Australian Government

Innovation and Science Australia

2030 Strategic Plan

Issues paper

20 March 2017

Further Information

Further information on the development of Innovation and Science Australia's 2030 Strategic Plan is available on the ISA website: www.industry.gov.au/ISA

Submissions

To ensure the 2030 Strategic Plan is based on the best possible advice and harnesses insight from the innovation, science and research system and the broader community, ISA is engaging the Australian public through comprehensive public consultations.

We are seeking your contributions and your ideas on the issues raised in this document.

ISA will accept submissions until 31 May 2017.

Our preference is to receive submissions electronically. For submission details please go to www.industry.gov.au/ISA

This Issues Paper has been developed by Innovation and Science Australia (ISA), an independent statutory board created by the Australian Government to provide it with advice about the innovation, science and research system (the System). ISA has already completed a review of the current performance of the System which was released in February 2017 and can be found at https://industry.gov.au/Innovation-and-ScienceAustralia/Documents/ISA-system-review/index.html.

The government has asked ISA to develop a 2030 Strategy to help guide its investment in the System as well as to facilitate conversations between other players in the System such as business, investors, researchers and other levels of government. ISA welcomes the views of these players and interested members of the public in helping develop the strategy and has developed this Issues Paper to help facilitate the conversation.

ISA also recognises that there are many relevant reviews and studies that have been done which it intends to build on and that significant reforms and initiatives are currently being rolled out, such as through the National Innovation and Science Agenda (NISA).

Context

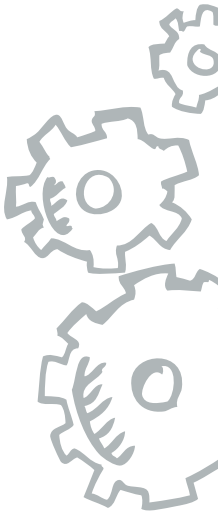
Australia is a prosperous country. Australia's economic performance has been among the strongest in the OECD over the past 10 years, driven by our ability to exploit global demand for our abundant natural resources. As a result, Australians have some of the highest living standards in the world. We have high life expectancy, access to high-quality schooling and health services, and some of the most liveable cities in the world.

However, waves of change are sweeping through with greater frequency. While we cannot accurately predict the future, we know that the Australian economy and our way of life will be subject to waves of change (e.g. in technology, society etc) that are reshaping the world we live in. Doing nothing will put at risk the wellbeing and prosperity Australians currently enjoy. More positively, there is an opportunity to ride these waves to our national advantage.

Australia should proactively respond to these changes. Australia requires concerted, pro-active and national action to respond to the far-reaching impacts of digital disruption, automation, ageing populations, and shifts in global powers. New approaches by government, business, educators and individuals are required to engender the dynamism and resilience that can further enhance Australia's position as a leading nation to live and work.

Our vision for Australia in 2030 is clear:

> *We want an Australia counted within the top tier of innovation nations, known and respected for its excellence in science, research and commercialisation.*
>
> *Innovation, which can underpin a diversity of internationally competitive industries, will enable todays and future generations to have meaningful work, and a great quality of life, in a fair and inclusive society.*



Achieving this vision will require many players to work together. The Commonwealth Government has tasked Innovation and Science Australia to develop a strategic plan to position Australia as a leading innovation nation by 2030. The 2030 Strategic Plan will describe what the innovation science and research system should look like in 2030 and determine how Australia can get there.

This issues paper nominates six challenges we see as central to shaping the strategy, and suggests themes and questions for discussion. We welcome your feedback on these challenges – are they the right ones? Have we missed something? How can we move from ideas to actions?

