



Innovation and
Science Australia

Australia 2030

Prosperity through

INNOVATION

Report on the Analysis of Stakeholder Consultations

The logo for Howard Partners, featuring the word "Howard" in a red, cursive script font, followed by the word "PARTNERS" in a blue, sans-serif, all-caps font. A vertical blue bar is positioned to the left of the text.

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Preface

This Report would not have been possible without the time and commitment of several hundred people to participate in Consultation forums and interviews across the country. Their exceptional generosity is greatly appreciated. I look forward to the opportunity of follow-up conversations after Innovation and Science Australia's Strategic Plan and this consultation report are released.

Those who participated in interviews and were invited to participate in the Consultation forums are listed in the attachments to this Report.

The Report also draws on the outcome of an *Expert Opinion Survey* conducted following the consultations. I greatly appreciate the time taken by the 361 people who took the time to complete the survey instrument.

I would also like to thank the many Regional Development Australia Committees that provided venues to enable the consultations to take place.

It was a great pleasure to work with staff from the Office of Innovation and Science Australia in providing advice and material for the forums and being in attendance. Particular thanks to Todd Mansell, Mark Looney and Debbie Willimott in this regard.

I must extend particular appreciation to Todd Williams, an associate of Howard Partners, who undertook the task of inviting to the consultation forums, registering their attendance, and facilitating the discussion at the Forum events.

I would also like to thank my colleagues on the project – Mark Matthews (SDG-Economics- UK) and Don Scott Kemmis (Howard Partners) and Paul Simmonds and Patries Boekholt (Technopolis Group, UK) for their work on the project.

The Report reflects the views and opinions of people consulted and interviewed. However, any interpretation of those views is entirely the responsibility of Howard Partners.

John H Howard

Overview of Findings

This is a Report of the Consultations Program undertaken by Howard Partners to assist Innovation and Science Australia develop the Australia 2030 Prosperity through Innovation Strategic Plan. These findings along with the information provided in the 130 submissions received from the public consultation process have informed the development of the 2030 Strategic Plan. A list of those submission that can be made publically available are at Appendix 1.

The Consultation Program sought to obtain the opinions of businesses, research and teaching organisations, government agencies and intermediaries about the current position, opportunities, and directions for Australia's Innovation Strategy. These meetings provided very valuable insights and context about what is currently being achieved, the constraints (and brakes), and actions and priorities to enhance innovation system performance over the short, medium, and longer-term horizons.

Appendix 2 lists the 176 innovation leaders who participated in direct interviews and group meetings. A further 233 people participated in Consultation Forums in all State/Territory capital cities and in Ballarat, Bendigo, Bunbury, Cairns, Geelong, Gold Coast, Launceston, Newcastle and Wollongong. We were absolutely delighted at the level of interest and participation.

Overall, our discussions generated a wide range of insights and opinions to assist the Board in the formulation of strategic priorities and action plans. We were also made aware of innovation strategies and accomplishments in business, universities, research organisations, NGOs, and government that often go unrecognised.

Our findings are grouped into several categories:

- Key messages, covering: Building and sustaining connections and connectedness across the Australian and global innovation systems, and particularly between the university/research, industry, and sectors – and within sectors; establishing a broader understanding of the scope and context for innovation, particularly in the services sector and in the social and environment domains; commitment to stability and continuity in policy and program initiatives.
- Approaches to achieving innovation outcomes, including seeing innovation as an '*investment* in the future' setting stretch targets, addressing the emerging role of universities in driving industry and regional development, and factors relating to demographic change, diversity, and social inclusion.
- Considerations relating to the Strategic Challenges identified by the ISA as potential 'high impact large scale initiatives' to stimulate innovation' identified during the Consultations and Interviews.
- Laying the foundations for transitioning to Australia's innovation future, including reinforcing an entrepreneurial mindset, leadership capacity and capability, access to capital, commercialisation capability, developing skills and talent for innovation, strengthening capacity for collaboration, and leveraging capabilities across policies, programs, and State/Territory Governments.

- Conclusions concerning addressing innovation outcomes, innovation system governance, levels of investment in science, research and innovation, developing a long-term Innovation System Budget and Plan, capturing the benefits of prior investments, and innovation system research

Many of these findings are not new and unsurprising. But they serve to reinforce the interests and concerns of key players in the innovation system. The Consultations were, however, able to build a depth of understanding of these areas of interest.

Overall, the Consultations program can be regarded as successful in terms of engaging with Innovation Leaders in an environment where people feel 'over consulted' – particularly in relation to government initiatives relating to policy development in science, research, education, and training. There is a high level of awareness of the intensity of innovation policy development regarding innovation over the last 25 years reflected in numerous policy statements, initiatives, inquiries, reviews and evaluations¹.

The Consultations also drew attention to the following:

- All regions and cities are different: innovation ecosystems are at different stages of development and have different enablers from which to work from.
- Connectivity, particularly national digital connectivity, was an overarching theme in all consultations
- A perceived absence of long term policies to assist in developing innovation.
- The concept of innovation itself, where people particularly in the creative fields, are actually 'being innovative' but not seeing it that way. Innovation *is* the business.
- The importance of international knowledge sharing and mobility of talent.
- The role of regional innovation systems and the contribution of universities to driving economic development and renewal in depressed regions.

Howard Partners extends sincere thanks to the people and organisations who made the time to participate in the Consultations, which generally covered two hours, and be available for Interviews, which were conducted over one hour.

¹ These are reported separately in a paper prepared by Dr John Howard, Twenty-Five Years of Review: Innovation Policy Statements Reports and Initiatives 1991-2017: An inventory and analysis.

Approach to the Project

This Consultations Report, prepared by Howard Partners, provides findings and insights from an extensive Consultations Program conducted across Australia over the period March-June 2017. The Consultations Program involved conducting ISA sponsored interviews with innovation leaders. It was followed up with an Expert Opinion Survey, at Appendix 5, to calibrate the direction and strength of views articulated in the consultations program.

This Report presents material that is sourced only from the consultations. It does not provide insights from our broader understanding of the Australian, international, and global innovation systems.

1.1 Background: Twenty-Five Years of Innovation Policy Development and Review

The development of the 2030 Strategic Plan was also informed by the considerable number of reports and reviews undertaken by, or commissioned for, the Commonwealth Government over the 25-year period 1991-2016 of the innovation system. This included reviews and reports– in the broad field of innovation, science, research, technology, and tertiary education and which are on the public record.

The portfolio, which totals over 150 documents, is divided into five main categories:

1. Government policy statements, strategies and plans (44).
2. Public inquiries, investigations and evaluations (71).
3. Productivity Commission inquiries and reports (6).
4. Reports from the Commonwealth Science Council (and predecessors) and Chief Scientist (20)
5. Parliamentary Inquiries and Reports (2).

There have been, in addition, a range of policy documents from other sources:

1. Insights from the Learned Academies, including the 13 Reports from the Securing Australia's Future (SAF) initiative.
2. The work of Commonwealth Government supported policy research agencies, including the Office of the Chief Economist.
3. Uncommissioned and unsolicited policy reviews and research presented by university and independent research institutes, industry and professional associations, professional services firms, including management consultants, and policy advocacy (lobby) organisations.

The knowledgebase created from this work is massive and provides a comprehensive perspective on Australia's innovation system. There are several common and continuing themes addressed in this material:

- Microeconomic reform, from 1991.
- End of the mining boom, and the need to find new sources of growth and wealth creation.

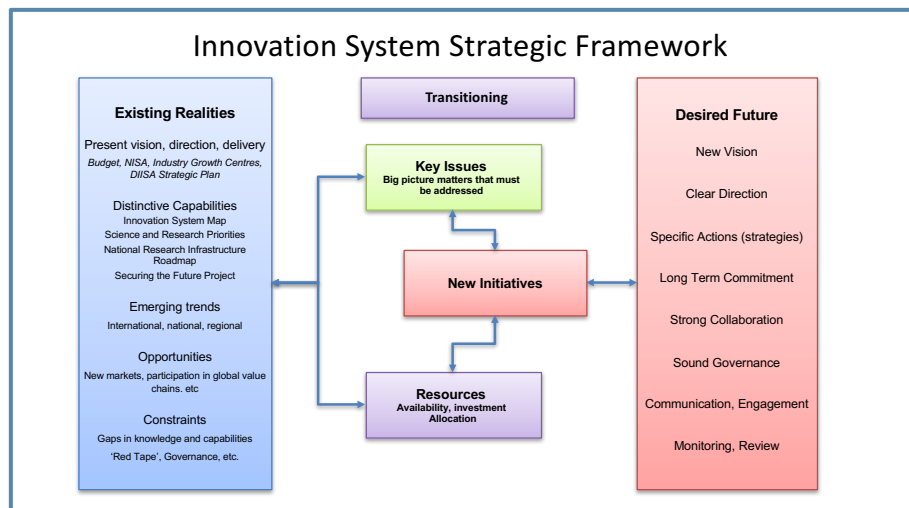
- A focus on manufacturing, manufacturing employment, and the need to preserve a manufacturing sector.
- Changing structure of industry, and the move away from large domestically based mass production organisations to smaller, more specialised interrelated firms in global value chains.
- The progressive movement to a services oriented economy, and requirement for knowledge based professional and technical skills.
- Growing attention to industry-research collaboration – but a continual statement of the problem, perhaps reflecting a poor understanding of the fundamental difference in missions between business and university organisations.
- Commercialisation of publicly funded research and a greater role for universities in driving industrial innovation.

1.2 The Consultations Program

This Consultations Report is structured around an approach to strategic planning that reflects the following elements:

- Where are we now?
- Where do we want to be in terms of a vision?
- What are the key actions that will be required to achieve the vision?
- How are we going to get there?

An abridged strategic planning analytical framework, developed and applied in most of our previous strategy assignments is represented below.



This framework underpinned the approach to the Consultations Program. Figure 1 provides a summary of the stakeholder engagement undertaken in the development of the 2030 Plan which covered:

- Eighteen ISA badged Forums in all State/Territory capital cities and in Ballarat, Bendigo, Bunbury, Cairns, Geelong, Gold Coast, Launceston, Newcastle and Wollongong over the period 20 March to 18 May 2017. Over 230 people participated in these events: 34 per cent were from business; 22 percent from Government; 22 percent were intermediaries;

20.0 per cent were from research and teaching organisations, and 2 % were from other categories (NGOs and unclassified).

- Interviews with 176 innovation leaders from across Business, Research and Teaching Institutions, Intermediary organisations, and in Government.
- Attending meetings with State and Territory Government officers arranged by the Office of Innovation Science Australia
- An Expert opinion survey that calibrates insights and opinions of 361 participants

Figure 1: Summary of the Stakeholder Engagement for the 2030 Strategic Plan



The taskforce in the Office of Innovation and Science Australia engaged directly with the Commonwealth Departments throughout the development of the 2030 Plan.

A list of the organisations or individuals that submitted public submissions are at Appendix 1. A number of respondents lodged confidential submissions; the details of these submission are therefore not included in this list The Innovation leaders engaged in the Consultation interviews are listed in Appendix 2. A list of organisations invited to participate in forums in the development of the 2030 Plan are at Appendix 3.

1.3 Consultations objective

The Program had a particular focus on the Board's thinking about the Strategy developed up to February 2017, which was reflected in a one page *Overview Paper* distributed prior to meetings, at Appendix 4. A longer [Issues Paper](#) was released publically on 24 March 2017.

At a meeting in December 2016 the ISA Board has adopted a draft vision for Australia's national Innovation, Science and Research System which was used during the consultation process:

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 today's and future generations to have meaningful work, a great quality of life in a fair and inclusive society.

At that time, the Board had identified six *Strategic Challenges* to achieve the Plan's vision:

- Moving more firms, in more sectors, closer to the innovation frontier.
- Moving and keeping Government closer to the innovative frontier.
- Delivering high-quality and relevant education and skills development for Australians throughout their lives.
- Maximising the engagement of our world class research system with end users.
- Maximising advantage from international knowledge, talent and capital.
- High impact, large scale initiatives to stimulate system innovation.

The vision and the above challenges formed the basis of discussion at the ISA Forums and interviews.

1.4 Case studies and entrepreneurial firm profiles

During the Consultations, Howard Partners had the opportunity to make site visits and record interviews with 20 innovative companies and co-working spaces. Those covered are:

1. Academy for Interactive Entertainment - <http://www.aie.edu.au/>
2. AC Solar Warehouse - <http://www.acsolarwarehouse.com/>
3. Bluezone <http://www.bluezonegroup.com.au/bluezone-home>
4. Darwin Innovation Hub - <http://darwininnovationhub.org/>
5. Evolve <http://www.evolvegrp.com/about-us>
6. EM Solutions - <http://www.emsolutions.com.au/>
7. Fishburners - <http://fishburners.org/>
8. Hello Claims - <https://www.helloclaims.com.au/>
9. Imagine intelligent materials <http://imgne.com/>

10. Intellidox <http://intelledox.com/>
11. Lang O'Rourke - <http://www.laingorourke.com/>
12. Maker+Co - <http://www.weliketomaker.com/>
13. Mineral Carbonation International - <http://mineralcarbonation.com/>
14. Pixelated induction - <https://www.pixelatedinduction.com/>
15. Reposit <https://www.repositpower.com/>
16. Sustainable Materials Research & Technology (SMART) – <http://smart.unsw.edu.au/>
17. Spinify - <https://spinify.com/about-us/>
18. Spee3d - <https://www.spee3d.com/>
19. Think Place - <http://www.thinkplace.com.au/>
20. Thomas Global - <http://www.thomas-global.com/>

The visits provided an opportunity to discuss and obtain insights into the entrepreneurial opportunity, the development of that opportunity, relationship with a university/research organisation, critical success factors, and impact. These case studies will be written up over coming months.

2 Some Key Messages from the Consultations

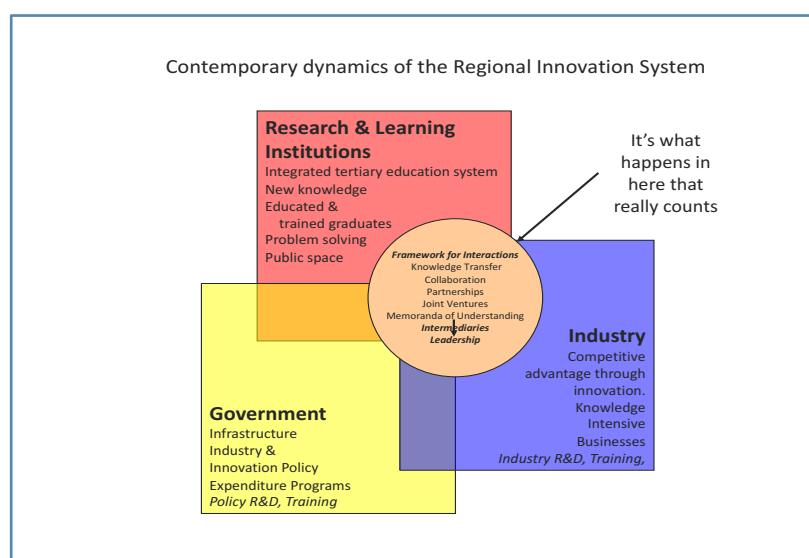
In undertaking the Consultations, and writing this Report, we wanted to anticipate the question 'what are the most important messages that you have picked up in the consultations?' Nine key message areas have been identified, which are canvased below.

2.1 Build and sustain connections and connectedness

Building better connections and connectivity between business, research organisations and government emerged as an underlying message in all consultations. The consultations indicated a strong interest in the 'Triple Helix' framework as a way of representing and comprehending interactions and connections between the three principal 'institutional pillars' in the Innovation, Science and Research (ISR) System - Industry/Business, Research and Learning, and Government (Figure 2).

The consultations supported a view that dynamic interactions and connections between business, universities and research organisations and government is a critical aspect of the ISR system performance – locally, regionally, nationally and globally – and is an area where system performance must be improved.

Figure 2: A 'Triple Helix' view of relations between research, industry, and government



Connections generally occur through:

- Networks - community of interest, sharing, personal contacts, conferences/events.
- Transactions - licensing and transfer of IP, research contracts, consultancy.
- Formalized relationships - collaborations, partnerships, joint ventures.

