
The Parliament of the Commonwealth of Australia

Inquiry into Australia's Future in Research and Innovation

Joint Select Committee on Trade and Investment Growth

May 2016
Canberra

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Chair's Foreword

Australia faces a world of rapid change as technology creates new products, new processes, and new industries. New innovative companies are expected to significantly contribute to Australia's economy and assist in its diversification, increasing employment and improving its global competitiveness.

Australia has a well-educated population, world-leading universities and research organisations generating new knowledge and inventions, coupled with a stable business environment providing opportunities for small and large companies.

The foundations of Australia's innovation system are strong and yet our record of building on these foundations has been mixed. Australia's efficiency in translating investments in the research sector into outcomes that have tangible social and economic benefit could be improved.

Australia's level of research collaboration between universities and business is amongst the lowest in the OECD. An avenue of opportunity for improvement is the exchange of knowledge and meaningful information between business and the research sector.

Increased collaboration could assist businesses develop novel solutions to the real-world problems they are facing. Collaborative research is also key to developing the disruptive, new-to-the-world technologies that could form the basis of significant new companies and industries.

Although growing, Australia's venture capital market is still small by global standards. Innovative ideas are the fuel for new and improved goods and services, but their development requires capital investment. As a venture capitalist remarked to the Committee, 'the idea cannot come to fruition without the capital, and capital, without an idea, is useless.'¹

Through this inquiry the Committee has examined Australia's innovation system from the creation of ideas through research and innovative thinking, through to the commercialisation of these ideas.

¹ Mr Danny Gilligan, Cofounder and Managing Director, Reinventure, *Official Committee Hansard*, Sydney, 9 March 2016, p. 4.

The recently released National Innovation and Science Agenda (NISA) has been largely welcomed by both the public and private sectors. The NISA contains a suite of measures aimed at positioning Australia as ‘a leading innovator; open to adapting and evolving to improve the wellbeing and quality of life for all Australians.’

The Committee has recommended the identification of potential new innovation industries, and a review of overseas commercialisation assistance models to inform additional ways of encouraging the commercialisation of Australian innovation. The Committee has also recommended a timely review of the NISA initiatives, and careful examination of the possible measures designed to encourage the innovation sector.

I would like to thank all the individuals, business organisations and government agencies who assisted the Committee by providing useful and insightful information to the inquiry. I would also like to acknowledge the contribution of Committee members and thank them for their work throughout the 44th Parliament.

Mr Ken O’Dowd MP
Chair



Membership of the Committee

Chair Mr Kenneth (Ken) O'Dowd MP

Deputy Chair Mr Patrick (Pat) Conroy MP

Members Hon Bruce Billson MP (From 22.02.16)

Mr Clive Palmer MP

Senator Joseph (Joe) Bullock (Until
13.04.16)

Mr Antony (Tony) Pasin MP

Ms Terri Butler MP

Senator Dean Smith

Senator the Hon Joseph Ludwig
(From 18.04.16)

Senator Zhenya Wang

Senator the Hon Ian Macdonald

Participating Members

Senator Christopher (Chris) Back

Senator Jenny McAllister

Senator Cory Bernadi

Senator Anne McEwen

Senator Catryna Bilyk

Senator James McGrath

Senator Carol Brown

Senator Bridget McKenzie

Senator David Bushby

Senator Claire Moore

Senator the Hon Doug Cameron

Senator Ricky Muir

Senator Matthew Canavan

Senator Barry O'Sullivan

Senator the Hon Kim Carr

Senator James Paterson (From 16.03.16)

Senator the Hon Jacinta Collins

Senator Nova Peris

Senator the Hon Stephen Conroy

Senator Helen Polley

Senator Sam Dastyari

Senator Linda Reynolds

Senator Sean Edwards

Senator David Fawcett

Senator Katy Gallagher

Senator the Hon Bill Heffernan

Senator Sue Lines

Senator the Hon Joseph Ludwig

(Until 18.04.16)

Senator Gavin Marshall

Senator Anne Ruston

Senator Zed Seselja

Senator the Hon Lisa Singh

Senator Glenn Sterle

Senator Anne Urquhart

Senator John Williams

Senator the Hon Penny Wong

Committee Secretariat

Secretary Ms Stephanie Mikac

Inquiry Secretary Dr John Carter

Senior Research Officer Mr Tim Brennan

Administrative Officers Ms Carissa Skinner



Terms of **R**eference

The Joint Select Committee on Trade and Investment Growth was established to inquire into and report on any measures to further boost Australia's trade and investment performance, including, but not limited to: barriers to trade; reduction of red tape and structural challenges; and opportunities for the Australian community.

As part of its remit, the Committee will investigate how the research and innovation sector can better assist in overcoming Australia's geographic, economic and labour challenges, with a focus on commercialisation including, how technology imports and exports could be further facilitated.



Abbreviations

AAH	Australian Academy of Humanities
AAS	Australian Academy of Science
ACCI	Australian Chamber of Commerce and Industry
AIG	Australian Industry Group
AIMI	Australian Innovation and Manufacturing Incentive
AMT	Advanced Manufacturing Tax
AMWU	Australian Manufacturing Workers' Union
ANSTO	Australian Nuclear Science and Technology Organisation
ARC	Australian Research Council
ATN	Australian Technology Network
CADET	Centre for Advanced Design in Engineering Training
CSEF	Crowd-Sourced Equity Funding
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DET	Department of Education and Training
DFAT	Department of Foreign Affairs and Trade
DIIS	Department of Industry, Innovation and Science
ECA	Export Council of Australia
ERA	Excellence in Research for Australia
ESVCLP	Early Stage Venture Capital Limited Partnership

GDP	Gross Domestic Product
GFC	Global Financial Crisis
GII	Global Innovation Index
GMC	Geelong Manufacturing Council
IIP	Industry Innovation Program
IP	Intellectual Property
ISA	Innovation and Science Australia
MFC	Manufacturing Finance Corporation
MP	Member of Parliament
NHMRC	National Health and Medical Research Council
NISA	National Innovation and Science Agenda
OECD	Organization for Economic Cooperation and Development
PIV	Premium Investor Visa
OPAL	Open Pool Australian Lightwater
R&D	Research and Development
SIV	Significant Investor Visa
SME	Small to Medium-Sized Enterprise
STEM	Science, Technology, Engineering and Mathematics
TAFE	Technical and Further Education
UK	United Kingdom of Great Britain
US	United States
USA	United States of America
UTAS	University of Tasmania
UTS	University of Technology Sydney

VCPE	Venture Capital or Private Equity
VC	Venture Capitalist
WIPO	World Intellectual Property Organisation
WSU	Western Sydney University



Recommendations

2 The Foundations of Innovation: Education and Research

Recommendation 1

The Committee recommends that Innovation and Science Australia identify emerging industries where strategic research investment could enable Australia to become a world leader.