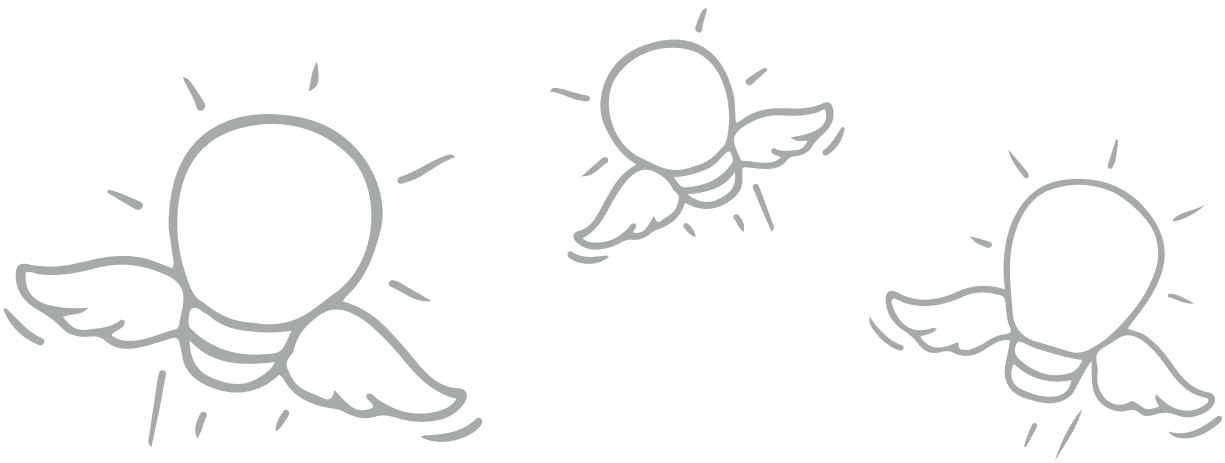
Over the next few months ISA will be leading a public conversation to discuss these issues and invite your contribution to a Strategic Plan that reflects the hopes and aspirations of all Australians.

How we think about the future

Identifying trends and opportunities, rather than predicting outcomes

The history of predictions about the future suggests it is easy to miss the mark. However, even as we cannot be wholly certain what will happen next month, let alone 13 years into the future, CSIRO and others have identified several trends they believe will play a significant role in shaping our future. The primary forces behind these trends are technology, globalisation, and demographic change. These forces are not new, but they are evolving rapidly. Each time they evolve, new megatrends are generated. Understanding the root causes of megatrends allows us to identify the interactions between and take advantage of the rapidly changing environment – even as new megatrends emerge. Current megatrends include:

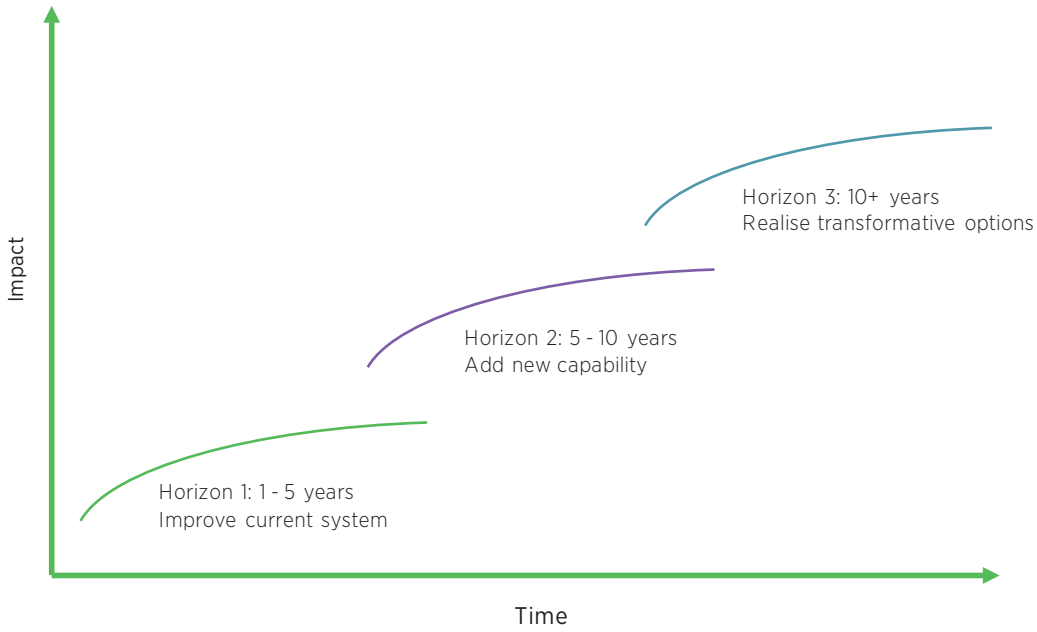
- **Changes in global economic power: Rise of China and India -** commodity dependent economies have been hit, including Australia, as global demand for their product has eased. In particular, Australia has relied on China's double digit growth to sustain our recent resource boom. China is now shifting its focus to building domestic consumption, by exploiting local or State owned resource assets in other countries, and India is growing in economic importance on the global stage. This economic shift will provide opportunity for Australia to build new export markets, trade relations and cultural ties. Tourists, and temporary or permanent immigrants will flow out of growing Asian countries and into Australia, providing an economic boost.
- **Industry convergence –** the world is challenged by large costly problems such as climate change, rapid urbanisation and increasing health care costs. Driven primarily by technology companies, long-held characteristics of industry are being disrupted and driving a convergence of industries. The automotive industry exemplifies this. When vehicles become autonomous, the automotive, transportation, and logistics industries could converge into a broader mobility industry. Building an industry culture that can take advantage of this megatrend will bring together skills from many disciplines to solve national and global challenges. Convergence represents a major growth opportunity.
- **The future workforce –** this megatrend predicts that as the digital revolution sweeps through business, the change in the shape and size of firms will be like nothing seen before. At the same time, the skills required by the workforce are changing rapidly, as new skills requirements emerge and old skills become obsolete. Artificial intelligence (AI), robotics, virtual reality and internet of things are likely to take labour displacement to a higher level. However, it is likely that automation will also produce new sectors, companies and forms of employment. Sharing economy start-ups (Airbnb, Uber) are one such example – if government regulation is agile and real-time.