Connectedness is an important extension of ‘collaboration’, and connecting universities, industry and government is a major imperative – and a challenge. National and global digital connectivity also emerged as a key issue.

It was apparent from the consultations that the three sectors want to improve collaboration performance, but they are often unclear about how this should be done. Nonetheless, there has been major progress made over the last five years.

The Consultations indicated that connectivity will be a fundamental requirement for achieving strategic outcomes in the realisation of ISA’s vision and objectives in the ISR System Strategic Plan. Connections require nurturing, experimentation, and investment. This will involve –

- Development of capability for effective networking - hubs, innovation districts, precincts, and ‘virtual’ associations.
- Transfer and translational capacity – involving Technology Transfer Offices (TTOs), Deputy Vice Chancellors (DVCs) Research/Innovation/Engagement, independent innovation intermediaries.
- Building partnerships and relationships – formally established and with research centres, institutes, partnerships and joint venture agreements.

Matters to address in improving connectivity are canvassed below.

2.1.1 Connections between business and universities/research organisations.

There was widespread discussion in the Consultations Program about the level of engagement between business and universities. There was also concern about the reported low levels of interaction between the sectors as indicated by various official measures.

Visits to universities, discussions with DVCs Research and Innovation, and industry leaders suggested that engagement had improved over the last 10 years, but there is still more to be done. In particular, there is a view that business-university relationships must move from a ‘transactional’ basis to a longer-term partnership basis. There is a particular challenge for SMEs in engaging on a long-term basis.

There was a view that over the last several years businesses have been seeking to be more actively engaged with universities. However, from the *Expert Opinion Survey*, Figure 21 (Appendix 5), only 92 of 293 respondents to the question (31 per cent), agreed or strongly agreed with the proposition that “businesses are actively seeking to engage more effectively with universities over innovation”

A relatively small number of respondents (97 or 34 per cent) agreed or strongly agreed with the proposition that “there have been major improvements over the last ten years in how effectively businesses engage with universities over innovation” (Figure 22 in Appendix 5).

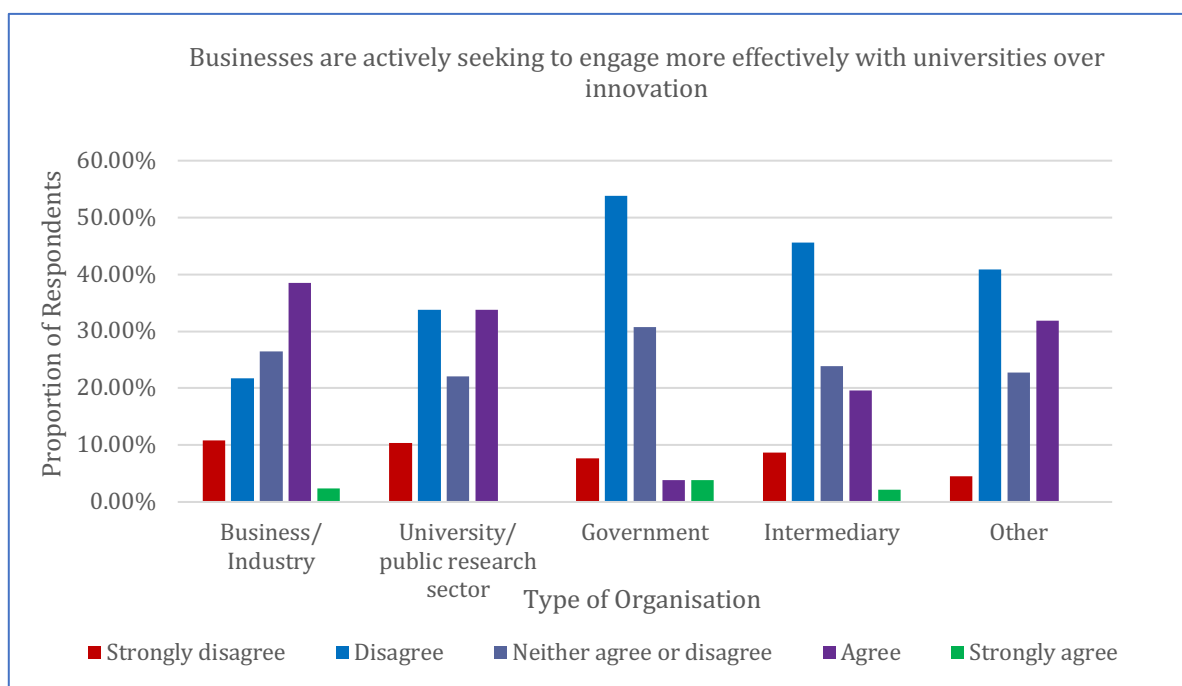
Responses to the proposition that “there are now mature collaborative relationships between business and university leaders” (Appendix 5, Figure 64) indicated that 91 agreed or strongly agreed (32.6 per cent of responses), whilst a similar number (88) disagreed or strongly disagreed.

One hundred responses were ambivalent. But *within* the responses, 47.4 per cent of respondents from universities/research organisations agreed or strongly agreed with the proposition, but only 27.5 per cent from business/industry respondents, and 19.1 per cent from government respondents had this opinion (Figure 3).

In many ways, this reflects an older stereotypical view apparent from consultations with sections of the business community, and a lack of awareness of some fundamental changes in approach by universities towards industry engagement over the last several years.

Thus, while progress is being made in improving connections between business and universities/research organisations, there would appear to be a little bit further to go, particularly around a new narrative that creates awareness of results, impact, and potential. The consultations identified many initiatives where universities/research organisations and intermediaries are seeking to further lift the level of engagement.

Figure 3: Business engagement with universities



2.1.2 Connections between universities and government

The consultations indicated that relationships between universities and the Commonwealth Government are at a low ebb. Currently it is predominantly a transactional approach built around funding programs rather than relationships built around partnerships and a recognition that universities are key players in Australia’s innovation future.

Universities generally recognise that some of the drivers that the Commonwealth has recently put into the system are positive in terms of driving a stronger innovation agenda. The new

research block grant funding arrangements have de-emphasised the contribution of outputs like publications and given a priority to impact. Having impact as a measure through the ARC is also seen as a positive.

Universities commented that prior to those and a few other changes, the focus was 'pretty much on research excellence rather than on what to do with the excellent research'.

Universities also point out that what is frequently missed in conversations, is that the primary business of the majority of the universities in Australia, is teaching and learning, not research. University leaders commented that the teaching and learning is actually the profitable side of the business. But the profit is required to cross subsidise other parts of the business. How the surplus is allocated is a strategic resource allocation decision for University Councils and reflected in Strategic Plans and Budgets.

Governments would appear to have a 'grants' rather than an 'investment' mindset for universities. There is, however, an emerging pattern of co-investment between universities and governments, particularly state governments, around a 'partnerships in development' type of strategy. This is in evidence, for example, in the optical electronics initiative between South Australian universities and the State Government.

It was suggested during consultations that universities should develop a strong narrative about working in partnership with Government in achieving economic, industry and social development outcomes. As an industry sector in its own right, universities have a major role to play in this direction. State governments have worked out the key strategic role of universities and are looking for longer-term relationships through their Innovation/Productivity Councils.

2.1.3 Connections between business and government

There is scope for improvement in the connections between business and government. The relationship has developed around a 'purchaser-provider' arrangement and the emergence of a strong and vocal lobbying sector in Canberra.

Procurement and probity requirements have created a wall between Government and Business that are essentially transactional and often short term in nature. Government finds it difficult to tap into the collective knowledge base of business and industry, preferring formal and open transactional approaches. In the AIIA consultation forum in Canberra, a participant observed:

I'm baffled that the millions of dollars of ICT services that many of us around the table, who represent companies that offer to the federal government, have not been invited in, to have a session, that talks about your experience with the government sector, the private sector's perspective, individually. I'm not talking about collectives and ticking boxes as if we've done it. I'm talking about in depth analysis of the

experience of engaging with the government and providing ICT services.

Unfortunately, there is a perception that Government seems to think it knows better about how to address the innovation challenge. In the ICT sector, there is a view that:

For some time, we have a government that wants to keep doing things itself ... Government needs to set the framework. It has some things it needs to do, particularly where it's inappropriate or where there's market failure, but it doesn't need to be building a lot of the solutions it does, because the businesses, that are actually driving the competitive forces in our economy, can actually do it.

This approach works against the ideals of 'open innovation'.

The Consultations that have formed part of the preparation of the Strategic Plan should be seen as a first step in an ongoing, direct, dialogue between Government and industry.

2.1.4 Connections between businesses

During consultations, there was a great deal of discussion about how businesses could connect and collaborate, whilst still maintaining their strategic (and statutory) responsibility to compete. Observations from the consultations include:

- Participation in informal business networks is considered vital for business success. Industry organisations and professional associations have an important role, as do community organisations and the *social capital* created in innovation hubs, districts and precincts.
- SMEs can have a key role in large corporate innovation sourcing strategies. However, large businesses often tend to adopt a predatory, rather than collaborative approach to SMEs.
- There has been a trend towards large businesses 'breaking up' and 'connecting' more informally to stimulate innovation, flexibility and agility. Based on the strategy developed by Richard Branson (Virgin), BlueScope is adopting this approach to strategy – and is the basis of its success in USA.

Respondents were aware of the need to build networks of trusted advisers to enhance innovation performance. In response to a proposition in the *Expert Opinion Survey* that, '*Businesses have a sufficient understanding of the value of networks of trusted advisers to enhance innovation effectiveness*' only 59 of 279 respondents (21.1 per cent), agreed or strongly agreed. A total of 149 (53.4 per cent) disagreed or strongly disagreed (Figure 23 in Appendix 5).

Consultations indicated a need to build intermediary capability involving independent and objective trusted advisers and "value adding" mentors, who can build learning connections between business over the longer term. *The apparent absence of a strong independent intermediary capability is an important issue for innovation policy.*

2.1.5 Connections between universities

Universities are autonomous public organisations. They compete – for students, for research funds, for money. Several universities had a concern that grant ‘funding’ arrangements exacerbate this:

- Grant allocations are made from a pre-determined amount of money that identifies a purpose for the funding.
- Submissions are lodged in an endeavour to satisfy pre-defined eligibility criteria, including alignment with research priorities. These can be interpreted widely, and ingeniously by professional grant writers.
- Assessments are made on some sort of rating or scoring scale.
- Distribution of funds may be made with a mind for ‘fairness’ in distribution across States/Territories and institutions.

Unless specifically provided for in the funding criteria, there is little incentive for universities to connect and collaborate. This works against building scale and establishing areas of specialisation across the sector. However, scale is considered to be essential to assist in building depth in knowledge and capability in both research and research translation. Monash and Melbourne universities agreed in June 2016 to create a joint research translation enterprise to bring a much larger share of their biomedical and clinical research to market.

It was reported in Consultations that many universities have sought to, independently, establish capability in fields such advanced materials, including for example, graphene, cyber security, and high-tech manufacturing. The Industry Growth Centres are considered to have an important role facilitating linkages to this capability. The university groups have an important role in building scale and connections across universities in their network.

Connections can be improved where funding organisations adopt a *strategic approach* to investment in capability. This will require funding organisations to develop investment strategies and for universities to collaborate to *build a business case for an investable project*. This approach, successfully adopted in the Education Investment Fund initiative, also gives a focus on outcomes and results to be achieved. The Rural R&D Corporations largely operate on this principle.

2.1.6 Connections between and within governments

During the consultations, there was concern expressed about ‘siloes’ approaches to innovation within and between governments. There was also concern about the absence of an *Australia Inc.* approach to innovation. There was a particular concern about representation of individual State

Government interests at international events, delegations and trade shows which was seen as sending a mixed message about an 'Australian' approach.

States have competed vigorously for many years in relation to inwards investment attraction, principally about generation of employment. A range of concessions is offered, including budgetary assistance, payroll tax exemptions, and facilitation of change in land use regulations. Some States are involved in a 'zero sum' of attracting businesses from other States/Territories.

When the potential for achieving greater coordination through the COAG arrangements was raised in Consultation Forums, it was generally met with benign smiles. But whilst the federal structure of Australia is acknowledged, it is seen to be important that Australia projects a consistent and collaborative approach to innovation internationally.

2.1.7 Connections with international markets, talent and capital

Participants in Forums and interviews acknowledge the fundamental importance of deep knowledge and sustained presence in international markets and global value chains. It was generally acknowledged that the concept of 'complete product' merchandising is of decreasing relevance.

The importance of international connections comes out strongly in responses to the Expert Opinion Survey.

2.1.8 Digital connectedness

The large number of businesses that are not connected digitally – to the Internet, and each other – was raised as a serious matter of concern in Consultations. Comments were associated with the poor quality of Australia's public broadband service, particularly in comparison with our global competitors.

2.2 Establish a broader understanding and context for innovation

In many Forums participants raised concerns that there is not a clear definition of innovation. This can be a little disturbing, as from a business and innovation policy perspective, innovation is, quite simply, the practice of new ideas being successfully applied². Success is generally

² This is a shorthand definition of the OECD 'Oslo Manual' definition: 'An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations'.

interpreted as 'adding value' – value to a business (shareholders, employees, customers), an industry, government, and the broader natural and socio-cultural environment.

But innovation is also changing in the sense that it has moved from where we were ten years ago when the first iPhone was released, and the concept of an 'App' was very innovative. Apps are now mainstream and now tend to support underlying services that deliver value. But the value is not in the App: it is in the underlying service value and the App is a wrap up that sits on top of it.

There is also a view that innovation has become contestable and there are large segments of the community that do not have any ownership of the concept. As Stuart Cunningham remarked in an Interview:

It may be of comfort to those who have to deliver programs in this area to try and settle in on some very known elements - which really are around manufacturing, how to get manufacturing working more efficiency, with more competitiveness and to be a driver of productivity gains. These are the heartland issues as they have developed in this country.

This question of where the heartland focus for innovation is expressed through the national research priorities in the sense that advanced manufacturing, biotechnology, energy, the so-called MET sector, agriculture. These are the known quantities, or at least they're better known than anything else.

The contestability arises from the fact that these are very important but if they're expressed in the way that have been expressed recently with notions of IT, high-tech and the digital leading the way, a lot of people will feel that they don't have any ownership of it.

This became a critical problem for the current government when it was apparent that in the 2015 election, there was quite a discernible backlash against if you like, to put it 'charicaturely', the inner-city hipster model of innovation. So, there was an attempt briefly to say, 'Innovation is for all.' And then essentially it slipped off the radar.

It follows that if innovation is to be embraced more broadly, it can no longer just be an 'expert system' approach. It was also pointed out during Consultations that that other countries and regions, particularly Europe, have more developed approaches to innovation and have embedded social innovation, creative innovation, and public sector innovation in their Innovation agendas.

2.3 Address the imbalance between research investment and industrial structure

There was a concern raised in Consultations about the 'misalignment' between the shape of industry in Australia and the shape of the basic research carried out in universities and research institutes - in our institutions, and whether there had ever been any attempt to achieve a better alignment.

For example, it was observed that there is a very large amount invested in basic health and medical research, but without a pharmaceutical industry, there are limited opportunities for adoption and application in Australia. The following observation was made:

People complain about things being taken offshore for development, but if there is no pharmaceutical industry, that's almost an inevitable outcome of putting a lot of money into really high performing research institutes around the country in health and medical research and the amount of dollars that go in there, it's almost inevitable then that it will end up offshore because there's no industry to support it.

Many years of institutional development has led to that situation. The National Health and Medical Research Council was established in 1932, but the Australian Research Council is a much more recent creation. Even now, the NH&MRC allocates more funds to one industry sector than the ARC does for all industry sectors. Agriculture, forestry and fishing is largely supported through the Rural Research and Development Corporations.

However, others have observed that with the very large investment in health and biomedical research 'we are on the verge of the next CSL flowing from investments started at the turn of the century'.

The Prime Minister has argued that universities and research institutes need to be agile in responding to industry opportunities. But, it was argued in Consultations, research institutes *are* agile in that they will always follow available dollars:

Why do we have more than 50 medical research institutes outside of universities? Because there's a lot of dollars there. They happen because of dollars. It's not being agile, you can't undo that kind of system quickly unless you very purposely and slowly move your dollars to whatever it would be, researching whatever area that would better align with industry.