Recommendation 2

The Committee recommends that the Department of Education and Training review overseas models of university-business collaboration with a view to identifying strategies which could be introduced in Australia.

3 Nurturing Innovation

Recommendation 3

The Committee recommends that the initiatives introduced as part of the National Innovation and Science Agenda be reviewed after three years of operation to determine their effectiveness and whether the programs should be expanded.

Recommendation 4

The Committee recommends that the Treasury undertake a close examination of a patent box scheme. If a patent box is introduced, it should be subject to a sunset clause after three years of operation. A review should be undertaken to determine the effectiveness of the patent box scheme and whether it should be extended and for how long.

Recommendation 5

The Committee recommends that the Treasury undertake a close examination of the proposal for a Manufacturing Finance Corporation. Should such a corporation be established, it should be reviewed after a period of five years to determine its effectiveness.

Recommendation 6

The Committee recommends that the Treasury undertake a close examination of the proposal for an Advanced Manufacturing Tax. Should such a tax be introduced, it should be subject to a sunset clause at which point a review should be undertaken to determine its effectiveness and whether it should be continued.

Introduction

Background

- 1.1 On 7 December 2015, the Australian Government released the National Innovation and Science Agenda (NISA).¹ Through the \$1.1 billion NISA², the Government has aimed to boost the level of innovation and entrepreneurship nationally and ‘help to create a modern, dynamic, 21st century economy for Australia.’³
- 1.2 The NISA package is based on the *National Innovation and Science Agenda Report* and structured on the four key areas⁴ of:
 - Culture and capital ‘to help businesses embrace risk and’ provide incentives for ‘early stage investment in [business] startups’.
 - Collaboration ‘to increase the level of engagement between businesses, universities and the research sector to commercialise ideas and solve problems.’
 - Talent and skills ‘to train Australian students for the jobs of the future and attract the world’s most innovative talent to Australia’;
 - Government as an exemplar ‘to lead by example in the way Government invests in and uses technology and data to deliver better quality services.’⁵

1 Hon Christopher Pyne MP, Minister for Industry, Innovation and Science, ‘Agenda to Transform the Australian Economy’, *Media Release*, 7 December 2015.

2 Hon Malcolm Turnbull MP, Prime Minister and the Hon Christopher Pyne MP, Minister for Industry, Innovation and Science, ‘National Innovation and Science Agenda’, *Joint Media Release*, 7 December 2016.

3 Hon Malcolm Turnbull MP, Prime Minister and the Hon Christopher Pyne MP, Minister for Industry, Innovation and Science, ‘National Innovation and Science Agenda’, *Joint Media Release*, 7 December 2016.

4 Each of these areas includes a range of specific initiatives.

- 1.3 The NISA is designed to capitalise on Australia's:
- 'Unprecedented access to the global economy' through the new free trade agreements with China, Japan and Korea; and
 - The established and internationally recognised research undertaken by universities and institutions such as the Commonwealth Scientific and Research Organisation.⁶

About the Inquiry

Objectives and Scope

- 1.4 The purpose of the Inquiry into Australia's Future in Research and Innovation was to:
- ... investigate how the research and innovation sector can better assist in overcoming Australia's geographic, economic and labour challenges, with a focus on commercialisation including how technology imports and exports could be further facilitated.⁷
- 1.5 The Committee's Inquiry is one of four current Parliamentary Committee inquiries relating to innovation in Australia. Other Parliamentary Committee inquiries underway are:
- The House of Representatives Standing Committee on Agriculture and Industry - inquiring into the role of technology in increasing agricultural productivity in Australia, including relevant emerging technology and barriers to its adoption.
 - The House of Representatives Standing Committee on Education and Employment - inquiring into how Australia's tertiary system can meet the needs of a future labour force, including the extent to which students are graduating with the skills needed for jobs, and factors that discourage close partnerships between industry, the research sector and education providers.
 - The Senate Environment and Communications References Committee - inquiring into the future of Australia's video game development industry, including how regulatory and taxation frameworks can help

5 Hon Malcolm Turnbull MP, Prime Minister and the Hon Christopher Pyne MP, 'Minister for Industry, Innovation and Science, National Innovation and Science Agenda', *Joint Media Release*, 7 December 2016.

6 Hon Malcolm Turnbull MP, Prime Minister and the Hon Christopher Pyne MP, Minister for Industry, Innovation and Science, 'National Innovation and Science Agenda', *Joint Media Release*, 7 December 2016.

7 Terms of reference to the Inquiry into Australia's Future in Research and Innovation.

the local industry to grow, and how Australia can attract videogame companies to establish themselves in Australia.

- 1.6 While the main terms of reference for each of these inquiries differs, all are centred on the theme of innovation. The evidence received during the Committee's inquiry has commonality with these inquiries and includes: the role of technology in sustaining innovation, meeting the future needs of the labour workforce in regard to training and skills development and encouraging research for the purpose of commercialisation.
- 1.7 During this inquiry, the Committee received a diverse range of evidence on how to stimulate and maintain innovation within the Australian economy. The majority of the issues raised with the Committee which address the inquiry terms of reference are included in this report.

Role of the Committee

- 1.8 The Joint Select Committee on Trade and Investment Growth (the Committee) was appointed⁸ to:
- ... inquire into and report on any measures to further boost Australia's trade and investment performance, including, but not limited to: barriers to trade, reduction of red tape and structural challenges and opportunities for the Australian community.
- 1.9 Following the receipt of wide ranging evidence⁹ to its first inquiry, on 30 September 2015, the Committee wrote to the then Minister for Trade and Investment (the Minister), the Hon Andrew Robb AO MP, seeking to extend the Committee to enable it to further investigate issues brought before it during the inquiry. In this vein, the Committee sought, (in line with its resolution of appointment), to receive Ministerial endorsement for it to undertake an Inquiry into Australia's Future in Research and Innovation.
- 1.10 On 8 October 2016, the Minister referred the Inquiry into Australia's Future in Research and Innovation to the Committee.

8 The Joint Select Committee on Trade and Investment Growth was appointed by the Senate on 4 September 2014 and the House of Representatives on 23 September 2014. Commonwealth of the Parliament of Australia, *Senate Journals No. 52*, 4 September 2014, p. 1429; Commonwealth of the Parliament of Australia, *House of Representatives Votes and Proceedings No. 67*, 23 September 2014, p. 840.