- **Resource scarcity -** as the world becomes more populous, urbanised and prosperous, demand for energy, food and water will rise. However, the planet is unable to support current models of production and consumption. By 2030, the global population is expected to demand 35% more food, in turn increasing the demand for water and energy. Increased occurrences of extreme weather will also drive demand for energy. Rising seas and changes in rainfall patterns will change food growing areas and seasons, again contributing to scarcity of resources. Crisis is spurring innovation and adoption. Distributed energy and water innovations hold the potential to have a transformative impact, and energy technology and business model innovation could avert the worst impacts of climate disruption and drive economic growth.
- **Continued Urbanisation –** by 2050, the world will be two-thirds urban and one-third rural. This issue is of particular importance for Australia, as our major cities are already under significant growth pressures and current models of urbanisation (both domestic and international) are unsustainable. Yet cities are a powerful force for economic development and shared prosperity – they generate 85% of global GDP. Making cities smart and resilient is a trillion-dollar opportunity for product and service providers, small and large companies alike.
- **Health reinvented –** health care spending is on an unsustainable trajectory thanks to the ageing population and increasingly sedentary lifestyles that accompany economic development and urbanisation. The fastest growing segment of the population will be the over 65s and diabetes is expected to be one of the leading cause of disease burden on the health care system in many countries by 2023. Healthcare is being reinvented by the drive for economic sustainability and digital disruption. There is opportunity for Australia to ensure it is at the forefront of the next wave of disruption by being prepared for the next generation of smart technology as well as incentivising long-term behavioural changes needed to tackle chronic disease.

Anticipating waves of change

A useful framework for thinking about strategic planning over time was popularised in the book "The Alchemy of Growth". This framework places strategic options and choices in the context of three "horizons", which are both conceptual and temporal. We have chosen to think about the 2030 strategy in a similar way, as shown in the figure below:



Challenge 1: Moving more firms, in more sectors, closer to the innovation frontier

Australia's 2 million firms, employing 9 million Australians, are the heart of our economy, and include firms that are both large and small, and new and old. Every year new firms join the economy, whilst others leave, and all firms seek to overcome the competitive challenges they face. Our continued national prosperity depends upon their continued success.

To thrive as a nation, we need a dynamic business environment where firms have the opportunity to rapidly adapt and excel on the global stage. Through value creation comes jobs, choice and wellbeing for all Australians

By 2030, we imagine a highly innovative Australia would have:

Built on our successes. Australia already has many firms that are world-class, and others that have the potential to develop in that way. We will need to continue to support our innovation leaders, whilst encouraging the emergence of the next generation.

Encouraged ambition in the long tail. A large number of Australian businesses are not exposed to international competition, or have chosen not to engage with export markets. Recent data has shown that businesses that engage with export markets are more successful. We need to encourage the transfer of the smart business practices that international markets require to businesses of all kinds. Improvements in effective competition policy, management capability and an increased appetite for risk in business will create a dynamic business environment necessary for international competitiveness.