The manufacturing industry generally doesn't put money into the university sector. Interestingly, agriculture does, through the RDCs and the levy system.

Academics here are no different to academics in other countries. They're probably very similar types of people, different cultures, but very similar types of people and you give them the right incentives and they'll follow those incentives. You have a country like Germany or wherever, where the right incentives may have been established for a long period of time, and therefore you have that long-term engagement.

Although construction is a major contributor to the economy, there is comparatively little investment in R&D relating to the built environment, building design and delivery, and workplace issues. There are, of course, a number of research centres in these areas, but they struggle to source funding.

It would appear from the Consultations that business, research organisations, and government find it difficult to come together to create the long-term strategic partnerships that provide the basis for building research capability and collaboration. The CRC program stands out as one of the most successful platforms for buildings collaboration.

The CRC program has been important in building this long-term commitment and engagement with 217 successful CRC applications since 1991 amounting to \$4.26 billion. However, 23 per cent of the investment has been in agriculture, fisheries and forestry, 20 per cent in the environment, and 18 per cent in health, medical and biotech. Just over 14 per cent has been in manufacturing and materials, but approximately 3.5 per cent has been allocated to services generally, and less than two per cent of the investment has been allocated to construction and infrastructure³.

It follows that with greater investment from business in collaborative research in areas such as construction and infrastructure and services, overall research investment could be more strategically aligned with Australia's industrial structure.

2.4 Address the future of work in a services innovation context

Discussion of developing STEM skills was raised in every Forum. There was a perception that we need more STEM skills to address the future, and it has very wide-spread support.

³ See accompanying report *25 Years of Policy Reviews and Statements*

It was pointed out that the STEM agenda is largely directed towards the primary and secondary sectors of the economy, which is considered to be very important for productivity. However, the more productive Australia is in these sectors, the less people will be employed in Australia's high-wage economy. Manufacturing, agriculture and mining are continually declining contributors to Australia's employment future.

Consultations indicated that Australia has lagged behind other innovation nations in *services sector innovation* because it has not fully grasped the importance of design-based innovation and design thinking. An interviewee pointed to the data assembled by the Alpha Beta Consultancy Group which studied four million plus job advertisements on Seek and other major job seeker sites between 2012 and 2015, that indicated a 212 per cent increase in jobs demanding digital literacy, 168 per cent increase in jobs demanding critical thinking and a 120 per cent increase in jobs demanding creativity.

Digital literacy is not just about everyone knowing enough about coding to be digitally literate in that respect, although that is important. It's about where the jobs are going to be, are people who can integrate digital technology into the service sector as well as other service sector work of the future.

Typically, it was argued, in the standard model of innovation that these would be regarded as *soft skills* - particularly creativity and critical thinking. These skills are not 'soft' any longer; it is how people get work. They are actually skills that become the qualifications for a lot of work, particularly in the services sector.

In social media management for example, it was said that 'you don't have to be a coder to be brilliant at solving corporations' social media management issues'. Social media management is needed right across the economy. It is expected that there will be a demand for thousands of people with skills in this area.

There is also a growing interest in innovation around government service provision and funding social enterprises. For example, an interviewee observed:

Governments may decide to fund a potentially innovative company not because it's going to produce a \$10 billion company, but it's going to lower the cost of service provision for mental health by 10% - the savings to government on that are astronomical. And so, while you might then have a business that becomes a non-profit, for government, it's a simple transaction because the payoff is huge. So just changing how we look at it is also really important. I could go get funding for an app pretty easily tomorrow if I really wanted to. But I probably couldn't

get funding for a social venture. And yet the social venture would have much greater payoff in terms of public value.

The NDIS has been setting up an innovation hub around assisted technology. There may not be a big commercial payoff, but there is a huge potential to create public value. These initiatives also have the potential to enable people with disabilities to undertake meaningful work.

2.5 Focus on solving problems, big problems

The Consultations indicated that a new way of 'doing innovation' is emerging and is being directed towards solving complex, or 'wicked' problems. Australia's future in industry, environment and society is seen to be about solving complex problems. Design thinking has emerged as an approach to addressing these complex issues.

There was a reported need for innovation to address issues that people really care about more broadly, such as the growing inequality agenda, the future of work agenda, and the whole environment agenda - particularly climate change. Addressing these areas will also require thinking about how trans-disciplinary knowledge inputs and cross sector approaches can be incentivized:

We know the value to the Australian economy of agriculture. We know to some extent, perhaps not as great an extent but we still have a pretty good understanding of the value to the Australian economy of tourism. But at a higher level what is the value of environment? That includes both.

Our thought leaders in agriculture are as concerned about the environment as tourism operators are. So, you've got to get above the special interests of particular sectors, such as in north and central Queensland. It's a particularly wicked problem. Everyone's got a stake in the environment, everyone. How can you get above the level of sectional interest and to that level where that's a real contribution to innovation?

We are not alone. The Great Barrier Reef is the largest reef system in the world. But every other reef system is facing similar issues of long-term degradation. Many of which aren't anywhere near hot spots of mining and agricultural sedimentation problems. Ours is particularly wicked because economic activity of one sort sits entirely adjacent to economic activity of another sort. They look like they're totally opposed but they both have a very strong stake in the environment.

It's often said that our burning platform is the end of the mining boom and the loss of jobs and so on associated with that. But what we're alluding to, is that some of those burning platforms are in the environment or the social area. They're burning at a slower rate but they are just as burning.

It was suggested that the system does not reward or acknowledge people and organisations trying to do things that are 'big, really big'. It seems that the policy focus is on people wanting to do something that's agile. *Innovation is heavily focused on 'doing it agile'*. There are, however, many things that cannot be 'done agile'. It was observed that:

You can't build planes agile. You can't launch things into space agile. You can't do energy agile. You can't talk to your customers agile. But we can talk to our customers about doing 'big innovation'.

In this context, it was pointed out on many occasions that researchers work better with industry when there is a big problem to be solved. University faculties, research centres, and research organisations are not well set up to deal with transactional, short term and low small one-off consultancy type projects. *They are not generally set up to be 'agile'*.

2.6 Re-affirm the link between innovation and productivity

The link between innovation and productivity did not come through strongly in the Consultation Forums, but received more attention in the Interviews, where it was acknowledged that innovation in environmental and social domains is likely to be major contributor to productivity change. This includes:

- Building and construction – BIM systems, virtual and augmented reality, automation, new materials, modular construction, green buildings, design of cities and urban renewal.
- Health services delivery – digital connections, diagnostics, personalised medicine, workplace health and well-being.
- Education and training – delivery, content, global providers.
- Law and public safety – crime prevention, detection, enforcement, workplace/occupational safety.
- Social and community services – communication, understanding of service need, monitoring and access.

These opportunities are in the services sector. As indicated elsewhere, they exhibit strong opportunities for application of design innovation and design thinking.

2.7 Address the geography of innovation

Discussion of the 'geography of innovation' was raised in most Forums, but particularly in regional locations.

Whilst it is acknowledged that innovation clusters and districts may thrive when there is a large R&D intensive corporation present, the Australian context makes this challenging given the relative small number of R&D intensive corporations. Most of Australia's publicly listed corporations are in the property development or financial sectors.

The Consultations and interviews pointed to the way in which property developers, universities, and State and Local Governments are working together to extend campuses, partly in response to the boom in student numbers, but also in response to the opportunity to build innovation centres and hubs that draw on university generated knowledge and the potential for transfer and translation.

These approaches have been quite strategic (as distinct from opportunistic) in their orientation. But they are often contingent on the availability of enabling infrastructure including public transport and broadband connectivity. This aspect of the geography of innovation is still being played out.

2.8 'Copycat' strategy is unlikely to work

People attending the Forums and discussions and in interviews indicated a strong 'reality check' in relation to the ability to replicate the development of innovation hubs such as Silicon Valley, and Israel. The 'special case' situations of these places are becoming better known. Internationally there is a growing commitment to innovation in 'peripheral' locations, such as St Louis, and areas where there is strong grass roots innovation leadership and innovation champions.

One interviewee commented:

The joke in Silicon Valley is that every engineer is trying to recreate his mother. And the reason they say that is because you look at what's being built at the moment: it's car share services, butler services, food delivery services, washing services, cleaning services. They're not innovative. They're service-based evolution.

But Silicon Valley produced transistors and computer chips and ... Intel didn't go through a three-month incubator and suddenly say 'Oh, we got that x86 construction set'. They took decades. And lots of defence funding to build these companies that were going to last, and have lasted, for 50 years and longer.

There was discussion in the Forums about the attributes of innovation leaders and champions, how they emerge and are nurtured.

It was argued on many occasions that 'Australia is different' and needs to develop its own solutions. It was noted too that 'Australia isn't so bad' and 'We are a land of opportunity. We've got so much to do. 'Our expats build up Australia, in contrast to our domestic commentators'.

In the corporate world copycat strategy rarely works. There is potential to learn from some aspects of practice, but adoption and implementation must reflect institutional settings and histories. While many people advocated adoption of the Fraunhofer model of university-industry collaboration for example, others counselled caution and pointed to weaknesses in the model.

2.9 Commit to stability and continuity in policy and program initiatives

Throughout the Consultations mention was made of the short-term commitment to innovation initiatives. An interviewee, with a career developed overseas, commented:

There seems to be a tendency in Australia if a government organisation is successful and there's a change of political leadership at the Commonwealth level, the first thing that the new leaders do is burn everything that was successful from the past.

One of the better features of the American system and of certain European systems is that there are institutions that are durable beyond the political electoral cycle. So, it is to be expected that the pendulum swings back and forth, and that the winners of the last election get to set the policy settings for the future but destroying institutional capability between elections. It is very damaging

According to the CEO of a prominent research centre, developing institutions and capability, and attracting people to move to Australia to build up knowledge in a certain area requires a long-term perspective.

The challenges of lifting Australia up out of a mining and extractive industries to value-added industries, to service industries and to the knowledge economy it's more than the three years, six years. it's a 20-year cycle.

It was noted that Australian universities are 'a magnificent example of institutional stability'. It is a capability to be valued – in a context of resetting and aligning strategic directions in an environment of major change. Most Australian universities have a strong commitment to strategic planning in the areas of teaching, research, and engagement. There is, potentially, greater scope for realignment of these approaches with Government strategies in research and innovation.

An interviewee commented that the Australian government is unique in its attitude towards universities, reflected, for example, in the approach in the 2017-18 budget. There was a strong call in the Consultations for the government, business, and research sectors to work as 'partners' and 'collaborators' in the economic, social and environmental development agenda. The *Expert Opinion Survey* overwhelmingly called for a bi-partisan approach to innovation policy.

3 Feedback on Achieving Innovation Outcomes

This Section links the messages from the Consultations in relation to achieving ISR System outcomes. They are complementary to the key messages outlined in the previous Section in that they focus on actions and initiatives that might be reflected in the ISA's 2030 ISR System Strategic Plan.

The commentary covers the main areas identified in the Consultations. Time and space has not made it possible to fully canvass the range and depth of views that were put forward at Forums and during interviews, and the knowledge and expertise made available.

3.1 Innovation is an investment

Small to medium businesses (SMEs) and Governments (particularly budget and expenditure control agencies) might see innovation as a cost, or an expense. Most SMEs work on cash accounting/cash flow basis which reinforces this perception.

For SMEs innovation competes with front of mind commitments such as making sales, collecting cash, and meeting payroll. Only larger businesses have capacity to see innovation commitments as 'investments' and incorporate them into their balance sheets and appropriately amortise them over time – subject of course to relevant accounting standards and taxation rulings.

This 'expense' approach also places pressure to realise returns from 'innovation' over a short time frame – such as within a financial year, or a quarter, or even a month. This is reflective of the *transactional* culture referred to earlier in this Report.

For Government, innovation should be seen as an infrastructure investment, in the same way as it approaches investment in national research facilities. An interviewee commented:

Innovation is not a cost, it's an investment. It's about identifying areas within what we're doing, that will generate a return. It is a high-risk investment, because there is no guarantee about it.

Innovation is not a program where we can say, 'We're going to push this number of millions of dollars and we're guaranteed this outcome.' It doesn't work like that. So, we still need to change our mindset about it, to think about it as an investment.

Many interviewees referred to a 'portfolio' approach that balances investments in basic research, applied research and translation.

3.2 Commit to an innovation vision

The Board has proposed a vision for Australia's Innovation, Science and Research System:

Innovation, which can underpin a diversity of internationally competitive industries, will enable today's and future generations to have meaningful work, a great quality of life in a fair and inclusive society.

We want Australia counted within the top tier of innovation nations, known and respected for its excellence in science research and commercialisation.

There was general support for this formulation of words, although there was discussion about what constituted the 'top tier'. It was noted, however, that in 10, 15 years' time, the world will look different. 'Not because of what we're doing, or because of what we're not doing, but because we are part of much broader trends. The vision must be a moving target'.

3.3 Set innovation targets

There was strong support in the Consultations Program for setting targets. It was suggested that there is an oversensitivity in Australia to the idea that the government shouldn't pick a winning technology, industry or sector.

There was generally strong support for the Growth Centre initiative as a means to set targets. There was also support for their continuation beyond the life of the election cycle, and as a vehicle for the delivery of other strategies, such as R&D investment and Business Development Programs.

3.4 Think big, think global

A view emerged that, if we want to compete, and compete globally we need to invest on a large scale. It is a matter of addressing the questions of who do we want to sell to, what services do we want the economy to provide in the future and who's the market for that. It also means asking how much we can get out of a market of 25 million people, and how much could we get out of a market of three billion people?

An interviewee commented:

There are markets of 3 and 4 billion people where an extra 25 million people this year are moving from rural India and rural China to middle class India and middle-class China. The market size is doubling potentially, so what do you want to do about that? How do you want to turn the innovation towards that market?

These are the sort of questions that interviewees would like the ISA Board to address. It also means asking the marketing question about which segments of these very large potential markets will be targeted.

3.5 It's not just high tech

There are many innovations, particularly in the social and environmental areas, that are not driven by high tech, but 'pull through' technology. Technology is the enabler – not the driver.

Previous technology booms have drawn attention to the risks associated with technology push solutions - envisioning a potential demand that is made possible by technological advances. Knowledge management as a professional practice largely failed because it was 'pushed' by technological possibilities.

There is some push back in the area of 'digital cities' and 'smart cities' where technological possibilities are getting ahead of demand and the uses that people are prepared to pay for - or for governments to invest in.

3.6 University role in driving innovation and industrial development

This is a complex area. Many participants were of a view that universities have tended to be very focussed on early science and not on applied science and commercialisation of research. This position has its supporters and detractors.

A view emerged in Consultations that universities should restrict themselves to discovery and invention – and should not be involved in innovation. This was an area of significance difference of opinion between university and business leaders. In reality, the relationship is much more nuanced, and varies across institutions and areas of research and fields of education. Effective collaboration links discovery, invention and innovation.

In terms of the engagement of the research system with users, it was said that 'many people including the Prime Minister have been pointing a finger at universities'. The reality is that Australian universities seem to be very able to collaborate with companies in the US and Europe, but are struggling to collaborate with Australian companies. Nonetheless, there is a strong view that in a knowledge based economy, universities have an important role to work with business, and where appropriate, stimulate industry development. This may include the potential for universities to take a lead in driving industrial innovation. An interviewee commented:

The most strident statement that the Prime Minister made on this was Australian industry is failing in innovation and universities are going to have to drive national innovation - which is an interesting statement from someone who comes from the commercial world to make.

There's part of me that thinks 'that's a ridiculous thing to say,' and there's another part of me that says, 'well okay, if that's what the role of universities is going to be in Australia, that's fine' but then we have to get on with it and government's got to resource it so it can actually happen. Maybe that is the right answer. It's an odd answer in all sorts of ways but if it works, then maybe that's a good thing.

This would appear to be a pattern in lagging regions, such as Tasmania and South Australia, but its generality is more qualified elsewhere. Some of the more traditional universities are starting to think differently.

Whether that really translates into acting differently, or they're trying to look like they're responding to what government is thinking in the hope there's money in it, I don't know. The universities are starting on this journey, but you have to give them time because it's like a battleship. They move very slowly as you well know, but they're starting to do good things.

