Table 5).

Table 3.
Applying CLA to 'the Resource Curse and Long-term Benefit'

CLA level	Problem/Issue	Strategies and Solutions
Litany	• Lack of skills diversity. • Stunted growth and/or degradation and inhibition of all non-traditional mining industries. • Poor communities.	• Invest in building up skills outside of traditional mining industries. • Implement initiatives that support Australia's agriculture, education, manufacturing and other industries that do not depend on finite natural resources. • Allocate resources to build capacity of communities.
Systemic causes	• Current governance structures do not enable long-term strategic planning. • Lack of infrastructure, education and resources to enable successful transition to other industries.	• Redesign governance structures. • Invest heavily in education and infrastructure needed to build up other industries.
Worldview	• Short-term goals that are market driven overall and fixated on GDP growth alone do not lead to long-term national benefit.	• Introduce new measures of wealth to determine progress – ones that are responsive to long-term goals and are holistic (encompassing well-being and other aspects of human and environmental health).
Myth/metaphor	• People only value money and are driven only by short-term interests.	• Value and manage Australia's minerals towards ensuring long-term benefit to Australia that extend beyond economic benefit.

At the worldview and myth levels participants interpreted this issue not as a lack of skills, poor communities or the stunted growth of non-traditional mining industries but of a narrow view and mismanagement of mineral wealth. The issue then became one of managing mineral wealth toward long-term national benefit. Potential solutions discussed here included diversifying the services of the minerals industry towards those that can be sustained, such as selling minerals expertise; increasing export markets for mining software and technologies; investing in technologies and processes that are energy and water efficient, including recycling technologies; and investing in other industries that do not rely on non-renewable resources.

Table 4.
Applying CLA to 'Understanding the Mining Industry's Contribution to Australia's Long-term Benefit'

CLA level	Problem/Issue	Strategies and Solutions
Litany	• Uncertainty around how long Australia's minerals industry will account for a significant export and GDP value (*currently* 55% of Australia's export value and 9% of GDP). • Mining drives regional development during operation years but this is not necessarily sustained when mines close down - in some cases the towns may be worse off due to environmental degradation. • Current heavy reliance of Australia's economic development on the Minerals industry (significant royalty and tax contributions).	• Increase investment in, and communication of research around peak minerals and increase research and development around more efficient and effective mining technologies and practices. • Invest in local communities (via infrastructure which drives long-term economic development such as schools and non-mining local businesses) and increase the extent and quality of rehabilitating environments affected by mining operations. • Expand mineral industry services to ones that can be sustained (such as education) so that it can continue to significantly support Australia's economic development.
Systemic causes	• Significant loss of jobs and income when traditional mining operations cease. • Challenge to sustain mining equipment and technology sector (which accounts for $30 billion) when traditional mining	• Invest in re-skilling existing mining workforce to meet the needs of new minerals services. • Invest in technologies and equipment that will transform the minerals industry from one that degrades the natural environment to one that contributes to rehabilitating it.

	techniques are no longer viable. • Current governance structures do not support deriving long-term benefit from Australia's minerals.	• Address current governance structures (government and industry) so that long-term benefit from Australia's minerals is prioritised and enabled.
Worldview	• Industry success is currently evaluated against short-term monetary contributions, which does not guarantee long-term benefit to Australia. • The current perception that it is sensible to have a primary industry as Australia's main economic engine is blinding Australia to the significance of preparing for when this industry is no longer viable.	• Develop new measurements for determining industry success, which reflect the significance of long-term and more holistic contributions to Australia's wealth. • Raise awareness of the risks associated with relying on a primary industry as the main economic engine of a nation and invest in building up industries and services that can be sustained.
Myth/metaphor	• People only value money and material goods and believe this leads to success, which leads to happiness.	• Implement new development measures and make investments and decisions that contribute to the new additional factors of development (such as human and environmental health and well being).

At the worldview and myth level the problem was seen as a false perception that protecting a natural resource industry to remain Australia's main economic engine is in Australia's long-term national interest, alongside the assumption that success and well being is achieved through satisfying short-term and selfish interests. Solutions and strategies thus moved from investing in greater research, innovative and clean technologies and re-skilling the industry to developing and responding to a more holistic and realistic perception of national benefit and developing long-term strategies for Australia's minerals industry to reposition itself as a major industry player in delivering on the new perceptions of long-term national benefit.