Unleashed "gazelles". Overwhelmingly, new jobs are created by new firms. We want to create an innovation ecosystem (community) where start-ups can flourish and scale-ups can successfully mature. To support this, the national innovation system will need to better connect high-growth firms to our science & research base, and provide adequate risk capital. We will also need to ensure that our national mindset regarding risk-taking is sophisticated and focused on wealth creation.

Created a winning regulatory architecture. Regulations are critically important for protecting the environment, safety and rights. They are equally important for facilitating commerce. We need to aspire to high efficiency regulation and tax regimes that are conducive to growth. This will be achieved by investigating where opportunities to stimulate innovation through regulatory change exist. The role and effect of the competition regulator on innovation will also be important.

Issues for Discussion:

- What is your reaction to this challenge? What's missing, such as other opportunities? Can you nominate your three highest-priority responses to address this challenge?
- How should we strike the balance between supporting existing innovative leaders and allowing the emergence of the next generation?
- How do we ensure our current (and future) workforce has the necessary skills to support firms in their ambition and realise Australia's vision to be a "top tier" innovation nation?
- What role could "clusters" of innovative activity play in fostering high-growth firms?
- What regulatory reform, and in what sectors, is required to help firms move closer to the innovation frontier and enable greater adaptability?

Challenge 2: Moving, and keeping, Government closer to the innovation frontier

As a service provider, employer, investor, regulator and leader, government plays a significant role in the lives of all Australians. Government is also an integral part of Australia's national innovation system with research agencies being a major contributor to the generation of new knowledge. Our public institutions must become synonymous with innovation to provide its citizens with ever greater public value.

By 2030, we imagine a highly innovative Australia would have:

Governments that lead by example. Governments operate significant public enterprises and count amongst Australia's largest employers. Unlocking the innovation potential of public entities will see benefits both inside and outside public service. To achieve this, government will need to embrace innovation and be, as the Government's National Innovation and Science Agenda suggests, an exemplar that sets new global benchmarks for best practice.

Governments that are demanding customers and valued partners. Government spending represents a significant share of Australia's GDP. By reducing the cost of doing business with government (e.g. simplifying procurement and compliance obligations), and maximising the innovation outcomes for the nation – government will be more creative when partnering with firms. Government must also be a demanding customer to ensure that taxpayers get the greatest value out of government expenditure.

Governments actively strengthen and sustain the innovation system. Government plays a critical role in sustaining a healthy and growing national innovation system – and the Commonwealth and state science agencies (e.g. the Commonwealth Science Industrial Research Organisation, South Australian Health and Medical Research Institute) deliver a critical lever for driving system performance and connectivity.

Governments that are dynamic in delivering services and public value. Whether you're drawing on government services or complying with government regulation, people and businesses should expect efficient and effective engagement outcomes. Government must continually examine the value being delivered to the Australian public, and seek to be dynamic and innovative in the way they achieve this.

Issues for Discussion:

- What is your reaction to this challenge? What's missing such as other opportunities? Can you nominate your three highest-priority responses to address this challenge?
- Where is innovation required to reduce the burden of partnering with government?
- How could government seek to leverage greater social benefit and public value from major program expenditure?
- Where can government reduce impediments to innovation within the public sector?

Defence – Moving closer to the innovative frontier

A key responsibility of the Australian Government is to ensure the safety and security of our people, territory and interests. The Defence enterprise consists of the Department of Defence, Australian Industry (large and small), public funded research agencies and academic institutions. Defence should be an exemplar for innovative public service that demonstrates a culture that embraces risk and seeks innovative solutions. As a creative and demanding customer Defence should actively break down barriers to innovation and reduce the burden of working with government. Defence should strengthen linkages across the innovation system through building partnerships that translate knowledge generated within Australia into defence capabilities (including enabling capabilities like ICT, defence estate and human capital). Defence's estimated $195b expenditure over 10 years will undoubtedly have direct and indirect innovation dividends to deliver public value to Australia.

Challenge 3: Delivering high-quality and relevant education and skills development for Australians throughout their lives

A well-educated nation, possessing a diverse range of skills and capabilities is an essential precursor for a vibrant innovation system. However, the accelerating pace of change means that skills will potentially lose their value more rapidly in future, at the same time that our potential working lives are becoming longer. In addition, changes in technology and educational practice offer the potential for increased learning effectiveness. To make the most of a more dynamic future economic landscape, we will need an excellent education system encouraging an innovation mindset and lifelong learning across our community.