9 Formal evidence (including submissions, exhibits and transcripts of evidence of public hearings) received during the Inquiry into Business Utilisation of Australia's Free Trade Agreements.

- 1.11 On 13 October 2015, the Parliament amended the Committee's Resolution of Appointment to enable it to continue its work for the remainder of the 44th parliament.¹⁰
- 1.12 On 3 December 2015, the Committee subsequently adopted the Inquiry into Australia's Future in Research and Innovation.

Inquiry Conduct

- 1.13 Following receipt of a Ministerial reference, the Inquiry was advertised via media release with submissions to be received by 11 February 2015. The Committee also invited submissions to the Inquiry from an extensive¹¹ range of organisations, including: the ICT¹², medical and bio-technology, technology, manufacturing, university and research, finance, alternative energy and finance sectors.
- 1.14 The Committee received 62 submissions and 23 exhibits to the Inquiry, which are listed at Appendixes A and B respectively. The Committee also held six public hearings in Canberra, Melbourne, and Sydney. Witnesses who appeared before the Committee at these public hearings are listed at Appendix C.
- 1.15 Submissions and transcripts of evidence are available at: http://www.aph.gov.au/Parliamentary_Business/Committees/Joint/Trade_and_Investment_Growth/Research_and_Innovation/Public_Hearings

Report Structure

- 1.16 Chapter 2 outlines Australia's approach to innovation and its application to the education sector, particularly in the area of fostering and growing university research.
- 1.17 Chapter 3 discusses various ways to nurture innovation in Australia drawing on current global approaches to transform innovation from concept to commercialisation.

10 *Senate Journals No. 120*, 13 October 2015, p. 3234, the Parliament of the Commonwealth of Australia; *House of Representatives Votes and Proceedings No. 148*, 13 October 2015, p. 1634, the Parliament of the Commonwealth of Australia.

11 The Committee sent over 200 unsolicited letters inviting submissions.

12 Information and Communications Technology

The Foundations of Innovation: Education and Research

Australia's Innovation System

2.1 The Department of Industry, Innovation and Science (DIIS) advocated that 'innovation activities are best optimised in the context of an innovation system'.¹ An innovation system was defined by DIIS as:

... an open network of organisations to produce and use knowledge and technology to create economic and social value. It is about the way these organisations interact to generate and exploit knowledge and ideas.²

2.2 Professor Roy Green also provided a definition of an innovation system stating that it was comprised of:

... the relationships between knowledge creating organisations (principally research and education bodies), knowledge adopters (industry and the businesses that constitute it) and government (in its policy, funding, market creation and regulatory roles). Financial institutions, including venture capital investors, innovation intermediaries, professional advisers and consultants all play an important financing, enabling and integrating role.³

2.3 The Australian Academy of Science (AAS) highlighted the economic importance of a 'well-functioning innovation system with the capacity to continually produce new and improved goods and services'.⁴ The AAS

1 Department of Industry, Innovation and Science (DIIS), *Submission 31*, p. 2.

2 DIIS, *Submission 31*, p. 2.

3 Professor Roy Green, *Exhibit 5: Australia's Innovation Future: Committee Expert Consultant Report for Senate Economics References Committee's Inquiry into Australia's Innovation System*, p. 3.

4 Australian Academy of Science (AAS), *Submission 3*, p. 6.

outlined four components of an innovation system, each of which 'has different needs but is vital to the success of the whole'.⁵ The AAS described these four components as:

- a strong research sector producing important basic discoveries;
- applied scientists and engineers taking those general, basic discoveries and using them to solve specific problems in diverse disciplines;
- innovative investors, entrepreneurs and companies making connections between the fruits of research and development and opportunities in the market; and
- larger experience-rich firms providing discipline, infrastructure and networks to scale prototypes to production.⁶

2.4 The Government has identified priority areas for business innovation and development through the Industry Growth Centres and for public sector research through the National Science and Research Priorities.

2.5 The DIIS stated that the Government was investing \$248 million over four years in six Industry Growth Centres focussed on 'areas of competitive strength and strategic priority'. The Growth Centres 'will work to unlock commercial opportunities and drive innovation by building links between businesses and industry organisations and the science and research sector'.⁷ The six Industry Growth Centres are:

- Advanced Manufacturing
- Cyber Security
- Food and Agribusiness
- Medical Technologies and Pharmaceuticals
- Mining Equipment, Technology and Services
- Oil, Gas and Energy Resources.⁸

2.6 The National Science and Research Priorities (Research Priorities) were developed in consultation with the former Chief Scientist Professor Ian Chubb AC. A proportion of Australia's research investment will be aligned to the Research Priorities to help build 'critical mass and scale in areas vital to our future'.⁹ The nine Research Priorities are:

5 AAS, *Submission 3*, p. 7.

6 AAS, *Submission 3*, p. 7.

7 DIIS, *Find out about the Industry Growth Centres Initiative*, <http://www.business.gov.au/advice-and-support/IndustryGrowthCentres/Documents/IndustryGrowthCentres-Overview.pdf> Accessed 19 April 2016.

8 DIIS, *Find out about the Industry Growth Centres Initiative*, <http://www.business.gov.au/advice-and-support/IndustryGrowthCentres/Documents/IndustryGrowthCentres-Overview.pdf> Accessed 19 April 2016.

9 The Hon Tony Abbott MP, Prime Minister and the Hon Christopher Pyne MP, Minister for Education and Training, 'National Science and Research Priorities', *Joint Media Release*, 26 May 2015.

- Food
- Soil and Water
- Transport
- Cybersecurity
- Energy
- Resources
- Advanced Manufacturing
- Environmental Change
- Health.¹⁰

2.7 The Australian Government budgeted expenditure on science, research and innovation was \$9.7 billion for 2015-16. This funding was comprised of:

- \$3.2 billion in support for the business sector (predominantly through the R&D Tax Incentive);
- \$2.8 billion in support for the Higher Education sector (primarily through university block research funding and Australian Research Council grants);
- \$1.9 billion for 'multi-sector' funding for large grant schemes such as the National Health and Medical Research Council (NHMRC) and the Rural Research and Development Corporations; and
- \$1.8 billion for government research activities such as the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the Defence Science and Technology Organisation.¹¹

Performance of Australia's Innovation System

2.8 The performance and strength of an innovation system is based on the dynamic interaction of a wide range of separate components. The Global Innovation Index (GII) is a widely recognised measure that attempts to 'capture the multi-dimensional facets of innovation' in order to provide an overall synthesis of the performance of national innovation systems.¹²

10 Australian Government, Science and Research Priorities, http://www.science.gov.au/scienceGov/ScienceAndResearchPriorities/Documents/15-49912%20Fact%20sheet%20for%20with%20National%20Science%20and%20Research%20Priorities_4.pdf Accessed 19 April 2016.