In the area of technology transfer there is an acknowledgement of a need to upskill technology transfer and commercialisation staff in universities and medical research institutes. It was argued that there is a significant skills gap that, without training and access to funding, independent of institutional funding, the performance of technology transfer and commercialisation offices will be constrained. A critical mass of experienced commercialisation teams is required to build capacity across the system.

The UK addressed this with third stream funding. One can ask the question as to how come UniQuest on behalf of UQ outperforms on every commercialisation metric under the National Survey of Research Commercialisation of any of the rest of the Group of Eight universities singularly and when they are combined. The answer is critical mass and training of an experienced team. Without the income from Gardasil or another blockbuster, no commercialisation office in Australia will be able to be funded at a level where it can contribute as significantly as UniQuest does to UQ.

Consultations indicated that other universities, including the University of South Australia, are making a major commitment to building capacity in technology transfer, including more 'business friendly' approaches to the management of Intellectual Property.

It was suggested in interview that public research organisations are constrained in making these investments in capacity building because of their inability to carry forward surpluses from year to year.

A parallel requirement is for people in senior executive roles covering engagement with industry to have skills in engaging with *both* people in business and with academic staff in faculties, schools and research centres.

3.7 There is a role for government

An interviewee noted that venture investors have only one funding structure, but added, that 'if you look at the most innovative venture investors over the last say 50 years in Australia, it's the Australian Government'. The Government bankrolled extraordinary developments across CSIRO and research. Most of the things that Australia is known for were government funded.

It was noted that we tend to say innovation must be funded by private venture investors. 'That is not our history, or the history elsewhere in the world. Government has a huge role to play there'.

3.8 The role of the military in leading innovation

The importance of Defence procurement in driving innovation was raised frequently in Consultations and interviews. Anecdotes were relayed about the difficulty of connecting with the prime contractors and the challenges of meeting procurement criteria around risk. However, examples were related about how success is achieved through building confidence and trust.

The Consultations indicated that in both the US and Israel Defence has been a major driver and enabler of innovation. This is far less pronounced in Australia. This relates to both technology development *and* personnel development.

The military has had an important role in developing leadership capability for Australian businesses. An interviewee commented:

I was in the army reserve. I couldn't do my job here without the skills I acquired there. There's a whole lot of things like I learnt about leadership in that role that I would not have learnt in the university. I think that Defence through ... both through its cultural leadership and investment in its people needs greater recognition.

In places like Wagga, Townsville, and Darwin, the military presence is considered to have a significant impact on growing the innovation ecosystem.

3.9 Demography, diversity, and inclusion

Australia's economic prosperity has been firmly embedded in an active immigration program, and is likely to continue to do so.

Immigration has the multiple advantage of sourcing skills and talent of people to work in growing businesses, start their own enterprise, and create demand for domestically produced goods and services. That demand has not, of course, been enough to sustain an unprotected manufacturing industry which failed to adjust to international competition when tariff barriers were removed.

Currently one third of Australian start-up founders were not born in Australia. We have a skill shortage, like right now and you know, we've just had a change to the 457 visas. There is a wealth of experience ... knowledge, expertise that we could be bringing to Australia to help build up our own innovation ecosystem and it would be remiss of us not to discuss it, or at least not to have it to be some discussion point.

... wouldn't it be fantastic if part of our immigration policy at some point is that, new arrivals into Australia have to undertake coding, or have to build up their technical skills.

And so, things like Techfugees, which is a hackathon for refugees, by refugees, creating technology services for refugees, is a fantastic example.

It was also argued in Consultations that Indigenous innovation should also receive prominence. Innovation around the requirements of the aged and the disabled should also receive greater attention. These opportunities would come from a greater focus on design and design led innovation.

4 Feedback on Strategic Challenges Identified by the ISA Board

This Section provides feedback on matters raised in the *Consultations Overview* document. Each subheading refers to a Strategic Challenge identified by the ISA Board. Further information is provided in Appendix 4.

4.1 Moving more firms, in more sectors, closer to the innovation frontier

Situation

- Successful businesses have an aggressive and unrelenting focus on customers.
- Corporate, university and PFRA innovation hubs perform an important role.
- Too many firms rely on too many grants for business success. A culture of 'entitlement' has emerged.
- Rules/accountability based grants arrangements stifle innovation potential. This has also nurtured a grant writing industry.

Possible actions

- Encourage all businesses to confront and embrace competition – locally, nationally, and globally.

Too many businesses confront competition by seeking a government grant/subsidy. A sort of government 'business safety net'.

The R&D tax incentive is seen as critical for technology based businesses. Consultations indicated that many successful businesses have not received, or sought, government enterprise development grants.

- Knowledge and information for businesses to embrace technological innovation and 'go with' disruption.

There are many good examples, including in agricultural enterprise, such as cotton – the most productive growing industry in the world.

Acquire technical capability to work with new and sometimes complex machine based software and 'digital threads'. Training is critical. Current reliance on 457 visas.

Effective use of robots on legacy machinery (e.g. for quality and precision in injection moulding).

- Introduce outcomes based grants systems, managed on a peer review basis. Involve IGCs in funding investment support for businesses in their area.
- Support the education and training of 'truly commercial' business advisers and mentors. Far too many great ideas are 'left on the cutting room floor' due to lack of access to truly independent and 'commercially oriented' advisors/companies/service providers, being available to help commercialise a viable idea and being focused to ensure it is a commercially viable success.

Peer to peer learning 'really gives the confidence to go out and innovate'.

- Respond to automation opportunities by innovating around business models that 'serve new customers in new ways'
Opportunities in platform technologies for mass customisation for as yet unknown products and services. Creates high demand for software developers and continuous/lifelong learning.
- Build management and leadership capability in emerging and established businesses
'It's leadership in the firms that's got to embrace innovation ... leaders must empower people to be better collaborators and for their firms to be better collaborators'.
- Build capacity for innovation in connecting with customers and end users
In the 'experience economy' businesses must have skills in ways to influence 'hearts and minds' using traditional and new media, big data and analytics.
- Establish a clear link between design and Innovation
'On a daily basis, we prove that with a focus on design and innovation you can manufacture products here in Australia cheaper than the likes of China. We are re-shoring work from Asia all the time'.
- Capture opportunities in 'demand side' innovation
Look at areas where demand is growing - holidays, audio visual, eating out, ready meals, housing, etc.
Seek innovation in new marketing and trusted communication channels, particularly visualisation.

4.2 Moving and keeping Government closer to the innovative frontier

Situation

- Australian Government is not seen to have an innovation culture.
- Procurement system is compliance driven and risk averse.
- Opportunities for innovation through procurement are largely unexploited.
- Local Government can be a strong innovator – but constrained by heavy legislative/regulatory oversight

Government sees itself as a procurer, not as a customer- I guess breaking it down into government as a customer and making it easier for government as a customer, but partnering with more innovative ... industries and businesses and making government as a customer and as an employer, more agile.

Possible actions

- Commitments to 'smart' government, public value creation.
E-government commitment – services focus (not just procurement).
Smart/intelligent infrastructure.
- Unleash innovation potential in government departments and business enterprises.
Innovation hubs – e.g. NDIA Assistive Technologies Innovation Hub.

Application and use of data, data science.

Some good examples – e.g. Australia Post with Star Track.

Develop appetite for risk and ‘fail fast’.

- Apply knowledge and technology to ‘break through’ policy, compliance, process, and regulatory roadblocks [process innovation].
BIM type systems are being used to establish connections between tender offer, evaluation, contract management and life cycle maintenance and renewal.
- Ensure that procurement is outcome based, solutions focused, and prioritises innovation.
Much procurement is based on a ‘contractor model’ rather than a capability sourcing model.
Encourage novel and disruptive approaches.
- Revitalise procurement/preferred supplier panels.
Adopt a strategic approach to innovation sourcing. Identify capability with small projects with development potential through ‘stage gate’ approaches.
Insist that procurement builds national industry capability.
- Risk averse tender assessment processes have excluded Australian SMEs from participating in major tenders.
Purchasers should manage risk rather than avoid or exclude it.
New Defence processes are seen as a major improvement.
- Ensure that ‘outsourcing’ functions activities are driven by innovation as well as efficiency and cost saving objectives
Require the development of outcome based contracts.
- Much public scrutiny work is about ‘gotcha’ events around economy and efficiency – and process. Encourage focus on the other two elements of public value – effectiveness and appropriateness.

4.3 Delivering high-quality and relevant education and skills development

This topic was a major focus of discussion at the Consultation Forums and in interviews. It was an area where participants have had direct experience, and understand problems and possible shortcomings in education services delivery. There were many suggested areas for improvement and action which were all generally well made.

Discussions became a great deal more complex when addressing questions about *how* change could be delivered within the current institutional structures and cultures.

There was overwhelming support for developing an ethos and practice of lifelong learning and discussion about how this could be delivered.

Situation

- Students are entering Higher education (HE) with no prospects of getting employment (seen as a problem of course quality and excess supply).
- Many students enter HE with poor literacy and communication skills.
- There are significant funding imbalances between HE and Vocational Education and Training (VET).

- HE is partnering creatively with Registered Training Organisations in delivery of course modules in degree programs to delivery flexible learning programs.
- A 'class system' is seen to have emerged between HE and VET, which encourages courses to move, inappropriately from VET to HE.
- There are burdensome compliance issues in Vocational Education, which has motivated good educators leave the system.
- *The idea of lifelong learning is currently seen as an aspirational goal, as opposed to something that happens often.*

Possible actions

- Create an education and training system that is fit for purpose.
A system that is agile, flexible, responsive, and integrated, and meets needs for delivery of basic skills, for people starting a business, or going into employment, and addresses demand for lifelong learning.
Give focus to the demand side. Big data (from SEEK, LinkedIn, etc.) is rich source for understanding demand.
- Focus on all sectors in the education system.
Reference was made to international developments, including the work that Schleicher at the OECD around education, with an agenda for change at the primary and secondary school system as well as the tertiary sector.
- Profile VET and technical education as having the same value as university education.
This could also involve giving public TAFE greater independence and autonomy, as 'public organisations' – like universities.
- Develop an education and training awards system that focusses on knowledge and competencies, rather than qualifications.
Develop a nationally (and internationally) recognised 'skills passport' around the testamur and including extracurricular achievements (e.g. capstone projects).
- Encourage and facilitate greater movement of staff between the academy and industry.
Remove barriers and blockages, including career advancement and IR issues.
- Build capacity for acquiring practice based management skills and mid-tier technical skills.
Consultations indicated major gaps in this area. Blending of academic and occupational learning.
Consider moving from 'training packages' and competency based learning to curriculum based learning.
- Recognise the importance and contribution of private VET and private universities and scope for innovation in education and training delivery through these channels.
Education is likely to be disrupted with opportunities and applications flowing from 'the Internet of Everything'.
- Incentivise small businesses to invest in training/ skills development through collaborations with education institutions.
Disseminate best practice in WIL, industry placements, STEM in schools, be-spoke courses and practicums.

4.4 Maximising the engagement of our world class research system with end users

Situation

- There is strong collaboration between Business and Research sectors, but much of it is global. There tends to be a strong focus on outcomes and results.
- Research funding organisations have developed funding agreement documentation which is excessively legalistic and complex.
- Universities are leveraging property assets to facilitate collaboration on campuses.
- A significant momentum in capability and collaboration was created by the EIF.
- Several universities allow IP to be owned by industry partners.
- SME sector is problematic in building research and teaching partnerships, but there are examples of good practice.
- There is seen to be a very significant risk to university research if the international student market collapses – for example:

We shouldn't pursue volume at the expense of quality. By traditional measures, Australia's research system is doing quite well in international metrics, it is well recognised as falling behind in its ability to generate impact. It's ability to translate that research, you know, those wonderful academic PhDs, or theses that sit on the shelf, into being commercialised, or turned into some benefit somewhere is a major challenge.

If you're looking at the international metrics on the number of university graduates, without even talking about the research, just the pipeline, China is producing probably 20 times or 30 times more graduates in one year, than we can produce in a decade.

So, the issue of volume may be quite a difficult one to address. So, then the question is, 'How do we address the issue of quality?' And if traditionally we do have the quality, despite our apparent volume disadvantage, then how do we translate that quality? How do we bring that quality into outcomes as opposed to letting it to sit on the shelf?

Suggested Actions

- Keep national focus on basic research in a 'portfolio' that also includes applied and translational research.
Global businesses are known to identify, seek out, and connect with excellent basic research capability in universities.
- Build scale in research through meaningful institutional collaboration in research and translation.

For example, in the biomedical/bio pharmaceutical areas where Australia invests a very substantial amount in basic research across multiple institutions. Also, cybersecurity.

Encourage sustainability in university research investment.

Universities be encouraged to secure their future by prudent investments in capability for research. The EIF played a major role as a 'nation building' initiative.

CSIRO and other PFRA's be permitted to retain earnings (annual surpluses) to invest in future capability.

- Establish an 'investment' approach to funding research and innovation, as adapted and applied in the EIF program.
Investment based strategies can create a clear link between 'funding', outcomes, and results.
- Establish clear links between Innovation Investment and National Research Priorities.
Consultations indicated these are only loosely coupled.
- Create a national standard for IP management.
Approaches differ across universities. Industry tends to be unhappy with IP ownership staying with universities. Several universities have departed from this.
- Create simple, straightforward, nationally endorsed templates for collaborative investment agreements (objective: no more than two pages).
Complex legal agreements and drawn out processes and are a major disincentive for businesses engaging with universities. Develop 'business in a box' type system of templates.
Create 'pathways' for SMEs from advice and consulting to research projects. E.g. UoW Facility for Intelligent Fabrication.
- Identify and promote best practice for the formation and governance of university research centres, institutes, and joint ventures.
Research centres are key instruments for effective collaboration. Practices and procedures for formation and dissolution vary widely.

4.5 Maximising advantage from international knowledge, talent and capital

Situation

- Businesses cannot acquire the skills and capabilities they require. Many have turned to S457 visa arrangements.
- Encouraging talented people to locate to Australia involves a 20-year time horizon.
- Mobile workers [digital nomads] are able and willing to work from anywhere.

Suggested Actions

- Leverage the international mobile workforce.
The global mobile workforce is set to increase from 1.32 billion in 2014, accounting for 37.4% of the global workforce, to 1.75 billion in 2020, accounting for 42.0% of the global workforce.
Is there a need to have talent physically located in Australia? Estonia has a program called 'E Residency.'

- National scholarships for talented business leaders to undertake executive programs at global business schools.
In addition to tuition, builds global business connections through alumni networks.
May require 'golden cufflink' assurance.
- Encourage and welcome the return of managers and leaders with international corporate experience.
Too often people with international experience expected to 'step back' into a risk averse and 'complacent' Australian management and corporate culture.
- Universities to maintain ongoing contact with international alumni.
Universities can assist in maintaining contact with talent through retaining electronic contact in relation to skills access (and not only philanthropy).
- Build the national skill base by supporting more women and minority groups into tech, innovation.
That is something that we can do closer to home immediately.

4.6 Building capacity/capability in regional innovation ecosystems

This was not identified by the Board as a strategic challenge – but was an important issue in Consultation Forums conducted in regional Australia.

Situation

- Australian Innovation system is a summation of many regional and local innovation ecosystems.
- Robust ecosystems are globally focused and locally engaged.
- International research and practice suggests that 'clusters work'. Connectivity and learning is critical for innovation.
- Sustainable ecosystems require large lead businesses and universities with a disposition to expand and invest.
- There is a great deal of promotion of innovation ecosystems and collaboration, but far less material about outcomes, impacts, and results.

Suggested Actions

- Develop a national approach to support the development of regional innovation ecosystems through an innovation oriented regional policy.
Ensure a consistent and coherent policy and strategy within and between Governments. EDV approach has merit.
- Promote investment in research, talent creation, and enterprise development on an 'ecosystem' basis.
For example, the Optoelectronics initiative across three universities in South Australia.
Requires intergovernmental and interagency collaboration in investment strategies.
- Encourage formation of research translation precincts that focus on commercialisation
Involvement of universities/research organisations, VET, schools, large anchor corporations.
Supportive statutory (land use) planning [as well as] money can be significant.