Table 5.
Applying CLA to 'Distribution of Mineral Wealth for Long-term Benefit/equity Across Society'

CLA level	Problem/Issue	Strategies and Solutions
Litany	• Current mining practices are causing environmental degradation and are not ensuring that future generations will have access to the same minerals. • Local communities can suffer when mining operations cease. • Australia has an abundance of minerals, while developing nations need these minerals for development – Australia has a duty to supply.	• Redesign mining practices so that they have minimal impact on the environment (positive where possible) and put systems in place to pro-long the supply of minerals. • Re-distribute mineral wealth to ensure that local communities get financial benefit via jobs and infrastructure. • Commit a portion of Australia's minerals to developing nations.
Systemic causes	• Current practices are driven by historical terms of trade, which do not ensure equitable distribution of wealth. • Australia's minerals industry is predominately driven by external demand. • Current governance structures do not ensure equitable distribution of minerals wealth (on an inter or intra generational level). • Implications of the perception that Australia's minerals industry has a comparative advantage.	• New terms of trade distribute wealth more equitably (such as compensating for environmental damage). • Expand down-stream services of the minerals industry, including manufacturing, which drives domestic demand. • Restructure governance mechanisms, such as longer terms of government, to enable strategic planning that addresses significant and long-term issues, such as inter- and intra-generational equity. • Recognise and make strategic decisions around lost opportunities from investing heavily in Australia's minerals industry.

Worldview	• The current perception that Australia's wealth resides in its natural resources obstructs preparation efforts for when natural resources are depleted. • Current perceptions of wealth and development hinder Australia's ability to fulfil its duty to ensure mineral wealth is distributed globally to facilitate global development.	• Invest heavily in peak minerals research - giving priority to minerals that humanity depend on for survival, such as phosphorous (essential for agriculture) and basic structural minerals and metals; implement appropriate management plans to minimise and increase efficient use of peaking minerals; and share this knowledge world-wide. • Adopt development indicators world-wide that measure progress on the basis of well being and equitable distribution of wealth, and new perspectives of value, including cultural and social benefits, which drive long-term and international development goals through sharing knowledge, resources and building capacity.
Myth/metaphor	• Mining is seen and treated as the 'Golden Goose' – nothing must 'kill or threaten to kill it'.	• Use Australia's minerals to transition Australia and the developing world to a sustainable future - new measures of development and an orientation toward long-term goals sees Australia gain a new perspective on its minerals wealth, enabling it to use its minerals in innovative and strategic ways (investing in sustainable industries and contributing to research that advances world-wide inter- and intra-generational equity).

The perception that Australia's minerals industry enjoys a comparative advantage was challenged when exploring this issue. The worldview analysis identified current short-term and narrow measures of wealth as an underlying foundation for existing decision making processes that do not recognise lost opportunities or evaluate all options in a critical way. A potential response identified was setting up new strategic and innovative management systems that ensure Australia's mineral wealth contributes to broad and long-term national benefit.

The output of the CLA and other futures activities, led to the early development of a preferred future vision.

Draft Vision and National Strategy

In small groups, participants described their vision, through words and images, and identified the 'pushes' and 'pulls' of these visions. These results were then discussed with the group at large, the output of which was the identification of five key elements of a combined preferred future (shared vision):

1. Prosperity from new business models to unlock value along the commodity chain (eg expanding services and renting minerals);
2. Achieving net positive benefits (sequestering carbon, clean water/energy provider and biodiversity);
3. Indigenous leadership and investment;
4. Brand Australia = clean energy solutions for the planet; and
5. Energized regional towns/centres.

From here, 'back-casting' was used to begin the development of a strategy to achieve the vision. Participants were asked to imagine that the shared vision had come to fruition and to explain to Sohail, who took on the character of a person who had slept for the last 30 years, how we had come to arrive at this preferred future. It took participants awhile to engage in this process. Perhaps this was due to an apparent uncertainty amongst participants about what their participation should look like, on the other hand this activity was conducted at the end of a two day workshop that had been very demanding on the creativity of the participants. Whilst not generating actions for 'how we get to the vision', the back-casting identified linked events which could lead to such a future and illustrated that 30 years into the futures is not such a long planning horizon as was first thought. Figure 4 identifies and describes the key elements of the strategy.