11 DIIS, *Submission 31*, p. 4.

12 Cornell University, INSEAD, and WIPO, *The Global Innovation Index 2015: Effective Innovation Policies for Development*, p. 419.

- 2.9 Australia ranked 17th in the 2015 GII.¹³ While Australia ranked relatively highly the CSIRO highlighted that Australia compares 'poorly' with its 12th world ranking 'for nominal Gross Domestic Product (GDP).'¹⁴
- 2.10 In 2013-14 Australia's gross spending on research and development (R&D) (which includes government, business, and university spending) was \$33.5 billion which amounts to 2.12 per cent of Australia's GDP.¹⁵ This puts Australia's R&D spending¹⁶ above the Organisation for Economic Co-operation and Development (OECD) average of 2.02 per cent.¹⁷ As the CSIRO highlighted, however, 'countries with strong international reputations for innovation... spend a minimum of 3 per cent of GDP on R&D per annum.'¹⁸
- 2.11 Australian business spent \$18.8 billion on R&D in 2013-14, which amounted to 1.19 per cent of Australia's GDP. In the same period, Australia's higher education sector spent \$9.6 billion on R&D, which amounted to 0.63 per cent of Australia's GDP.¹⁹ As a percentage of GDP, Australia's R&D spending by business and the higher education sector ranked 15th and 8th, respectively, amongst the 34 OECD+²⁰ countries surveyed.²¹
- 2.12 In 2015, Australia ranked 10th for Innovation Input²² but 24th for Innovation Output.²³ Australia was ranked 72nd for Innovation Efficiency, or the ability to translate inputs into outputs.²⁴ The CSIRO stated that Australia's low efficiency ranking 'reflects Australia's weakness in commercialising and exporting the innovations Australia creates into new market-ready products and services'.²⁵

13 Out of 141 countries. Cornell University, INSEAD, and WIPO, *The Global Innovation Index 2015: Effective Innovation Policies for Development*, p. 167.

14 CSIRO, *Submission 43*, p. 4.

15 DIIS, *Australian Innovation System Report 2015*, p. 123.

16 As a percentage of GDP.

17 This is the average for the OECD+ which includes all the countries of the OECD as well as China, Taiwan and Singapore.

18 CSIRO, *Submission 43*, p. 7.

19 DIIS, *Australian Innovation System Report 2015*, pp 109, 110, and 123.

20 The OECD+ includes all the countries of the OECD as well as China, Taiwan and Singapore.

21 DIIS, *Australian Innovation System Report 2015*, pp 110, and 123.

22 The GII rating for Innovation Inputs is based on rating a country's performance across the five criteria of: institutions, human capital and research, infrastructure, market sophistication, and business sophistication.

23 The GII rating for Innovation Output is based on rating a country's performance across the two criteria of: knowledge and technology outputs, and creative outputs.

24 Cornell University, INSEAD, and WIPO, *The Global Innovation Index 2015: Effective Innovation Policies for Development*, p. 167.

25 CSIRO, *Submission 43*, p. 4.

- 2.13 The Chief Scientist for Australia (Chief Scientist) highlighted Australia's weakness in transforming research into economic benefit and stated:
- ... the imbalance in the entrepreneurial pipeline from R&D to economic output is a significant barrier to Australia's growth as an innovator, and will need to be addressed if Australia is to develop its knowledge economy.²⁶
- 2.14 Sendle conceptualised innovation systems as comprising 'stocks and flows' and contended that Australia had strong stocks but weak flows. Sendle stated:
- ... if you look at the innovation system in Australia, there are two things that matter in it: stocks and flows. Our stocks in the innovation system are our bodies of knowledge. They are our people. They are the universities, the CSIROs and others. The thing about Australia is that we actually have pretty good stocks for our size on the world stage. Our stocks are good, but the other [way] you can measure the innovation system is by the flows: how much knowledge is being transferred between these organisations – from the public service to the private sector; how often is knowledge going through; what are our flows like between Australia and the rest of the world? And, if there is one area where I think we need to lift our game internationally, it is the flows within the innovation system.²⁷
- 2.15 One of the strengths of Australia's innovation system is its strong research sector. Australia accounts for 3.71 per cent of the world's publications and 6.9 per cent of the world's one per cent most highly cited publications.²⁸
- 2.16 The Department of Education and Training (DET) stated that human capital is 'a critical element in fostering and driving innovation'²⁹. Australia has a relatively well educated population by OECD standards. The DIIS stated that in 2013, 39.5 per cent of Australians aged 25 to 64 had attained tertiary education above the OECD+ average of 33 per cent.³⁰ The DET also reported that 'since the early 1990s' the proportion of '20 to 64 years olds who hold a bachelor level qualification or higher increased three-fold, from around 10 per cent to 29 per cent.'³¹

26 Chief Scientist for Australia (Chief Scientist), *Submission 49*, p. 2.

27 Dr James Chin Moody, Chief Executive Officer, Sendle, *Official Committee Hansard*, Sydney, 9 March 2016, p. 15.

28 University of Tasmania (UTAS), *Submission 34*, p. 1.

29 Department of Education and Training (DET), *Submission 40*, p. 5.

30 DIIS, *Australian Innovation System Report 2015*, p. 121.

31 DET, *Submission 40*, p. 5.

- 2.17 Universities Australia described Australia's cutting edge innovation and 'levels of research and development in our innovative firms' as 'underwhelming'.³² Universities Australia explained that:

The percentage of innovative firms in the manufacturing and services sectors that undertake R&D, either internally or with a partner, is the lowest and second lowest respectively in the OECD. In addition, only 9.3 per cent of large firms in Australia (27 of 28 OECD countries) and 9.2 per cent of SMEs (21 of 28) introduced products new to the market in the period 2010 to 2012.³³

- 2.18 The University of Tasmania (UTAS) suggested that Australia's lack of corporate R&D facilities meant that universities had a greater responsibility to engage in knowledge diffusion. The UTAS stated:

In considering mechanisms to promote innovation linkages it must be noted that Australia does not have the large corporate R&D base present in much of the US, UK, Europe and East Asia. This lack of technology-receptive avenues (ready to absorb and use knowledge produced in Australia's universities) necessitates a different knowledge diffusion and innovation model for Australia's circumstances. An Australian innovation model must address this difference and recognise that universities must take on more of the "heavy lifting" in the knowledge diffusion process.³⁴

Role of Innovation and Science Australia

- 2.19 As part of the NISA package the Government announced the creation of a new independent statutory body, Innovation and Science Australia (ISA), with responsibility for 'strategic whole of government advice on all science, research and innovation matters'.³⁵ The Government's investments in research and innovation are spread across 15 portfolios and ISA will assist with 'coordination of data and advice' to evaluate these measures and plan future innovation investments.³⁶

32 Universities Australia, *Submission 27*, p. 3.

33 Universities Australia, *Submission 27*, p. 3.

34 UTAS, *Submission 34*, pp 1-2.

35 Australian Government, *National Innovation and Science Agenda: Innovation and Science Australia*, <http://www.innovation.gov.au/page/innovation-and-science-australia> Accessed 19 April 2016.