Universities have recently been active in campus development around this action. University campuses can become 'public spaces' for connectivity and collaboration.

- Develop a national performance monitoring system that provides metrics on outcomes and impacts for precincts/innovation districts/hubs.

Currently there is a great deal of data on activities and outputs, but investors want to know about results, and how they have been/can be achieved.

- In collaboration with universities, states and local governments, establish good practice 'light touch' network governance frameworks for regional innovation ecosystems.

Aim to develop regional innovation ecosystem strategies, establish priorities, build entrepreneurship, report achievements and account for investment of public funds

Look to understanding local and global knowledge flows and learning processes, and the interaction effect of civic capital and local institutions in supporting the development of a local 'learning economy'⁴.

4.7 High impact, large scale initiatives to stimulate system innovation

The last component of the Consultations Program agenda outlined in the Overview Paper was to identify high impact, large scale initiatives that would stimulate system innovation. One basis of the Consultations, the highest priority areas for major strategic initiatives reflect the following considerations:

- Establish a bipartisan approach to innovation that is long term.
- Create a world class and competitive National Digital Connection capability.
- Establish Energy Security as a priority to drive and execute innovation opportunities.
- Leverage Big Data, technology platforms, and research infrastructure.
- Place Design Excellence and Design Thinking at the forefront of innovation strategy.

The desire for a bipartisan narrative coming from the workshops, forums and interviews was overwhelming.

⁴ BRAMWELL A., NELLES J. and WOLFE D. A. (2008) Knowledge, Innovation and Institutions: Global and Local Dimensions of the ICT Cluster in Waterloo, Canada, Regional Studies 42, 101-16. 0.1080/00343400701543231

5 Transitioning: Laying the Foundations for Australia's Innovation Future

In this Section, views and opinions from the consultations and interviews on how to *achieve* the Strategic Challenges and large-scale initiatives identified by the Board in the *Issues Paper* are outlined.

5.1 Overarching 'system wide' issues

Set out below are overarching matters that arose during the Consultations and were seen as important for Australia's innovation future. Many of these matters are well known and have been canvassed previously in many forums and in papers prepared for government and industry. But they remain important in developing actions for delivering Australia's Innovation Future.

Whilst it is relatively easy to identify the 'problems', developing and implementing the solutions is, of course, is much more complex. It would inevitably involve additional and reallocation of public sector resources and a significant attitudinal, behavioural and institutional change which can only be approached over the longer term. *A strategically driven, evidence based, communication strategy is essential in this context.*

During Consultations, participants were constantly challenged about implementation. In many situations, understanding, accessing, and pulling the 'policy levers' was identified as a complex area. It would require intense cross institutional collaboration and commitment. This means establishing priorities and quantifying the return on investment (results and impacts) that a heavy resource commitment would deliver.

5.1.1 Build connections and connectivity

As observed earlier in the Report, building connections and connectivity emerged as a very strong message in the Consolations. Comments included:

- 'Where all in this together'; 'We must all pull in the one direction'.
- Utilise the new network forms that are emerging, particularly around social media.
- Create 'space' for connectivity.

5.1.2 Remove the 'brakes' on innovation

Consultations revealed a portfolio of 'brakes' on innovation. These included:

- Digital connectivity, which is seen as a very serious issue.
- Red tape – restrictions, multiple approval points, compliance.
- Work practices and embedded institutional behaviours.

5.1.3 Support innovation in regions on the basis of sound investment propositions

The Consultations indicated that regions *are* important. Comments included:

- Combine 'bottom up' and 'top down' approaches.
- Avoid categorical 'grants' programs.
- Ensure that government agencies with a regional presence and impact collaborate to secure resources for investment.

5.1.4 Create a professional role for innovation intermediaries

The useful role of expert and independent intermediaries in facilitating university-business and business-business engagement over innovation has been identified as an important issue to connect people and organisations in the innovation system. Previous experiments funded by the Commonwealth in this area did not match up to expectations and deliver a return on investment.

There was a strong view that this area should be revisited, but intermediary arrangements should not be connected to the delivery of or access to some form of government grant or capturing commissions. This creates a challenge for program design.

5.1.5 Develop an appetite for risk

Innovation inherently, is about taking risk. This is now a difficult issue in Australia which has historically developed on a culture of 'having a go'. Investors and financial institutions tend to have a low appetite for risk, unless it can be secured over other assets, including intellectual property.

Desirably, approaches to risk should involve mitigation and management – not avoidance. This means developing a good understanding of current, future and potential risks. Risk also has behavioural, reputational, and financial implications.

For small businesses, costs of insuring against risk can be prohibitive – in circumstances of natural disasters and failure if customers to meet their credit obligations. And it is not possible to insure against the risk of *failing to find (create)* customers.

A common way to mitigate risk is to move slowly and progressively build on achievements and results. This takes time, resilience, and patience. The site visits indicate that innovative and entrepreneurial businesses take time (many years/decades) to achieve sustainable results.

The Consultations involved talking to many people who had taken risks, and succeeded in their innovation initiatives, as well as others who had, and are, persisting with their innovation vision.

5.1.6 Address the 'trust deficit'

Consultations indicated that there is a 'trust deficit' across the system. This starts with a loss of trust in our politicians⁵ and works its way through business elites and impacts the innovation ecosystem. Reversing this deficit must start at the top – with our political leaders.

Transactional approaches to business-university relations rarely embed trust. The expression 'people do business with people they trust' came up frequently in Consultations and interviews.

5.1.7 Address the 'crisis of confidence'

Participants and interviewees referred to a 'crisis of confidence' among innovators and potential entrepreneurs. There are many reinforcing behaviours:

So, you're a student who's finishing year 10, who's about to go and decide what they're going to do if they're ... and thinking about their ATAR, thinking about getting to university. They drop out of maths, because it's been put in the too hard basket. You know, it's going to be harder to get the ATAR, to do the thing that I want to do, because maths is harder ...

Confidence comes from mentoring and support from families, trusted colleagues, advisers, collaborators, *and customers*.

5.1.8 Work towards a national innovation narrative

This need for an innovation narrative emerged throughout the Consultations. Narratives are 'stories' about our innovation culture that must be seen as authentic and representative of our past and provide an aspiration for our future. A narrative should not overstate achievements through selected anecdote, as there are always downsides – such as the Sarich Engine.

In Consultations, many participants drew analogies with our sporting culture and achievements. That narrative is very much about aspiration dedication, hard work, and long-term commitment. It is also about team work and deep-seated support from family, friends, competent coaches, teachers and mentors. It has also been associated with 'grass roots' investments in building capability at an early age and at school, community and regional level. Narratives can also become corrupted through organisational politics and the impact of vested interests.

⁵ See also Sam Crosby, 2016, *The Trust Deficit*, Melbourne University Press.

The sporting and cultural analogy suggests that Australia has a fair way to go in developing the supporting infrastructure and institutional settings for a robust innovation narrative. So far, commitments to developing early stage companies has been intermittent, short-term, and subject to frequent change. Changes to the Australian Institute of Sport represent a case in point. Currently, innovation responsibilities are highly distributed across departments, agencies, States and Territories. The 'signal to noise' ratio from the professional, industry and lobby groups is low.

Consultation sessions also raised questions about who should 'own' the innovation narrative. This should be seen as a cue for Innovation and Science Australia.

Building a narrative is not about 'telling', or even 'selling' the innovation imperative. It will be achieved by demonstrating that a commitment to innovation is important for Australia's future. It will follow from the strategies and actions of business, academic, and government leaders as being seen to be innovative

5.2 Reinforce an 'entrepreneurial mindset'

Consultations indicated that entrepreneurship is a national resource. It is a set of attitudes and behaviours that drive innovation and business creation. It concerns start-ups, new businesses, and mature businesses entering new markets and diversifying product and service range – particularly in the light of disruption and global change.

5.3 Encourage the development of leadership capacity and teamwork

Leadership is a resource for innovation system growth and development. This came through strongly in Consultations. The requirement was referenced across sectors:

- Business – the Board and executive leadership required to grow and sustain firms.
- Government – a strong view from the consultations that *Governments, and Ministers*, must show greater leadership and commitment to innovation.
- Community – grass roots leaders who can marshal resources for innovation investments and lead communities along an innovation journey. There are no prescriptions. Leaders can emerge in Local Government, NGOs, leading businesses, consultancies, and universities. But they have a capacity to project an innovation aspiration and the outcomes that follow.

5.4 Ensure new and growing businesses have access to capital

An interviewee commented, refreshingly, that in order to sell goods and services to customers, and create profit, *businesses need capital*.

You need capital to enable you to afford to do the research, afford to go to make prototypes, to develop marketing plans, to hire people. You

need money. And so, unless you can capital, there is very low likelihood of you getting to innovation.

This is seen as a problematic issue for a lot of people because they don't understand how capital functions, the people who control it, and what their requirements are. 'People who obviously control capital tend to want to make money too. So, unless you're putting forward a plan that takes you to revenue generation, you don't get the opportunity to raise the cash'.

Nevertheless, as I say to a lot of people, 'If you run a business, your fundamental nature is that you're a capitalist. Get over it. Move along. The objective is to make money.'

So, but my objective is to make money and to do things that are useful to the community and that are to the planet as well and that of course also satisfy my shareholders.

At the same time, many businesses finance their growth through cash flow. Trade credit also a significance source. It was submitted in interviews that new bankruptcy laws may limit this form of capital and constrain new business growth.

There are of course, thousands of lifestyle 'businesses' which people may even run at an accounting loss, that support hobbies and pastimes. There are also 'businesses' that service contractors establish to manage their financial affairs. These should not be within the ambit of innovation policy.

5.5 Address availability of commercialisation capital and quality of IP Management

A feature of the Australian commercialisation landscape is said to be the relative abundance of later stage venture capital. In correspondence with a Forum attendee it was pointed out that 'propelled by the Federal Government's National Innovation and Science Agenda we now have nearly a billion dollars on new additional funds':

- \$200m CSIRO Innovation Fund.
- \$500m Biomedical Translation Fund managed by Brandon Capital, One Ventures and Bioscience Managers.
- \$200m National Universities Innovation Group Fund with the Group of Eight Universities and the UK's IP Group.

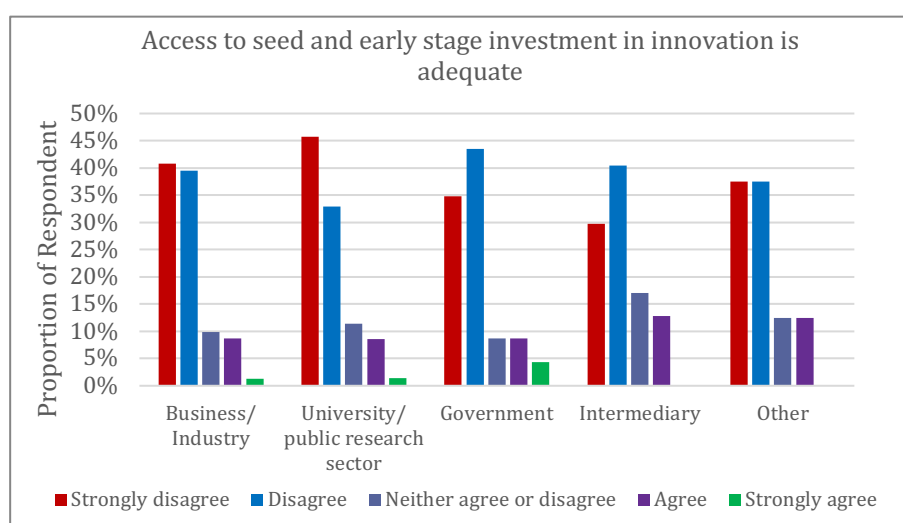
The majority of this capital is directed towards follow-on investments. This was a capital gap that was highlighted to Government through the experience of Fibrotech, Hatchtech and particularly Spinifex Pharmaceuticals. It is argued that this gap has now been filled.

5.5.1 Access to seed and early stage investment funding

The Expert Opinion Survey pointed to a gap in the seed and early stage investment categories. This is an important area to address in terms of laying the foundations for Australia's innovation future.

In response to the proposition that '*access to seed and early stage investment in innovation is adequate*', only 9.8 percent of business respondents, and 9.9 per cent university respondents agreed or strongly agreed. This is indicated in the Figure 5 below.

Figure 5: Access to seed and early stage investment in innovation



In consultations suggestions were put forward for a *National Innovation Fund* to address a funding gap at the early stage, *particularly for university and research organisation commercialisation opportunities*.

It was pointed out in correspondence that:

- Intellectual property as a tangible outcome of competitive grant funded-research is inherently immature and the investment market will generally not invest at this early stage. There are few grant schemes beyond ARC Linkage and NHMRC Development which target the establishment of commercial proof-of concept and the timeframe of these grants is not suited to the majority of commercial opportunities in this setting.
- Investments at this stage bear the greatest risk and fall to the university and their technology transfer and commercialisation officers to fund. This is not at scale and is only available on at best an ad hoc basis across some of the Group of Eight universities. The net result is that a significant number of commercial opportunities from grant-funded research are squandered.
- Access to proof-of-concept funding remains the most significant barrier to the effective commercialisation of university and associated-medical research institutes intellectual property. The creation of a National Proof-of Concept Scheme which would be light touch and locally administered would be a very desirable intervention with considerable, quantifiable benefit to the National innovation landscape.

5.5.2 IP Management

The Expert Opinion Survey points to unevenness in the quality and direction of IP management across the university and research sector. Business is looking for consistency and simplicity, while academic staff are looking for standardisation and guidance. An interviewee, with international experience, commented:

Today I was looking for the 'plain vanilla' model non-disclosure agreement. I had an engagement with a fellow who came to visit the University from a textiles company down in Melbourne and he said, 'I want an agreement that's only on one page.' And I was trying to find our agreement thinking that four, five pages was sort of the minimum.

I couldn't find the agreement. And I've called the technology office, I've emailed them, I've said, 'could you just send me the plain vanilla agreement?' No agreement. I go online, I can download Harvard's, I can download Stanford's. I can download Harvard's and they've conveniently highlighted with Adobe Notes, 'insert here the whole list of all the technologies'.

So, the agreement—the secrecy agreement in Australia itself is a secret. That is not good. And that either means that somebody is the controlling gatekeeper in the university and doesn't want anything to happen unless they can control it, but other highly innovative world-class research institutes are freely willing to give it to me when I'm working at a university. And I'm one of the good guys, I'm on the same team. That's a problem.

Whilst this anecdote is not saying that this issue is universal across the university sector, it is indicative of concerns expressed during Consultations and Interviews about IP management.

5.5.3 Industrial PhDs

Consultations and interviews called for the general introduction of 'industry-related' PhD programs. Interviews indicated that these are well in place across the university sector, particularly in the ATN Group, Swinburne and UNE, although further initiatives could be instituted. There would be benefit in dissemination of practice experience, both in academic guidelines and business experience with PhDs.

The site visits indicated several successful practices and initiatives in this area.

5.6 Invest in formation of skills and talent for innovation.

As indicated in Section 4 above, this area occupied a very significant amount of time in Consultations and Interviews. Although the strength of opinion was not tested in the *Expert Opinion Survey*, it is apparent there is not a great deal of consensus on how to address the problems identified. Many of the problems also emanate from institutional patterns and structures that are not readily apparent.

For example, while many people observed that graduating students were ill prepared for the workplace, others commented that they welcomed the fresh thoughts, curiosity, and digital competence that was emerging from the universities and VET colleges.

The areas covered in Consultations and interviews covered:

- Instilling innovation attributes in K-12 Education (at great length).
- Digital literacy and soft skills, including problem solving and creative skills.
- Building the technical skills base and the performance of public VET.
- The role of private VET.
- The Australian Qualifications Framework.
- Integration of occupational and academic learning, including pathway programs between VET and higher education.
- Developing capability for curiosity.
- Lifelong learning and micro credentialing.
- Access to international talent pools.
- Internships, work-integrated learning, capstone projects.
- Gap years in industry, domestically and internationally.
- Lifelong affiliations with universities and graduate schools.
- The potential from culturally diverse community.
- Opportunities and challenges in the freelancer economy, including putting people in charge of their careers.
- Challenges in areas of socio economic disadvantage.