By 2030, we imagine a highly innovative Australia would have:

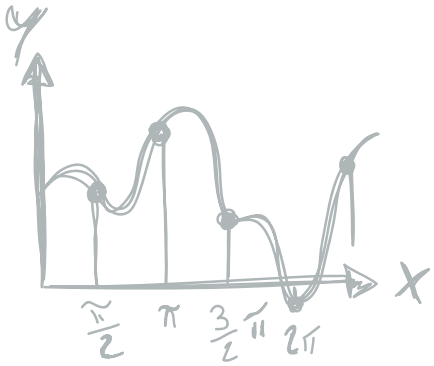
An education system that delivers work skills and education through lifelong learning. Australia's demographic profile will continue to change as we move to 2030, and the demands of our economy will also change, probably at an increasing rate. Our workforce will require the deep discipline skills to generate, transfer and implement knowledge and ideas. This means we need an integrated education and skills system that supports a workforce capable of successfully reacting and adapting in real time to continual change. This will require a joint effort, including consideration of new models for funding and delivering education, between employers, employees and governments.

Embedded skills for innovation across our community. We need to cultivate our innovation and entrepreneurial skills from an early age. We also want our children to have highly developed skills in the areas of logic, creativity, and social interaction. The acceptance of and learning from failure as well as an attitude that it's okay to start again must become the norm.

An education system that chooses the best techniques based on robust evidence. Rapid changes in technology are affecting the education sector as much as any other. This offers the opportunity of a much more personalised approach to learning, where the journey of an individual is tailored to their needs, rather than the student having to fit into a standard approach. The best education system will see experienced and well-qualified teachers combining emerging technologies with well-established techniques to deliver the best possible learning outcomes for their students.

Issues for Discussion:

- What is your reaction to this challenge? What's missing? Can you nominate your three highest-priority responses to address this challenge?
- How do we create a cohesive education and training system that is integrated into to the innovation and research system?
- How can we increase people and idea exchanges between industry and the education and training system?
- How do we create and support a culture of agile learning?



Challenge 4: Maximising the engagement of our world class research system with end users

Australia's science and research base is rightly regarded as a source of strength and a major asset for our innovation system. However, for many years, reviews have highlighted its poor connectivity with the end-users who can turn the knowledge it generates into wealth. The potential for value creation is significant if we can generate effective teamwork amongst those who generate knowledge and those who put it to work.

By 2030, we imagine a highly innovative Australia would have:

A well-supported and impactful world-class research base. Research done in Australia addresses the needs of the nation, as well as global challenges. Recognized in international rankings, ethically sound, independent, it must be supported by appropriate funding levels, equitably shared across the system, and supported by world-class research infrastructure. We must ensure that our research has impact, is communicated widely across the nation and is translated into practical outcomes.

Enhanced mobility for innovators across the system. The Australian research community exhibits high levels of international collaboration and is well represented in international scientific efforts. However, collaboration between the research and business communities is weak, and mobility of people between academic and business careers is low and not seen as beneficial. We will need an innovation and research system without barriers, giving researchers the flexibility to move across the system to ensure the highest quality and connectivity of the system is maintained.

A flexible research training system. Australian research training degrees are held in high regard around the world, but in the modern economy the graduates from these degrees can expect to find work in a diverse range of settings. We need to ensure that the research training system produces a quality and quantity of graduates, in a diverse range of sectors that adequately serves the needs of a knowledge intensive future.

Issues for Discussion:

- What is your reaction to this challenge? What's missing? Can you nominate your three highest-priority responses to address this challenge?
- How do we create a comprehensive research training system that is connected to the needs of end users?
- How can we increase people and idea exchanges between industry and research? How can we increase the multi-disciplinary engagement and exchanges across industries?
- Do we have the right incentives to encourage research translation?

Challenge 5: Maximising advantage from international knowledge, talent and capital

To nurture and enhance our innovation, science and research system Australia must seek to gain maximum advantage from international talent, knowledge and capital flows and global value chain engagement.

Research shows that firms that regularly export are more likely to be 'innovation-active' than domestic-only firms. Foreign investment also often brings access to technology, skills and global value chains that assist firms in their international business development and growth.

By 2030, we imagine a highly innovative Australia would have:

Enhanced its global engagement. Evidence indicates that higher levels of global engagement correlate with higher levels of innovation. Ongoing community support for greater global engagement will depend upon communicating the benefits that international knowledge, talent and capital flows bring to our community, including the importance of our Australian 'innovation diaspora'. Building a stronger evidence base for the value Australia derives from international talent and capital will be critical to this support.