36 NISA, *Factsheet 25, Innovation and Science Australia*.

- 2.20 The ISA will replace Innovation Australia but will have ‘broader functions than its predecessor’.³⁷ The ISA’s board will be ‘chaired by the current Innovation Australia Board Chair Mr Bill Ferris AC and Australia’s Chief Scientist will serve as Deputy Chair’.³⁸ The ISA is due to commence on 1 July 2016.³⁹
- 2.21 The incoming Chair of the ISA stated that among the first tasks undertaken by ISA will be ‘mapping the extant programs, state and federal – who is doing what’.⁴⁰ The Chief Scientist reported that following the assessment of existing programs the ISA will develop a ‘national strategy plan for science, research and innovation to cover a 15-year period’.⁴¹

Emerging Opportunities

- 2.22 Several universities believed that Australia had an opportunity to improve its research and innovation performance by focusing research on areas where Australia had a strong chance of developing world-leading research and innovation. The Australian Technology Network stated that universities should collaborate on ‘genuine areas of excellence’ to address ‘grand challenges for individual industry sectors’ and that this would ‘strengthen Australia’s global competitiveness’.⁴²
- 2.23 La Trobe University called for ‘prioritising government investment in industry sectors with high growth potential that align with historic areas of competitive advantage’.⁴³ La Trobe University added that the Industry Growth Centres and the National Science and Research Priorities should form a focus for future investment.⁴⁴
- 2.24 Sendle also emphasised the importance of aligning research investment to Australia’s competitive advantage, stating:

Where does Australia want to make its mark internationally? Where are we aligning great competitive advantage – national competitive

37 Australian Government, *National Innovation and Science Agenda: Innovation and Science Australia*, <http://www.innovation.gov.au/page/innovation-and-science-australia> Accessed 19 April 2016.

38 DIIS, *Innovation and Science Australia*, <http://www.industry.gov.au/Innovation-and-Science-Australia/Pages/default.aspx> Accessed 19 April 2016.

39 DIIS, *Innovation and Science Australia*, <http://www.industry.gov.au/Innovation-and-Science-Australia/Pages/default.aspx> Accessed 19 April 2016.

40 Mr William Ferris, Chair, Innovation and Science Australia (ISA), DIIS, *Official Committee Hansard*, Canberra, 3 March 2016, p. 11.

41 Dr Alan Finkel, Chief Scientist, *Official Committee Hansard*, Canberra, 3 March 2016, p. 2.

42 Australian Technology Network, *Submission 46*, p. 1.

43 La Trobe University, *Submission 39*, p. 2.

44 La Trobe University, *Submission 39*, p. 2.

advantage – with global megatrends? ... If we can match them up we can confidentially start to stick some stakes in the ground and say, 'Yes, this is an area that we actually want to start focusing on as a country.'⁴⁵

Education — An Innovation Approach to Skills and Training

Role of Universities and TAFES

- 2.25 Universities Australia advised that the economy is estimated in 2025 to require 'approximately 2.1 million more university graduates than it needed in 2015' which was equal to a 30 per cent demand growth. Skilled graduates would be required in 'education and training; healthcare and social assistance; professional, scientific and technical services; public administration and safety; and financial and insurance services.'⁴⁶
- 2.26 Universities Australia added that international students currently helped to fill skills gaps in Australia's workforce. For example, former international students made up 'around one third of the skilled migrants to Australia in 2013–14.'⁴⁷
- 2.27 Curtin University advised that the education 'trade' was one of Australia's top four export industries and was worth \$18 billion in 2014–15. In addition, the direct and indirect revenue from international students was \$140 billion for the same year. Curtin University added that 'major changes in policy settings on international education' in the last decade had diminished opportunities and allowed offshore competitor institutions to gain a greater market share. Further, while the market had recovered in the last three years, more needed to be done.⁴⁸
- 2.28 Universities Australia stated that in 2014 university research had generated knowledge with an estimated value of \$160 billion, 'equivalent to almost 10 per cent of Australia's gross domestic product.'⁴⁹
- 2.29 The UTAS, however, reported that while Australia ranked well on the Global Innovation Index for innovation inputs,⁵⁰ it ranked much lower for innovation results.⁵¹

45 Dr James Chin Moody, Sendle, *Official Committee Hansard*, Sydney, 9 March 2015, p. 16.

46 Universities Australia, *Submission 27*, p. 5.

47 Universities Australia, *Submission 27*, p. 6.

48 Curtin University, *Submission 20*, p. 2.

49 Universities Australia, *Submission 27*, p. 1.

50 7th globally on tertiary education, 8th on R&D, 9th on general infrastructure.

- 2.30 La Trobe University drew attention to the level of funding per student which had remained flat in real terms over 20 years and had constrained ‘the degree to which universities balance high quality teaching and research with greater access.’ La Trobe University acknowledged the need for budget repair, but stated:
- ... maintaining insufficient rates per student funding undermines the role of higher education plays in skills development, research and innovation.⁵²
- 2.31 TAFE Directors Australia commented that about 3.4 million people were enrolled in the vocational education sector⁵³ and this was ‘probably three times larger than the university sector’. TAFEs enrolled about 1.6 million students a year including about 40 000 Chinese students.⁵⁴ TAFE Directors Australia also stated that course completions for TAFE students had increased in contrast to the overall trend for the vocational education sector. Ninety per cent of those who completed a TAFE course obtained employment because job experience was a component of TAFE courses.⁵⁵
- 2.32 TAFE Directors Australia drew attention to the links between TAFE institutions and universities. Universities, particularly in regional areas, positioned their products or programs as a follow on from TAFE. For example, ‘up to a third or more’ of Charles Sturt University’s graduate intake was from TAFE.⁵⁶

STEM Education

- 2.33 The Chief Scientist stated that the ability to deliver on the innovation agenda will always depend on having a highly skilled workforce. ‘Young people and young adults [needed] to be deeply skilled and have disciplined knowledge.’ The Chief Scientist, however, had ‘serious concerns’ about the diminishing capacity to provide the appropriate training. Not only was this becoming apparent in schools but ‘also becoming significant in universities’.⁵⁷

51 26th for knowledge creation, 42nd for innovation linkages, 48th for knowledge absorption, 78th for knowledge diffusion. UTAS, *Submission 34*, p. 1.