5.7 Encourage investments in transport and communication infrastructure

The Forums and Interviews drew attention to requirements for supporting investments in communication and transport infrastructure. This is an essential component of Connectedness referred to above. The CEO of the Committee or Sydney commented at an event during the Consultations period:

For innovation to be fostered, infrastructure needs to be available. Many regions across Australia and even cities, suffer from poor transport. Keep expanding Sydney? People will have to travel someday, there'll have to be transport, there has to be ... much more

communication required, internet options. We have a lot of that, but we need to keep working on it, because the requirements right now, won't be the requirements in 2021 or 2030, so ... that's how we can germinate innovation.

The requirement for a world class national digital connectivity network has been canvassed throughout this Report.

5.8 Build collaboration, cooperation, and partnership

This area also occupied a great deal of time in Consultation Forums and Interviews. It is widely acknowledged and appreciated that collaboration is vital for Australia's innovation future – but there are important issues to address about how to set up and sustain viable collaborations that achieve results.

Some matters that arose in Consultations are canvassed below.

5.8.1 Research centres, institutes, and foundations

The importance of collaboration has been well made. Less well understood are issues concerned with collaboration governance. This matter was raised often during Interviews.

The CRC model is well regarded and is seen as a 'premium' model of collaboration. The CRC-P initiative is welcome and has had high take up. There are other potential models, and there are opportunities to be innovative in the way that collaborations between research and industry are built.

There was a view that universities should change the way they think about collaboration. Currently, most universities have guidelines and procedures for setting up university 'designated research centres', and approved research centres, and then there are processes and procedures to setup institutes and other centres. Such arrangements may not be sufficiently flexible and agile to accommodate new and emerging collaborations.

There was a view that governance and structural arrangements for collaboration should reflect the strategies, aims and objectives of the arrangement, and not get in the way of achieving outcomes. There has been very little evaluation and discussion of best practice in this area. Reference is often made to the German Fraunhofer Institutes, UK Catapult Centres, and the US CRADA arrangements, but often giving little attention is the structure, governance and management arrangements and the institutional setting they are placed in, and which contribute to their success.

5.8.2 Incubators, accelerators and co-working spaces

The Consultations and interviews indicated strong support for incubators, accelerators, and other forms of co-working. They are operated and/or sponsored by universities and research

organisations, profit and not for profit organisations, and property developers. They also perform an important social function. Moreover, they are not just for young millennials.

Consultations indicated that incubators tend to focus on trying to discover a new use for an existing platform or foundation technology, like another Uber or another Airbnb or food service area by developing a new 'App' or 'game'. Like popular music, some may end up being 'hits'. However, there is also a need to focus on breakthroughs, discovering new technologies, and new ways of creating value, including social value:

There's a lot of focus on currently and ultimately reskinning solutions to old problems, and making them sexier and better and easier to use and things like that. And there is a place for that, but as we commoditise technology, it becomes harder and harder to differentiate and so yes, you can get some initial traction, but you have no long term sustainable advantage because everybody else can do the same thing as you at very low cost, with no barriers to entry.

There are numerous stories about how innovations emerge from people working together in their 'college dorms', garages, and other accessible spaces where people can meet easily. But, innovations also emerge in research centres and corporations where a strategy of encouraging innovation through a well-established 'ideas, experiments, ventures' approach⁶. Multinational corporations establish incubators as way of bringing ideas in from outside, and there are many operating in Australia.

The message is that there is no one best way, and it is important to acknowledge what works, and look systematically at the results and returns on investments.

5.8.3 Engaging with established firms

The importance of collaboration arrangements connecting with established businesses was raised on many occasions in the Consultations.

⁶ For example, JOLLY V. K. (1997) *Commercializing New Technologies: Getting from Mind to Market*. Harvard Business School Press, GANGULY A. (1999) *Business Driven Research & Development*. Palgrave Macmillan.

5.8.4 Promote the importance of innovation networks and networking

Strong networks are considered by participants to be a critical resource for innovation. Feedback from Consultations and Interviews regarding the importance of networks and networking has been referred to in earlier parts of the Report.

Research and practice suggests that, to be successful, networks require a mission and purpose, over and above meeting to discuss and exchange views. Commitment to specific projects that specify outcomes and results to be achieved are often a mark of success.

5.9 Leverage capabilities across the innovation system

The capacity to leverage practice and achievements across the innovation system is considered to be an importance focus of attention. Leverage covers opportunities in:

- Businesses leveraging capacity in research and teaching organisations, particularly in relation to facilities and equipment and students. There was strong support for improving access to facilities in the *Expert Opinion Survey*.
- Build on success in strong and growing sectors, such as tourism, property, finance. These sectors have the potential to adopt and apply technologies developed in other sectors, as well as providing insights and possibilities for new ways of addressing problems in other sectors.
- Leverage across programs, such as the industry Growth Centres Program, rather than introduce new and separate initiatives.
- Leverage international connections, particularly through connections made with international students.

6 Conclusions

This Section draws together material from the consultations and interviews, canvassed in the Report into a number of areas that might be considered for the development of ISR System strategy.

6.1 Addressing innovation system outcomes

It was proposed during the Interviews with innovation leaders that 'if you can think of innovation around outcomes and then work back you've got a better chance of coming up with a more improved, ecological model of innovation rather than a system or linear model of innovation'.

The question was also raised about how to think about outcomes: 'should our outcomes be focused more these days on not just a robust, export-oriented mining sector and an emerging competitive advanced manufacturing sector as our traditional manufacturing base erodes rapidly, or should we be thinking about innovation outcomes around inclusion, around the future of whatever we can do to prepare for the future of work around big shocks such as climate change, innovation and disaster management for example'.

It was suggested that thinking about these outcomes might frame the next generation of innovation thinking.

6.2 Innovation system governance

The Governance of the Australian Innovation, Science and Research System is complex. Innovation and Science Australia has an important role, through the 2030 Strategy, to guide and facilitate innovation system development and growth.

ISA are not necessarily distracted by being required to execute and deliver programs. It has a critical role however, in advising and making the business case for new program directions, resourcing, and evaluation.

6.3 The level of investment in science, research and innovation

There was a concern, expressed throughout the Consultations, that the resources available for innovation were not large enough to make a significant impact.

Over the 12 years 2005-2017, a total of \$104 billion has been invested in science, research and innovation. Of that, 25 per cent has been allocated to tax incentives, 21.7 per cent to organisations such as the CSIRO, 19.3 per cent for universities, including the block grant arrangements, and 10.7 per cent for health. This is indicated in Table 1 below.

Table 1: Commonwealth budget allocation to science, research and innovation by socio-economic categories, 2005-2016

Socioeconomic category	Total expenditure 2005-06 to 2016-17 (\$m)	Proportion of Total (%)
00. Tax incentives	26,018.1	25.0
00. Multiple research categories	22,613.9	21.7
01. Exploration and exploitation of the earth	2,033.1	2.0
02. Environment	673.9	0.6
03. Exploration and exploitation of space	375.3	0.4
04. Transport, telecommunications and other infrastructures	122.3	0.1
05. Energy	2,309.3	2.2
06. Industrial production and technology*	7,241.8	7.0
07. Health	11,107.9	10.7
08. Agriculture	4,286.4	4.1
09. Education	9.7	0.0
10. Culture, recreation, religion and mass media	4.4	0.0
11. Political and social systems, structures and processes	1,095.8	1.1
12. General advancement of knowledge – block grants for universities	20,158.5	19.3
12. General advancement of knowledge - other	926.4	0.9
14. Defence	5,148.9	4.9
Total inactive programs	104,125.7	100

*Includes \$2.1 billion for Automotive assistance (2.0 per cent of total SRI expenditure) and \$2.1 billion for Cooperative Research Centres Program (2.0 per cent)

There was consistent questioning in the Consultations and interviews about the extent to which this has represented the best allocation of resources to achieve innovation outcomes.

6.4 Towards an integrated Innovation System *Budget and Plan*

Innovation priorities need funding. There should be an arrangement to identify scope for identifying lower priority and underperforming areas and reallocation of resources according to priority. It is also important to resist temptations for ‘one-offs’, unless there has been an *investment fund* that operates to support high priority, high return projects, for which there is an investable business case.

The expenditure reported above is an aggregation of expenditure programs that fall within the responsibility of more than a dozen portfolios, each making allocations from their own funding envelopes. There is no mechanism for prioritising and reallocating expenditure identified as ‘science, research and innovation’ according to strategies and plans developed by Innovation and Science Australia.

Suggestions were made during Consultations that the Science, Research and Innovation *Strategy* should be accompanied by a Science Research and Innovation *Budget*. An acceptance of a process for re-allocating resources for science research and innovation would be a difficult, but potentially worthwhile exercise in terms of maximising the returns from the scarce resources available.

6.5 Long term commitment

As mentioned through this Report, long term policy and program commitment is seen as essential for the future development of innovation capability and outcomes in science, research and innovation.

Science, research, technology and innovation investment creates *national infrastructure assets* that are available for ongoing use into the future. It should not be seen as 'funding' or 'expenditure' which carries a connotation of cost, and can be readily cutback in the pursuit of budgetary savings and fiscal balance.

It is understood that Infrastructure Australia is examining potential investments in teaching and research infrastructure.

6.6 Communication and engagement

Mention has also been made of the importance of an Australian innovation narrative. The narrative must be seen as authentic and a focus for future commitment to innovation. It must avoid attention grabbing PR messages. Messaging must also make effective use of social/new media.

6.7 Measuring success

An important aspect of strategy and strategy implementation is knowing when success has been achieved. This involves putting in place measurable outcomes, including value created for business (shareholders, management, employees and customers), industry, and the broader economy. Innovation should also be expected to create *public value*, in terms of social well-being, and the protection preservation and repair of natural capital.

An important aspect of measuring innovation success is through appraisal of a well-articulated *pathways to adoption*.

6.8 Capture the benefits of prior investments, have patience, and learn

Innovation strategy should capture the returns of past investments – for example the large investments over many years in medical research, agriculture and mining. A significant proportion of this has been supported by Commonwealth and State Governments. It has taken many years for outcomes and of this to be realized, with impacts across industry and in areas where Australia has a competitive advantage. The wine industry has been a standout example.

The *Expert Opinion Survey* suggests that these investments should continue. However, it is important to make investments in areas that are considered to be important to Australia's future

and where we can build competitive advantage and distinctiveness – particularly in areas where our global competitors will find hard to replicate.

The EIF (HEEF) had a major impact in providing Infrastructure, and the returns now being seen as current campus tours will validate. But the program has been largely forgotten and it has never been evaluated.

Universities are investing their surplus on teaching, leveraging their property assets, and co-investing with business and government to create world class infrastructure. Some of this has been in place for many years, such as the Australian Animal Health Laboratories, which makes a critical contribution to food security.

It follows that innovation strategy must build on and extend capably investments; hold the line on programs and projects; invest prudently for the long term; wait and see how they pan out; outcomes may not be what was planned/envisaged.

Stories and narratives about success and impact are an important aspect of building a sustainable innovation strategy.

6.9 Innovation system research

Innovation research is currently highly distributed across universities, consultants and think tanks. However, it lacks resources and commitment and connection to a national innovation strategy. Economic approaches provide an important capability, particularly through the Office of the Chief Economist in the Department of Industry, Innovation and Science. But there is a need for research to be focussed on developing a comprehensive understanding of how and why businesses invest in innovation, the incentives and motivations, the management and governance capacities and capabilities.

At the same time, there is a wealth of knowledge contained in the surfeit of innovation statements, reviews and inquiries conducted over the last 25 years. **These have been indexed in an accompanying report, *25 Years of Review: Innovation Policy Statements, Reports and Initiatives 1991-2016*.** This material raises numerous issues not only in innovation policy but also in related policy areas, including industry policy and trade policy, and in particular, the practice of public administration.

Much could be learned from this material, including the related submissions and papers prepared as input to this work.

Appendix

1. Public Submissions to 2030 Strategic Plan Issues Paper

Submissions made to the Office of Innovation Science Australia are subject to the conditions outlined in the privacy agreement accepted by each respondent.

A total of 130 respondents provided a formal submission. Of these, 13 respondents lodged confidential submissions; the details of these submission are therefore not included below. However, all submissions were included in the analysis of this consultation.

2026 Spatial Industry Transformation and Growth Agenda Team	Business Council of Australia
Academy of the Social Sciences in Australia	Centre for Culture, Ethnicity & Health
ACM Administrative Centre	Cheever, Paul
Australian Advisory Board on Impact Investing	Coffey, James
Advanced Manufacturing Growth Centre	The Action Learning Institute
Anderson, Nathan	Cotton Innovation Network
ANZA Technology Network	Council of Australasian Museum Directors
Association of Australian Medical Research Institutes	Council of Rural Research and Development Corporations
Association of Heads of Independent Schools of Australia	CSIRO
Australian Trade and Investment Commission	Dalton, James
Australasian Open Access Strategy Group	Department of Defence
Australian 3D Manufacturing Association	DocuSign
Australian Academy of Science	Australian Early- and Mid-Career Researcher Forum of the Australian Academy of Science
Australian Academy of Science National Committee for Data in Science	Ecological Society of Australia
Australian Academy of Technology and Engineering	Foundation for Young Australians
Australian Academy of the Humanities	Freese, Imo
Australian Brain Alliance	Geoscience Australia
Australian Chamber of Commerce and Industry	Gerard, Wayne
Australian Council of Engineering Deans	Human Factors and Ergonomics Society of Australia Inc.
Australian Genomics Health Alliance	Huxtable, Paul
Australian Institute of Marine Science	Huxtable, Paul
Australian Marine Sciences Association	Huxtable, Paul
Australian Mathematical Sciences Institute	Huxtable, Paul
Australian Nuclear Science and Technology Organisation	Ideapod
Australian Private Equity & Venture Capital Association Limited	Innergise Pty Ltd
Australian Research Council	Innovative Research Universities
Australian Technology Network of Universities	James Cook University
Barker, John	Knowledge Commercialisation Australasia
Blue River Group	Keenan, Sam
Brown, Paul	Khanna, Rajiv
Bushfire & Natural Hazards CRC	Lancman, Katherine
	Leaver, Sean and Potts Jason
	Yee, Rebecca
	Lester, Diane

Madjeric, Lou
Melbourne Genomics Health Alliance
Murdoch Children's Research Institute
Nasrin, Sultana
National Association of Steel-framed Housing Inc
National Centre for Vocational Education Research
National Committee for Chemistry of the Australian
Academy of Science
National Committee for Data in Science of the
Australian Academy of Science
National Committee for Physics of the Australian
Academy of Science
National Farmers' Federation
Naumovski, George
Navitas
National Energy Resources Australia
Noble, David; Charles, Michael B; Keast, Robyn
Office of Science, Department of the Premier and
Cabinet, Western Australia
Queensland Chief Scientist
Optus
Pearcey Institute
Plant Biosecurity Cooperative Research Centre
Professionals Australia
Regional Universities Network
Research Australia
RMIT University
Robinson, Phil
Science & Technology Australia

Sedgwick, Geoff
Smith, Lizzy
South Australian Science Council
Space Industry Association of Australia
Joish, Sripadaraja
StartupAUS
Surtees, Tony
Swinburne University of Technology
TAFE Queensland
TechSydney
The Council of Australian Postgraduate Associations
The Council of Australian University Librarians
The George Institute for Global Health
The Group of Eight
The National Committee for Space and Radio
Science of the Australian Academy of Science
The University of Melbourne
The University of Sydney
Universities Australia
University of New South Wales
University of Newcastle
University of South Australia
University of Tasmania
University of Technology Sydney
UTS Business School, University of Technology
Sydney
Victorian TAFE Association
Water Services Association of Australia
Zheng, Jihua