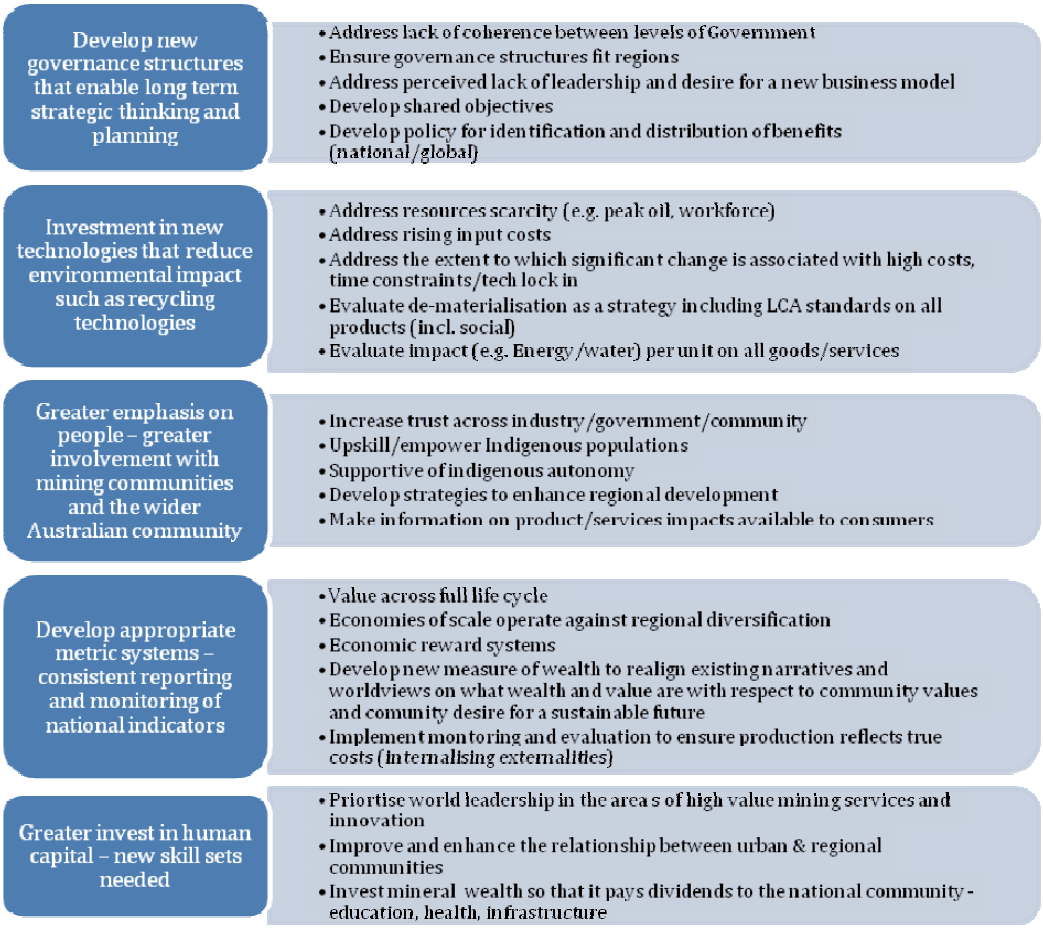


Figure 4. Key Elements of the Draft Strategy Developed at Vision: 2040

The key elements of the vision and ideas for the strategy to achieve this will act as the foundation on which to build a more robust and detailed vision and strategy. The next steps will involve providing the workshop participants with an opportunity to critique and add to the raw data collected at the workshop, and incorporating this feedback into the final vision and strategy. Supplementary interviews with key stakeholders will also be conducted to test the robustness and practicality of the vision and strategy and explore their implications.

Future Research

Outputs from the Vision 2040 workshop will contribute to ISF's two main areas of research. The Vision, created as part of the Mineral Futures stream of research at the Institute, will provide the starting point from which to examine how key Australian commodities might be produced and consumed into the future. (http://resourcefutures.net.au/sites/default/files/draft_consultation_pre_survey_030511.pdf) Researchers

at the Institute, along with colleagues from Monash University are currently working on several case studies, including copper, lithium, gold, coal and iron ore. Data from these case studies will help to illustrate possible future scenarios that are developed from the Vision 2040.

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Notes

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