52 La Trobe University, *Submission 39*, p. 3.

53 Mr Martin Riordan, Chief Executive Officer, TAFE Directors Australia, *Official Committee Hansard*, Sydney, 8 March 2016, p. 36.

54 Mr Martin Riordan, TAFE Directors Australia, *Official Committee Hansard*, Sydney, 8 March 2016, p. 34.

55 Mr Martin Riordan, TAFE Directors Australia, *Official Committee Hansard*, Sydney, 8 March 2016, p. 36.

56 Mr Martin Riordan, TAFE Directors Australia, *Official Committee Hansard*, Sydney, 8 March 2016, p. 37.

57 Dr Alan Finkel, Chief Scientist, *Official Committee Hansard*, Canberra, 3 March 2016, p. 1.

- 2.34 The problem was most apparent in the lower secondary schools where there were 'recognised problems, especially in the STEM disciplines'. This was:
- ...due to too many teachers teaching out of field. That [was] either because they did not have a specialty to start with, because they have done an undergraduate education degree with no actual emphasis on specialisation, or because the school happens to be under pressure and is putting teachers into teaching maths in the lower secondary who are just were not trained at that. The problem is not very common in the upper secondary. The schools do tend to get skilled teachers into the upper secondary ...⁵⁸
- 2.35 A report prepared for the Australian Council of Learned Academies stated that Australia has high levels of participation in STEM subjects at the year 12 level (72 per cent maths, 52 per cent science).⁵⁹ At tertiary level, however, STEM student enrolments are comparatively low, particularly in engineering and mathematics.⁶⁰ Tertiary enrolments in information technology declined by 50 per cent between 2002 and 2010 but have risen slightly since.⁶¹
- 2.36 This has followed through to Australia's research capability which, the CSIRO stated, was very strong in a number of scientific disciplines, but was 'well below average' in a number of STEM disciplines such as engineering, physics, chemistry, materials science, and mathematics.⁶² There was also a gender imbalance in the STEM fields.
- 2.37 The DIIS commented that a cultural change was necessary to achieve gender balance in STEM disciplines and stated:
- ... women make up 55 per cent of STEM graduates but only one in four information technology graduates and less than one in 10 engineering graduates. They occupy fewer than one in five senior research positions in Australian universities and make up around a quarter of the STEM workforce overall.⁶³

58 Dr Alan Finkel, Chief Scientist, *Official Committee Hansard*, Canberra, 3 March 2016, p. 3.

59 Marginson, S, Tytler, R, Freeman, B and Roberts, K, *STEM: Country comparisons*. Report for the Australian Council of Learned Academies, 2013, p. 61

60 Marginson, S, Tytler, R, Freeman, B and Roberts, K, *STEM: Country comparisons*. Report for the Australian Council of Learned Academies, 2013, p. 61

61 Bell, J, Frater, B, Butterfield, L, Cunningham, S, Dodgson, M, Fox, K, Spurling, T, and Webster, E, *The role of science, research and technology in lifting Australian productivity*, Australian Council of learned Academies, 2014, p. 94.

62 Mr Craig Rawley, Deputy Chief Executive, CSIRO, *Official Committee Hansard*, Canberra, 3 March 2016, p. 12.

63 Mrs Jane Urquhart, Head, Science and Commercialisation Policy Division, DIIS, *Official Committee Hansard*, Canberra, 25 February 2016, p. 7.

- 2.38 The NISA includes an initiative aimed at inspiring Australians, ‘from pre-schoolers to the broader community’ to engage with ‘STEM in society and participate in further study.’ The measures include:
- expanding the Prime Minister’s Prizes for Science;
 - supporting students to participate in international STEM-based competitions and hosting the 2019 Asian Physics Olympiad;
 - developing ‘play-based learning apps and science and mathematics resources for early childhood educators’; and
 - ‘expanding community engagement, including Inspiring Australia and citizen science projects.’⁶⁴
- 2.39 The NISA also includes an initiative to ‘encourage more women to embark on, and remain in,’ STEM related careers. The initiative includes:
- expanding the Science in Australia Gender Equity pilot;
 - establishing a new initiative to focus on STEM-based and entrepreneurial industries; and
 - partnering with the private sector on initiatives to promote female STEM role models and foster interest in STEM.⁶⁵
- 2.40 The University of Technology Sydney stated that expanding a STEM-skilled workforce was only part of the solution. Other ‘boundary crossing skills’ were needed such as creativity and problem solving.⁶⁶ Cloud Insurance P/L commented that an emphasis on STEM programs and young people, missed ‘a whole populace of 50-plus who have gone through maybe different machinations of technology and systems in their lifetimes that will play a vital role in our economy’s future.’ Encouraging workers over the age of 50 back into the workforce would bring experience of due diligence processes and financial services to the FinTech sector.⁶⁷

Other Innovation Skills

- 2.41 The University of South Australia reported that innovative research often challenges academic discipline boundaries stating ‘disruptive innovation, which can include transformational technologies, are often derived from

64 NISA, *Factsheet 18, Inspiring a Nation of Scientists*.

65 NISA, *Factsheet 20, Expanding Opportunities for Women in Science, Technology, Engineering and Mathematics*.

66 Professor Roy Green, Dean, UTS Business School, University of Technology Sydney, *Official Committee Hansard*, Sydney, 9 March 2016, p. 29.