2. Interviews with Innovation Leaders

*Meeting arranged by Business Council of Australia

Adamek, Petr, CEO, CBR Innovation Network
Aithen, MaryAnne, Executive Director, Research Office, La Trobe University
Amour, Angus, BCA, Business Council of Australia
Arnold, Jenifer, Head of Solution Centre of Excellence & Demand Management, SAP*
Austin, John, Economist (contractor), Infrastructure Australia
Bagga, Karen, Programme and Project Management Consultant, Informed Professionals
Bailey, Fran, Chairman, Animal Aid, Victoria
Batainah, Hala, Federal Director, Microsoft
Bement, Jason, Optus
Ben-Meir, Mr Doron, Vice-Principal (Enterprise), Chancellery, The University of Melbourne
Berry, John, Director and Head of Corporate and Regulatory JBS Australia, JBS*
Biggs, Professor Simon, Executive Dean, Faculty Engineering, Architecture & Information Technology, The University of Queensland
Blackhall, Lachlan, Co-founder and CTO, Reposit Power
Blatch, Professor Greg, Pro-Vice-Chancellor (Research), University of Notre Dame
Boyle, Professor Brian, Deputy Vice-Chancellor (Enterprise), The University of NSW
Brinson, Ashley, Executive Director, The Warren Centre for Advanced Engineering
Brown, Matt, Deputy CEO, Group of Eight Universities
Buculo, Sam, Professor Design and Innovation, University of Technology, Sydney
Bullock, Matt, Spinify, CEO / Founder, Entrepreneur, EziPay
Burrowes, Darren, Chief Technology Officer, Blue Zone Group
Camilleri, Steven, Chief Technology Officer, Spee3D
Campbell, Bob, Organisation Development Consultant, HR Consultant
Cebon, Peter, Principal, Cebon Consulting
Clarke, Professor Alice, Sustainable Minerals Institute, The University of Queensland

Conlan, Lindus, Research Focus Area Development manager, La Trobe University
Coyne, Julian, CEO, Design Org
Cram, Lawrence, DVC-R, Charles Darwin University
Cram, Barbara, VET Pathways, Charles Darwin University
Culbert, Geoff, President and CEO, GE*
Cullen, Dr Kevin, CEO UNSW Innovations, The University of NSW
Cundy, Darren, Director, Business Development and Technology Transfer, University of Tasmania
Cunningham, Stuart, Director at ARC Centre of Excellence for Creative Industries and Innovation, Queensland University of Technology
Dan, Jack, National General Manager, Telstra
Daniel, Heiko, PVC, Research, University of New England
Davies, Craig, CEO, Griffin Accelerator
Dawe, Marcus, CEO, Carbon & Health Entrepreneur, Informatics Specialist, Health Horizons
Dawson, Warwick, Director, Research Strategy and Partnerships, The University of NSW
Day, Professor Karen, Dean, Faculty of Science, The University of Melbourne
De Margheriti, John, Entrepreneur, Game Plus Co-working, Dreamgate Studios
Deamer, James, Co-Founder, Garden Space
Dennis, Ian, Executive Director and Chairman (Pro bono), Pearcey Centre for Innovative Industries Economic Research
Desai, Bharat, Head of School, School of Service Industries, Charles Darwin University
Dickerson, Wayne, Associate, JPW Architects
Dods, Sarah, General Manager, eHealth Solutions, Telstra Health
Domani, Ayala, Director Innovation, Telstra*
Drummond, Callum, DVC Research and Innovation, RMIT University
Dunne, Professor Tim, Executive Dean, Faculty Humanities and Social Science -, The University of Queensland
Edwards, Meredith, Emeritus Professor, University of Canberra

Eedle, Liz, Universities Australia

Farrelly, Colin, Partner/Owner, Indago Partners

Finlay-Jones, Professor John, Deputy Vice-Chancellor (Research), Edith Cowan University

Fitzpatrick, Rob, Chief Executive Officer, AIIA

Fitzsimmons, Wayne, Chair, Pearcey Foundation

Forest, Christy, Managing Director, Asia-Pacific, CEB*

Fowler, Craig, Managing Director, National Centre for Vocational Education Research

Frater, Michael, Rector, UNSW Canberra at ADFA, The University of NSW

Gahan, Professor Peter, Director, Centre for Workplace Leadership, The University of Melbourne

Gibley, Chris, CEO, Imagine Intelligent Materials Pty Ltd

Gilmore, Rowan, CEO and Managing Director, EM Solutions

Glover, Barney, Vice-Chancellor and President, Western Sydney University

Goldstone, Trevor, Pro Vice-Chancellor, External Relations, University of New England

Gooch, Daniel, Director, Strategic Projects Group, University of New England

Green, Roy, Dean, Business School, UTS, UTS

Gregory, Oscar, Director ARC Research Hub For Australian Steel Manufacturing, University of Wollongong

Groth, Andrew, Senior Vice President I Regional Head, Australia & New Zealand, Infosys*

Halloran, Lucille, Partner, Government & Public Sector Oceania Leader, EY

Hamley, Ben, Partner, Strategy Designer, Business Models Inc.

Hanson, Matt, Director, Hello Claims

Harch, Professor Bronwyn, Executive Director, Institute for Future Environments, QUT

Hargreaves, Professor Mark, Pro Vice-Chancellor (Research Collaboration and Partnerships), The University of Melbourne

Harris, Andrew, Director, Laing O'Rourke, Engineering Excellence Group

Harrison, David, Director, Government and Corporate Communications, The University of Western Australia

Henderson, Angus, Innovation Partnerships & Programs Leader, Australian Council of Learned Academies

Henry, Professor Robert, Director, Queensland Alliance for Agriculture and Food Innovation, The University of Queensland

Hermans, Ty, Managing Director, Evolve Group and Marco Engineering

Heywood, Brigid, Deputy Vice-Chancellor (Research), University of Tasmania, University of Tasmania

Hicks, Kim, Senior Manager, Policy and Advocacy, AIIA

Hilder, Emily, Director, Future Industries Institute, UniSA

Hindmarsh, Renee, CEO, ATN Universities

Hiscock, Ms Rose, Director, Science Gallery, The University of Melbourne

Hobbs, Julie, CEO, Chair, DIA, The Future Now

Hoff, Brand, Company Director and Investor, Think Place

Howard, Mat, Associate, 2017 Award for Architecture Innovation, JPW Architects

Howlett, Dig, Cochlear*

Hurps, Murray, CEO, Fishburners

Hutchinson, Kelly, Program Manager, Dept. Economic Development, Jobs, Transport and Resources

Hutchinson, Angus, CEO, Thomas Global Systems

Hutchinson, Will, Chair, Thomas Global Systems

Ireland, David, Entrepreneur, angel investor, and innovation consultant, ThinkPlace

Jackson, Catriona, Deputy CEO, Universities Australia

Jeng, Hoyoung, Head, SAP Innovation Center Brisbane

Jensen, Professor Paul, Deputy Dean, Faculty of Business and Economics, The University of Melbourne

Johnston, Professor Emma, Pro Vice-Chancellor Research, The University of NSW

Jones, Professor Margaret, Director, Office of Research and Innovation, Edith Cowan University

Kellock, Jo-Ann, Exec Director, Australian Design Alliance

Kennedy, Sam, Director Public Sector Strategy & Innovation, Optus Business

Kennedy, Narrelle, Innovation Advister, Kennedy Group

Key, Peter, Policy Director, Australian Steel Institute

Keys, Glen, Co-Chair at Aspen Medical and Owner, Aspen Medical

King, Conor, Executive Director, Innovative Research Universities
Kooman, Kaaren, IBM
Kovachevich, Anne, Associate, QLD ESD Leader and Australasian Foresight + Innovation Leader, Arup
Lawrence, Roger, Founder and Director, Viceversa reality
Layton, Peter, Director, EY
Linton, Valerie, Professor, School of Mechanical, Materials and Mechatronic Engineering, University of Wollongong
Mak, Swee, Director, Strategic Innovation, RMIT University, RMIT University
Marcus Clark, Phillip, Former Chair, EIF, JP Morgan
Mareels, Professor Iven, Dean, Faculty of Engineering, The University of Melbourne
Masters, David, Corporate Affairs Manager, Microsoft
McArdle, Michael, Director, Office of Research, Queensland University of Technology
McCluskey, Professor Jim, Deputy Vice-Chancellor (Research), The University of Melbourne
McColl, Susan, General Manager, Division of Enterprise, The University of NSW
McDougal, Rohan, Director, IP Commercialisation, Curtin University
McEwan, Professor Alastair, Pro-Vice-Chancellor (Research) -, The University of Queensland
McKay, Tim, CEO & Co-Founder at OKRDY
McLennan, Tim, CEO, QUT Bluebox Pty Ltd
McMenamin, Thomas, Co-Founder Pixelated Induction Pty. Ltd., Student at The ANU, Pixelated Induction
McNaughton, Nick, CEO, ANU Connect Ventures
McPhillamy, Louisa, Optus
Melbourne, Michelle, Co-Founder, Installed
Metcalf, Andrew, EY Federal Government Lead Partner, EY
Miller, James, Technical Consultant, Informed Solutions
Moghtaderi, Behdad, Head, Chemical Engineering, School of Engineering, University of Newcastle
Moran, Professor Chris, Deputy Vice-Chancellor (Research), Curtin University
Mortimer, David, Chairman, Crescent Capital Partners Ltd
Moss, Dr Dean, Director, Uniquist Pty Ltd, The University of Queensland

Mullins, Trish, Director, Policy and Government Relations, The University of NSW
Munive, Joseli, National Manager, Alliances and ICT Industry, GS1
Munro, Tanya, Deputy Vice Chancellor, Research and Innovation, UniSA
Nelson, Peter, DVCR, Macquarie University
Nicholls, Paul, Director of Strategic Projects, Curtin University
Noonan, Liza, Executive Manager, Innovation and Director ON, CSIRO
O'Brien, Michelle, Policy Adviser, Innovative Research Universities
Owczarek, Professor Aleks, Deputy Dean, Faculty of Science, The University of Melbourne
Owens, Professor Robyn, Deputy Vice-Chancellor (Research), The University of Western Australia
Owens, Daniel, Executive Director, Research Services, The University of NSW
Palmer, Lauren, Policy and Projects Manager, Australian Council of Learned Academies
Pankhurst, Ned, Senior Deputy Vice-Chancellor, Griffith University
Pantano, Victor, University of Canberra
Pearcey, Laurie, Pro-Vice Chancellor International, The University of NSW
Pellegrino, Jason, Managing Director, Australia & New Zealand, Google*
Penders, Monica, CEO, ACT Screen Industry Association Ltd
Perkins, Carolyn, CEO, RUN universities Group
Plint, Professor Neville, Director, Sustainable Minerals Institute -, The University of Queensland
Plunkett, Sandy, Founder, Innovation Clearinghouse, Pty Ltd
Poier, Luther, CFO, startup adviser, Blue Chilli*
Reece, Mr Nick, Director Strategy, The University of Melbourne
Reed, Tim, CEO, MYOB*
Richards, Janine, Director, Research Analysis and Operations, Office of DVC - R, The University of Queensland
Robertson, David, Design Ambassador, Design Institute of Aus.
Robinson, Belinda, CEO, Universities Australia
Roche, Suzanne, General Manager Policy and Government Relations, AIIA
Rodda, Stephen, Director and Chief Executive, UniSA Ventures, University of South Australia

Rowan, Professor Alan, Director, Australian Institute for Bioengineering and Nanotechnology, The University of Queensland
Russell, Jonathan, Engineers Australia
Sah, Professor Pankaj, Director, Queensland Brain Institute, The University of Queensland
Sahajwalla, Veena, ARC Laureate Director, Centre for Sustainable Materials Research and Technology, The University of NSW
Saini, Deep, Vice-Chancellor, University of Canberra, University of Canberra
Saunders, Elaine, CEO, CEO Blamey Saunders hears
Schneider, Bennett, Co-founder, Pixelated Induction
Shannon, Frances, DVC Research, University of Canberra
Shannon, Rob, Associate Director, Business Development and Innovation, UWA
Shepherd, Graham, Director, Telecommunications Association
Smyth, David, Director, AC Solar Warehouse
Snell, Andrew, Founder and Principal, The Coaster Group Pty Ltd
Somerville, Dianna, Founder, Regional Pitchfest
Sonenberg, Professor Liz, Pro Vice-Chancellor (Research Infrastructure & Systems), The University of Melbourne
Sterling, Leon, Advisory Board, cuuble
Stevens, Neville, Chair, NSW Innovation and Productivity Council
Stirling, Petra, Head of Legal Capability and Transformation, Gilbert+Tobin*
Stoianoff, Tanya, Head of Corporate Affairs, DXC
Sullivan, Leigh, DVCRI, Federation University
Templeon, Guy, President and CEO, WSP*
Thodey, David, Chair, CSIRO
Thompson, David, Acting CEO, RDA Northern Inland
Tidhar, Gil, Entrepreneur, The University of Melbourne
Tulloch, Sylvia, Entrepreneur, Angel Investor; Chair, Renewable Energy Innovation Fund
Varcoe, David, CEO, Steel Insight
Ward, Professor Robyn, Deputy Vice-Chancellor (Research), Acting Executive Dean, Faculty of Medicine, The University of Queensland
Watt, Ian, Former Secretary, DPMC, Australian Government
Wilson, Carolyn, CEO, Centre for Entrepreneurial Research and Innovation

Woods, Mike, Former Productivity Commissioner, R&D Inquiry, Government
Wulff, Monica, Co-founder and CEO, Startup Muster
Zannon, Steve, CEO, Proactive Ageing
Zulli, Paul, CEO, ARC Research Hub for Australian Steel Manufacturing, University of Wollongong

3. Organisations invited to participate in Consultation Forums

List of organisations or bodies invited to be involved in stakeholder engagement roundtables

5 y's Pty Ltd	Aurecon
99 Consulting	AusBioTech Ltd
A.F. Gason	AusBioTech Ltd
Academy of Interactive Entertainment	Austeng
ACCI	Austmine
ACOLA	AusTrade
Action learning	Austrade
Acumen Ventures	Australian Business Chamber
ADSA Promotions	Australian Business Software Industry Association - ABSIA
Advance Cairns	Australian Capital Ventures (Hindmarsh Group venture fund)
Advantage Wollongong (NSW Dept Industry)	Australian Centre for Robotic Vision
AE Projects Pty Ltd	Australian Honey Products
Agricultural consulting firm	Australian Industry Group (AIG)
AIIA	Australian Information Industry Association (AIIA)
Albins Performance Transmissions	Australian Institute of Marine Science
Allotrac	Australian Manufacturing Workers' Union
Amaero Engineering	Australian National Fabrication Facility
AME Systems	Australian National University - Hotlight Systems
ANU Connect Ventures (ANU/MTAA backed venture fund)	Australian Private Equity & Venture Capital Assoc Ltd
Aquahydrex	Australian School of Management (ASM)
Aqualuma LED Lighting	Australian Sports Tech Network, Manager ICT
ARC Centre of Excellence for Creative Industries and Innovation	Australian Steel Mill Services
Ardex Australia Pty Ltd	Australian Trade and Investment Commission
Arthritis Relief Plus Limited	Autech Software and Design
Artibus Innovation, The Work Lab, Skillsbook	AutoMed
ARTO	Axeze Pty Ltd
ARUP	BAE Systems
Asialink Business	Ballarat Innovation Industry Group
Aspen Medical	BASE Engineers
Astaricks (Yoomax Solutions)	Beacon Foundation
Astute energy Solutions	BEC Feed Solutions
ATN Universities	Behaviour Innovation
ATP Innovations	Bell Bay Aluminium
Augisoft	