Positioned itself as a great place to study, work, live and invest. Australia has the opportunity to be a preferred destination of choice for both international talent, including researchers, entrepreneurs, start-up founders and highly skilled staff and for international capital. How we position Australia as an attractive and welcoming destination; the actions we take to ensure this positioning is authentic; and the practical measures we have in place to facilitate these flows will be critical for our ongoing success in the global competition for capital and talent.

Built on its strengths and addressed capability gaps through international engagement. To help us build on national strengths and fill capability gaps, we may choose to focus our talent and capital attraction activity on specific sectors, capabilities or system infrastructure and enablers. Encouraging and facilitating greater value chain engagement by more Australian businesses, across a range of sectors, will also be likely to assist in increasing innovation.

A leading role in international knowledge sharing. Australia can add value to its knowledge through more widespread international partnerships in research and business. Creating and taking opportunities for Australian researchers to collaborate internationally, including through taking advantage of our links in Asian growth markets, will stimulate the flow of ideas and innovation. Identifying where we could gain most from data collaboration, and setting the regulatory framework to assist, may accelerate this potential source of innovation.

Issues for Discussion:

- What is your reaction to this challenge? What's missing such as other opportunities? Can you nominate your three highest-priority responses to address this challenge?
- How can we ensure that Australia remains attractive to international firms and individuals as a place to study, work, live and invest?
- What specific measures may be needed to facilitate talent and capital flow and greater value chain engagement?
- How can we maximise the value of international knowledge exchange? Where are the areas where we are getting this consistently right and how?
- What happens if the current protectionist mood in some major countries becomes a major trend and international mobility of knowledge, talent and capital reverses its recent trend of growth?

Challenge 6: Bold, high-impact initiatives

The coming decades will bring significant economic, geopolitical, environmental and social challenges for all nations. Overcoming these challenges will not be easy, but they will eventually be overcome – and why should Australia not play a leading role? By galvanising industry, the research sector, government and the community around frontier pushing projects, can Australia develop solutions, and problem-solving capabilities, that leave a lasting and transformative impact on the community?

By 2030, we imagine a highly innovative Australia would have:

Undertaken bold, high impact initiatives designed to deliver significant direct and spillover benefits. Australia has the geographic, industrial, research and cultural strengths to undertake its own bold initiatives. Collaborations of government, private companies, not-for-profits, scientists and researchers can change the path of our regions, and the nation, for the better.

A willingness to be bold – highlighting some of Australia's recent "big science" projects

Australia is already engaged in ambitious domestic initiatives, including in advancing quantum computing and the bionic eye, and is a participant and/or host in large global initiatives such as the next-generation Square Kilometre Array (SKA) radio telescope. Successive Australian Governments have committed to Australia's participation in the SKA project, which is expected to result in Australian industry receiving a boost not only in delivering infrastructure, but in contributing to the SKA's next generation energy-efficient computing and data technology. The SKA project will also boost Australia's scientific and STEM capabilities.

Taken a consultative approach - A broad base of sustained support is required to pursue any ambitious initiatives, or "moon shots". Such support is required to embrace risk, and weather some failures along the way, in pursuit of a common goal. In undertaking its ISR Review, ISA heard calls for clearer long term strategic leadership and more effective governance of Australia's innovation system. The pursuit of bold, high-impact initiatives will require close attention to "grass roots" priorities, which can be used to build a strong support base for larger projects. It will also require astute judgement as to the best scale on which to act, balancing the need to remain relevant with the opportunity to achieve large-scale impact.

Been rigorous in selecting and executing high impact projects that will ensure maximum direct return on investment, as well as spillover benefits. We will need to be strategic in deciding where Australia can genuinely be the best in the world at something. We will also need to be sophisticated in the approach to managing risk and dealing with the inevitable failures that would feature in a portfolio of bold projects.

Issues for Discussion:

- What is your reaction to this challenge? What is missing? Are there other opportunities?
- What type of initiatives would achieve the greatest impact? Bold high impact initiatives at regional, national and/or international scale? How should we decide?
- Does Australia have a national "burning platform"? Do our regions?
- What is the right balance of government and other sector involvement in leading and supporting bold high impact initiatives? What measures are required to achieve this?