67 Ms Joanne Cooper, Director, Cloud Insurance P/L, *Official Committee Hansard*, Sydney, 8 March 2016, p. 41.

research occurring at the boundaries of individual disciplines'.⁶⁸ In a similar vein, the University of Wollongong emphasised the importance of interdisciplinary research, which it had supported from its 'very earliest days', stating:

This is in recognition of the fact that, in the modern era, we must be interdisciplinary if we are to find solutions to modern problems. In the same way that problems tend to occur at the intersection of disciplines, their solutions can be found there too.⁶⁹

- 2.42 The Australian Academy of Humanities (AAH) emphasised that 'in a global age, innovation will be underpinned by language proficiency and inter-cultural competence. These knowledge sets and skills must be recognised as core competencies of the innovation system.'⁷⁰ The AAH also stated that the humanities, arts and social sciences have 'a massive contribution to make to an ideas-driven agenda for Australian innovation' and that Australia's innovation system will require 'workforces that encourage the dynamic interaction of technical and non-technical skills.'⁷¹
- 2.43 The Chief Scientist stated that 'STEM R&D is necessary but not sufficient to grow a strong knowledge economy; an entrepreneurial mindset is required to utilise STEM knowledge for innovation.'⁷² The Chief Scientist further stated that 'entrepreneurship has been part of university education in the USA for over three decades' but that, by contrast, 'Australian universities do not place a priority on teaching high-impact entrepreneurship, and there are no funding incentives to engage in entrepreneurial behaviour or teaching'.⁷³

Early Stage Research

Funding Public Sector Research

- 2.44 The DET described Australia's current system of research funding through the Australian Research Council (ARC). The National Competitive Grants Program supported both basic research as well as applied research and sought to balance the research to:

68 University of South Australia, *Submission 9*, p. 3.

69 Mr Paul Scully, Chief Operating Officer, Australian Institute for Innovative Materials, University of Wollongong, *Official Committee Hansard*, Sydney, 9 March 2016, p. 9.

70 Australian Academy of the Humanities, *Submission 33*, p. 3.

71 Australian Academy of the Humanities, *Submission 33*, p. 3.

72 Chief Scientist, *Submission 49*, p. 3.

73 Chief Scientist, *Submission 49*, p. 3.

... find the big discoveries of today that will help to make our industries innovative and more competitive now but also research which will benefit our community, environment and industries in the years to come.⁷⁴

- 2.45 Block grants, which are not tied to specific projects, are provided to universities allocated on a competitive peer review process. The DET advised that new arrangements would be introduced for 2017 which would 'boost reward for industry and other end-user engagement, giving it equal emphasis to research quality.'⁷⁵ The new arrangements are part of the NISA.⁷⁶
- 2.46 The ARC also funds Linkage Projects which are used for solving problems that 'help generate more products and services for Australia's economic, commercial and social benefit.'⁷⁷
- 2.47 The University of Melbourne commented that the block grant funding scheme would specifically reward collaboration with industry, but suggested that international experience had shown that a dedicated funding stream could also act as an effective stimulant for collaboration. The University of Melbourne recommended that this new third stream of funding be introduced, but that it should not come at the expense of the value of current block grants.⁷⁸
- 2.48 Curtin University was concerned that the continual changes to programs designed to assist commercialisation and a low funding commitment to those programs had limited their effectiveness.⁷⁹ The University of South Australia was similarly concerned.⁸⁰
- 2.49 The Australian Nuclear Science and Technology Organisation (ANSTO) reported that it was 'not eligible to directly apply for linkage grants from the ARC (and the NHMRC). If this was changed ANSTO could extend and better support industry'.⁸¹
- 2.50 The increased focus on commercialisation in the NISA was welcomed by the University of Melbourne. The University, however, advocated for complementary actions to address the early stages of the translation of ideas to commercialisation:

74 DET, *Submission 40*, p. 8.

75 DET, *Submission 40*, p. 8.

76 NISA, *Factsheet 11, Driving Greater Collaboration through University Research Block Grants*.

77 DET, *Submission 40*, p. 9.

78 University of Melbourne, *Submission 41*, pp 16, 17.

79 Curtin University, *Submission 20*, p. 6.

80 University of South Australia, *Submission 9*, p. 3.

81 Australian Nuclear Science and Technology Organisation, *Submission 7*, p. 6.

Provision of support at the very early stage is critical to building a flowing source of potential commercialisation ventures that can go on to bid for seed and venture capital funding.

The translation gap will *not* be filled by the market as the nature of the endeavour means that most of these opportunities will never make a commercial return.⁸²

2.51 The University of Newcastle stated that while the NHMRC provided proof-of-concept funding for health and medical research there was no similar scheme under the ARC. The lack of proof-of-concept funding made it difficult to progress research outcomes to a commercialisation stage.⁸³

2.52 Sendle categorised research into Horizon 1, 2, and 3 research and suggested that Australia was not undertaking enough Horizon 2 research. Sendle stated:

Horizon 1 is where you have known knowledge and known application. Horizon 2 is known application but unknown knowledge – that is where we know the problem and we need to do research. That is often where a CSIRO or others fit in. Horizon 3 is unknown knowledge and unknown application – that is what is sometimes called ‘basic research’... I think we probably need a bit more balance in horizon 2... I think a good innovation system is a bit of a normal curve around horizon 2... my big questions would be around ARC [is] ‘are we getting that balance right?’⁸⁴

2.53 Industry funding for university research totalled \$1.59 billion for the three years 2008 to 2010. Medical and Health Sciences received 44 per cent of this funding (\$700 million), with Engineering (\$220 million) and Biological Sciences also receiving significant shares (\$150 million).⁸⁵ Explaining the proportion of funding going to Medical research, Professor Roy Green stated that:

The concentration of funding in the medical and health sciences reflects the strong and continuous investments over many decades in basic, or fundamental research through the NHMRC, State governments, philanthropy and other sources. It has built up a

82 University of Melbourne, *Submission 41*, p. 13.

83 University of Newcastle, *Submission 10*, p. 8.

84 Dr James Chin Moody, Sendle, *Official Committee Hansard*, Sydney, 9 March 2016, p. 16.

85 Professor Roy Green, *Exhibit 5: Australia's Innovation Future: Committee Expert Consultant Report for Senate Economics References Committee's Inquiry into Australia's Innovation System*, p. 25.

world-class capability that is of interest to the health and medical industry.⁸⁶

National Health and Medical Research Council Development Grants

2.54 The NHMRC stated that its Development Grants were specifically designed to support ‘proof-of-principle or pre-seed research to help bring discoveries to the point where they can attract commercial funding.’⁸⁷ The Development Grants scheme:

... supports the commercial development of a product, process, procedure or service that if applied, would result in improved health care, disease prevention or provide health cost savings.

Research supported by this scheme must have experimental data that supports a demonstrated proof of principle or pre-seed concept and have a detailed feasible commercialisation strategy that takes into account the regulatory pathway, protectable IP, commercial barriers and potential routes to market.⁸⁸

2.55 The NHMRC stated that the grants were attempting to bridge ‘at least the first part of the so-called ‘valley of death’⁸⁹ before venture capital funding and other sources of commercial funding can take over.’⁹⁰

Biomedical Translation Fund

2.56 The Biomedical Translation Fund will be managed by an ‘independent body that will invest in promising biomedical discoveries and assist in their commercialisation.’ The Biomedical Translation Fund will draw on private sector fund managers who ‘will bring at least matching funding’. The \$250 million fund will be ‘funded by reducing the capital

86 Professor Roy Green, *Exhibit 5: Australia's Innovation Future: Committee Expert Consultant Report for Senate Economics References Committee's Inquiry into Australia's Innovation System*, p. 25.