Biodiem
 BioMelbourne Network
 Bluechiip Limited
 BlueScope Steel Wollongong
 Blundstone Australia Pty Ltd
 BMT WBM Machinery Group
 Boardcave.com Pty Ltd
 Bombora Wave Power
 Bond Business Commercialisation Centre, Bond University
 Bond University
 Bondi Labs Pty Ltd
 Boomaroo Nurseries
 Bosch Australia
 Brandsema Tomatoes
 Bridestowe Lavender Farm
 Bulk Nutrients Bioflex Nutrition, Tasmanian Health and Fitness Expo, and Southern Nutrition
 Bunbury Geographe Chamber of Commerce
 Bunbury Wellington Economic Alliance Inc
 Bureau of Meterology
 Burleigh Brewing Company
 Business SA
 Busselton Chamber of Commerce Inc.
 C.E. Bartlett
 Cairns and Hinterland Hospital and Health Service
 Cairns Chamber of Commerce
 Cairns Regional Council
 Campbell Scientific
 Cape York Partnership, Dreamtime Funding
 Capital Angels (ACT Angel investor network)
 Carbon & Health Entrepreneur, Informatics Specialist, Mentor, Director
 Carbon Nexus
 Carbon Revolution
 Carina Biotech
 CCIQ
 CDU Power & Water engineering sustainability
 CEA Technologies Pty Ltd
 Centre for Appropriate Technology
 Centre for Cancer Biology
 Centre for Crocodile Research
 Tas Rail
 Ceramet
 Challenging Thinking & Business SA Board member
 Chamber of Commerce and Industry WA
 Chamber of Commerce NT
 Charles Darwin University (CDU), Darwin
 Chris Hardy Pty Ltd
 Cicada Innovations
 Cisco
 City of Ballarat
 City of Gold Coast
 City of Greater Geelong
 City of Ipswich Economic
 City of Newcastle
 City Plan Strategy and Development
 Civmec
 Clarity Pharmaceuticals
 Clinilink Systems
 Clipchamp Pty Ltd
 CMA Engineers
 Co Founder/CMO
 Cogito Group
 CombiTile Pty Ltd
 Commerce Ballarat
 Committee for Ballarat
 Commonwealth Bank
 Companhia Brasileira de Metalurgia e Mineracao
 Cook Incorporated
 Coral Sunscreen Australia
 Core Resources Pty Ltd
 Council of Small Business Australia (COSBOA)
 CPDlive | Cahoot Learning | Professional Education
 CQ University
 Cradle Coast Authority
 Cradle Coast Innovation Inc.
 Cram Group
 CRC for Developing Northern Australia
 CRC for Remote Economic Participation
 Creative Universe, Creativity Australia & Creative Innovation Global
 Cromarty
 CSBP
 CSIRO
 CT4 Pty Ltd
 Cullen Wines

Cullin Innovation Pty Ltd
 Curtin University
 DAFWA - Department of Agriculture and Food
 Darwin Port
 Data 61
 Deakin University
 Defence Materials Technology Centre University Of
 Wollongong
 Deloitte
 Deloitte (Darwin)
 Deloitte Access Economics
 Deloitte Australia, Lonsdale Trade Storage, Bell
 Management Consultants P/L
 Depart of Education and Training (Queensland)
 Department of Agriculture, Fisheries and Forestry
 Department of Education and Training
 (Queensland)
 Department of Health
 Department of Industry
 Department of Science, Information Technology &
 Innovation
 Department of State Development
 Department of the Chief Minister, Northern
 Territory Government
 Dept of Primary Industry and Fisheries
 Dept. Agriculture and Food
 Design + Industry Pty Ltd
 Design Innovation Research Centre
 DesignMoves
 DHIVE & Envision
 Digital Capability
 Director of Office of Innovation UC
 DMTC
 DSG
 Dyesol
 Dynamic Efficiency
 Eagle Crest Technologies
 Early Risers - Gold Coasts Club for Women in
 Business
 ecka granules
 EcoJet Engineering
 EDC Consultants Pty Limited
 Eden Foods and West Haven Dairy
 Edith Cowan University
 Effusiontech Pty Ltd
 Eidos Institute & MindHive
 Ellume Pty Ltd
 EM Solutions
 Energy&Energy Networks ,Utilities, Mining Services
 Manufacturing
 Engineering Network Geelong
 Engineers Australia
 enVizion Group
 Envorinex
 Enware
 Epic Pharmacy Group
 Ergon Energy
 Eviva Pty Ltd
 Evolve Energy, AC Solar Warehouse, Energy
 Innovations Pty Ltd
 Evolve Group and Marco Engineering
 Executive Chairman
 Faculty Director TAFE
 Farmer
 Federation of Ethnic Communities' Councils of
 Australia
 Federation University
 Finders University
 Findex Group
 FireAnt
 Fishburners
 Five Faces Pty Ltd
 Five Y's
 Flinders University
 FMP Group
 Food Innovation Australia
 Food Innovation Partners Pty Ltd
 Food South Australia
 Forager Foods
 Forico
 Founder
 Fusidium Pty Ltd
 FutureNow
 G2 Innovation
 G21 Agri Forum
 G21 Geelong Region Alliance
 Geelong Chamber of Commerce
 Geelong Manufacturing Council

Gekko Systems
 GET Trakka Pty Ltd
 Glass Terra Pty Ltd
 Gold Coast Central Chamber of Commerce
 Gold Coast City Council
 Gold Coast Health & Knowledge Precinct
 Gold Coast Innovation Centre
 Goldfields Esperance Development Commission
 Good View Fruits Co., Ltd., Landsen Innovation Pty Ltd, Natures Haven
 GrantReady Pty Ltd; President of Entrepreneurs
 Grattan Institute
 GRD Franmarine Holdings Pty Ltd
 Great Southern Development Commission
 Greater Sydney Commission
 Griffin Accelerator CBRIN
 Griffith University
 Hamilton Collins Pty Ltd
 Haymes Paint
 Hazelbrae Hazelnuts
 Health Reimagined
 HealthRFID
 Healthscope
 Hello Claims Pty Ltd
 Hunpty Doo Barramundi
 Hunter Medical Research Foundation
 Hunter Research Foundation
 Hunter TAFE
 Hunter valley coal chain coordinator
 Hunternet
 Huon Acquaculture
 Hydrowood
 iAccelerate
 IBIS World
 Iconics Energy Pty Ltd
 ICT Industrial Control Technology
 Illawarra Business Chamber
 Illawarra Innovative Industries Network
 Illawarra Retirement Trust
 Imagine Intelligent Materials
 Imaginot Pty Ltd
 Impact Innovation Group
 Indigenous Business Australia
 Indigital Pty Ltd
 Industry Capability Network (ICN) Victoria
 Information Security & IT Assurance, BRM Holdich
 Innov8ED Pty Ltd
 Innovation NQ
 Innovative Asset Solutions Pty Ltd
 Innovative Manufacturing CRC Ltd
 Inpex
 Instacluster
 Institute for Glycomics
 Intel Australia/New Zealand
 Intelledox
 InterfereX Communications Pty Ltd
 Intergrain
 Internetrix
 Inventium
 IP Australia
 IS-ON
 Ivy Pty Ltd
 IXL
 J.L.V. Industries Pty Ltd
 James Cook University
 JESI Management Solutions
 Joy Mining
 Jurox
 Kiama Municipal Council
 KILN Incubator
 Kinetic Pressure Control
 Knowledge Commercialisation Australia
 KPMG Australia
 KPMG, Darwin
 Lake Macquarie City Council
 Launceston Chamber of Commerce and Industry
 Launceston City Council
 LGM Industries
 Lighthouse Sydney
 Linear Clinical Research Ltd
 Liquid Instruments Pty Ltd
 Luk Beautifood
 M Dingle Pty Ltd
 M&C Saatchi
 Macquarie Atlas Roads, Telstra Corporation,
 Stockland Group
 Magnattack Global
 Magnetica Limited

Magnix Technologies Pty Ltd
 Maker & Co Collective Pty Ltd
 Marand Precision Engineering
 Margaret River Chamber of Commerce
 Marist 180
 Master Builders NT (formally Territory Construction Association), Darwin
 McCain Foods
 McKell Institute
 Me3D
 METS Ignited Australia Ltd
 Meyer Vandenberg Lawyers
 MHG Glass
 Michael William Crowe Consultancy Services
 Microsoft
 Minerals Council Australia NT Division
 Minifab
 Mitchell Institute
 MLA
 Monash University
 Mondelēz International
 Moneycatcha Pty Ltd
 Moshi Moshi Marketing
 Multicap Tasmania
 Murdoch University
 Museum of Old and New Art (MOANA)
 Myer
 MyHealthTest Pty Ltd
 N/A
 NAB Ventures
 National Association for Commercial UAV / Drone Operators (ACUO)
 National Australia Bank, Darwin
 National Home Doctor Service/University of Queensland
 NCVER
 Newcastle Port Corp
 NIB
 Northern Australia Environmental Resources Hub
 Northern Midlands Business Association
 Northern Tasmanian Development
 Northern Territory Cattlemen's Association (NTCA), Darwin
 Northern Territory Government
 Northern Territory Seafood Council
 Nova Group
 Nova Systems
 Nowra Chemicals
 NSW Department of Industry
 NSW Premier & Cabinet
 NT Farmers
 NTG Dept of Innovation
 Nuonic
 Nutrakol Pty Ltd
 NXT Global Pty Ltd
 Office of the Industry Advocate, South Australian Government
 One Ventures Innovation Funds
 Ontoto Pty Ltd
 Opmantek Ltd
 Optika Solutions
 Orange Squid
 Orrcon Steel
 Pacific Marine Batteries
 Payment Network International Pty Ltd
 PD Analytical Pty Ltd
 PDC
 Penguin Composites
 Perimeter Security Industries Pty Ltd
 Phoenix Australia
 Phoenix Power Recyclers Pty Ltd
 Pixalux
 Plant Health Australia
 POD Active
 Pollenzier
 Polygon Door
 Port Stephens Council
 Precision Agriculture Pty Ltd
 Primary Industries and Regions SA
 Principal
 Private Forests Tasmania
 Pro Bono Australia
 Professionals Australia
 PwC
 QMI Solutions Ltd
 Queensland Department of State Development
 Queensland Incubator

Queensland Indigenous Family Violence Legal Service
 Queensland University of Technology
 Quickstep Automotive
 Quickstep Holdings Ltd
 QUT
 QUT Creative Enterprise Australia
 qutbluebox
 Rankin Securities Pty Ltd
 Raygen Resources
 Raytheon
 RDA
 RDA - Far North Qld
 RDA - South West
 RDA - Goldfields Esperance
 RDA - Great Southern
 RDA - South West
 RDA - Tas
 RDA - ACT
 RDA -Perth
 RDS Partners
 Red Hat
 RedEye
 Regional Development Australia - Hunter
 Regional Development Australia - Moreton Bay
 Regional Development Australia, NT (Formally NTACC)
 Remsafe Pty Ltd
 Reposit Power Pty Ltd
 Resilient Futures
 Rio Tinto Iron Ore
 Ripples Pty Ltd
 River City Labs
 RMIT University
 Rockfield Technologies
 Roesner Pty Ltd
 Rozenberg and Co Pty Ltd
 Runway Geelong
 Saab Australia (Mawson Lakes)
 Safety Culture
 SAP
 SAP Innovation Centre
 Savanna Solutions Pty Ltd
 Science and Industry Endowment Fund
 Science Industry Australia
 Science Technology Australia
 Scientell
 Sea Salt Marketing
 SeaSwift
 See Group
 Seeing Machines
 Seeley International
 SEM Fire and Rescue
 Sendle
 Shellharbour City Council
 Sight for All
 Silanna Semiconductor
 Simoca Operations Pty Ltd
 Sitesee
 Skills Australia
 Slingshot Accelerator
 Small Business Smart Business
 Smart Cities Council Australia New Zealand
 SmartCap Technologies
 SME Gateway
 Snap Network Security
 Soto Engineers
 South 32 Worsley Alumina Pty Ltd
 South West Catchments Council
 South West Development Commission
 South West Science Council
 Spinify
 SRA
 SSS Manufacturing Pty Ltd
 Startup Aus
 Startup Catalyst + EIR @ River City Labs.
 StartUp Foundation
 STC Australia
 Steel Stewardship Council Ltd, Bluescope Steel
 Steele Business Solutions Pty Ltd
 Stramit
 Strongbuild
 Sue Spence Communications
 Sundrop Farms - Port Augusta and Adelaide City
 Swanport Harvest
 Swinburne University of Technology
 Sykes Racing
 Synergy

TAFE Directors
 TAFE Illawarra
 TAFE Queensland North
 TAFE Queensland North
 Talison Lithium Pty Ltd
 Tap into Safety Pty Ltd
 Tasmanian Chamber of Commerce and Industry
 Tasmanian Fruit & Vegetable Export Facilitation Group
 Tasmanian Institute of Agriculture, University of Tasmania, Strategic Alignment Associates Pty Ltd
 Tassal Group
 TasTAFE
 Taylor Rail Australia Pty Ltd
 TechinSA
 Technical Fabric Services Australia Pty Ltd
 TEXTOR TECHNOLOGIES PTY LTD
 THE ARNHAM LAND PROGRESS ABORIGINAL CORPORATION
 The Australian Centre for Social Innovation
 The Boston Consulting Group (BCG)
 The Business Centre Newcastle Region
 The Clubhouse
 The Foundation for Young Australians
 The Friday Collaborative
 The Group of Eight
 the SPACE Australasia
 The University of Melbourne
 The University of Sydney
 The Yothu Yindi Foundation
 TheSpace
 ThinkPlace
 TomW Communications Pty Ltd
 Top Centre laundry
 Towards Success Transformation Program
 Townsville Business Development Centre
 Townsville City Council
 Trade and Investment Queensland
 Tribal Group
 Uni SA
 University of Adelaide
 University of Canberra
 University of Newcastle
 University of Queensland
 University of Queensland Business School
 University of South Australia
 University of Tasmania
 University of the Sunshine Coast
 University of WA
 University of Wollongong
 UNO Management Services
 UNSW
 UNSW Innovations
 UoMC Ltd
 Upstart Challenge
 UQ
 UQ Business School
 Urban Frontiers Pty Ltd
 USM Pty Ltd
 USQ
 UTS
 V2i
 VECCI
 Venus Shell Systems
 Victoria University
 Visy
 Warrigal
 Western Dairy Hub
 Western Dairy Incorporated
 Wingecarribee Shire
 Wollongong City Council
 Women in Agriculture and Business of SA Inc.
 Women in Stem & Entrepreneurship (WiSE), Griffith University
 World4Brains.com - Consult the World!
 Xero
 Xtek Limited
 Zaptz Pty Ltd

4. Consultation Overview Paper

Innovation and Science Australia (ISA) Australia's 2030 Innovation System Strategic Plan Consultations Program

[Innovation Science Australia](#) (ISA) is developing a long term strategic plan to maximise Australia's innovation potential, positioning Australia to seize the next wave of economic prosperity and ensuring Australia's wellbeing and economic growth in the future. It will identify investment and infrastructure priorities and areas for consideration by government.

The Plan will build on the findings of the performance audit of Australia's innovation, science and research system and other reviews. It will describe what the System should look like in 2030 to ensure Australia reaches its innovation potential and make recommendations as to how Australia can get there. It will also outline how progress against the Plan can be evaluated.

The Board aims to release the Plan at the end of 2017.

Vision

The Board has adopted a vision for Australia's national Innovation, Science and Research System:

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 today's and future generations to have meaningful work, a great quality of life in a fair and inclusive society.

Approach

The Plan will build on reviews that have either been completed or are currently being undertaken as they relate to innovation, science and research in Australia and overseas. Key Australian reviews may include but are not limited to:

- [Performance Review of the Australian Innovation, Science and Research System](#)
- The Australian Government's [Science and Research Priorities](#)
- The [2016 National Research Infrastructure Roadmap](#)
- International best practices in innovation, science and research.

The Board intends to engage widely with businesses, industry, research organisations, teaching institutions, government and non-government agencies, and the broader community to develop the Plan. This will involve face-to-face meetings, forums and workshops in Australian capital cities and regional centres, and social media. The Board has commissioned [Howard Partners](#), a policy research firm, to assist in the consultations.

In undertaking the consultations, the Board is mindful of the extensive consultations processes that have been undertaken by the Commonwealth in the science, research and education areas in recent years and the submissions that have been prepared for major policy reviews and several Parliamentary Inquires - including the [Inquiry into Australia's Innovation System](#) and the [Inquiry into innovation and creativity: workforce for the new economy](#). The Board will draw on this work and the submissions that have been made which are in the public domain.

Challenges that the Plan will address

The Board has identified six Strategic Challenges to achieve the Plan's vision:

- Moving more firms, in more sectors, closer to the innovation frontier
- Moving and keeping Government closer to the innovative frontier
- Delivering high-quality and relevant education and skills development for Australians throughout their lives
- Maximising the engagement of our world class research system with end users
- Maximising advantage from international knowledge, talent and capital
- High Impact, large scale initiatives to stimulate system innovation

5. Expert Opinion Survey