87 Professor Anne Kelso AO, Chief Executive Officer, National Health and Medical Research Council (NHMRC) *Official Committee Hansard*, Canberra, 17 March 2016, p. 1.

88 NHMRC, *Development Grants*, <https://www.nhmrc.gov.au/grants-funding/apply-funding/development-grants> Accessed 12 April 2016

89 The ‘valley of death’ is a period in the development of an innovation where the innovator faces significant costs but minimal opportunities to earn revenue. The CSIRO explained that ‘the Valley of Death is identified as a phase of commercialisation before ‘success as a business’ where there is little to no income and a large outgoing cash flow. Often this phase is after a period where there has already been significant investment in R&D and resources may be depleted.’ CSIRO, *Submission 43*, p. 6.

90 Professor Anne Kelso AO, *Official Committee Hansard*, Canberra, 17 March 2016, p. 1.

contributions to the Medical Research Future Fund' and will be 'fully capitalised by 2019–20.'⁹¹

- 2.57 The ISA observed that having 'private sector funds managers with experience and scar tissue in backing medical discoveries and commercialising them' will be attractive to small business and their boards.⁹²
- 2.58 CSL Ltd supported the Biomedical Translation Fund and advised that it had formally submitted to the Government that 20 percent of the Medical Research Future Fund be directed towards such translational research when the future fund was fully operational because it was 'a fundamental economic driver for the country and something that is missing at the moment.'⁹³

CSIRO Innovation Fund

- 2.59 The CSIRO Innovation Fund was established under the NISA and will include a \$200 million early stage innovation fund. This fund will 'support co-investment in new spin-off and start-up companies, products and services created by Australian research institutions.' The CSIRO Innovation Fund will be funded in part by revenue from licensing CSIRO's wireless local area network technology, and investment from the private sector. The fund will commence in 2016 with oversight from the CSIRO Board.⁹⁴

Basic Research

- 2.60 Several organisations emphasised the importance of basic (also known as pure or foundational) research in enabling the long-term development of innovation. The AAS stated that:

Basic research is the genesis of all innovation in that it is the new discoveries and leaps in understanding that provide the human and knowledge capital to drive innovative solutions to current and future challenges. Unless Australia maintains its capacity to undertake world-class basic research across diverse fields of science, there will be a diminished capacity to engage in and enjoy the benefits of innovation in the future.⁹⁵

91 NISA, *Factsheet 6, Biomedical Translation Fund*.

92 Mr William Ferris, ISA, *Official Committee Hansard*, Canberra, 3 March 2016, p. 9.

93 Dr Andrew Cuthbertson, Chief Scientific Officer and R&D Director, CSL Ltd, *Official Committee Hansard*, Melbourne, 10 March 2016, p. 8.

94 NISA, *Factsheet 5, CSIRO Innovation Fund*.

95 AAS, *Submission 3*, p. 10.

2.61 The AAS further highlighted that future commercial output is only one of the benefits that basic research provided to society and provided examples of other benefits such as:

- improvements in public health through new or improved methods of clinical practice, based on advances in biomedical knowledge;
- advances in management of land and the environment through improved knowledge of natural processes; and
- production of graduates trained in research techniques and methods, who use their skills in the public and private sectors to solve difficult problems that face the community.⁹⁶

2.62 The University of Newcastle also supported the value of basic research and emphasised its critical role in ensuring the long-term health of Australia's innovation system, and stated that:

It is vital that the importance of basic research is not ignored or downplayed. Without the underpinning activities of basic research the commercialisation processes will very quickly drain the well of innovation leaving nothing to commercialise.⁹⁷

Research Collaboration

2.63 One of the key weaknesses in the Australian innovation system is the low level of collaboration between public sector research organisations and the private sector. The *Australian Innovation System Report 2015* reported that Australian innovation-active small to medium sized enterprises (SME) ranked 24th in the OECD⁹⁸ and innovation-active large businesses, 29th in the OECD, in relation to collaborating on innovation.⁹⁹

2.64 The DIIS, emphasised the importance of collaboration between research and business and stated:

Links between research organisations and businesses are crucial in order to diffuse knowledge and commercialise research. Research collaboration is also fundamental to scientific excellence and technological breakthroughs.¹⁰⁰

96 AAS, *Submission 3*, p. 10.

97 University of Newcastle, *Submission 10*, p. 8.

98 Of 31 countries measured which included all members of the OECD as well as China, Taiwan and Singapore.

99 DIIS, *Australian Innovation System Report 2015*, p. 115.

100 DIIS, *Submission 31*, p. 2.

- 2.65 The DET also highlighted the critical importance of collaboration in yielding commercial benefits from research and supporting Australia to meet economic and social challenges, and stated that:

Greater collaboration between the research and innovation sector and industry is critical if the research and innovation taking place in Australia are to yield commercial outcomes. This is an essential step in ensuring that research and innovation support Australia to meet its current and future geographic, economic and labour challenges.¹⁰¹

- 2.66 The University of Newcastle emphasised that in knowledge based economies successful innovation systems required collaboration. The University of Newcastle stated:

In the context of a knowledge-based economy, however, the research sector cannot operate effectively in isolation. The best innovation systems are those where new industries and opportunities are delivered through collaboration across research, industry and government. Each of the key stakeholders has an important role to play in maximising Australia's strengths and driving innovation.¹⁰²

Encouraging Public Sector Demand for Collaboration

Incentives for Universities and Academics

- 2.67 One of the most significant barriers to greater collaboration between universities and industry are the metrics used to evaluate the performance of universities and their staff.
- 2.68 Victoria University explained how the Excellence in Research for Australia (ERA) program created a barrier to universities engaging with industry Victoria University explained:

... the Commonwealth's ERA initiative 'rewards' research excellence by measuring it according to traditional academic metrics, including publication in top-ranking academic journals. On the other hand, activities that have a direct impact on industry, government and community clients, especially those that provide a commercial return, do not achieve results in terms of ERA recognition. As a consequence, in the pursuit of ERA recognition,

101 DET, *Submission 40*, p. 4.

102 University of Newcastle, *Submission 10*, p. 2.

researchers avoid many forms of industry collaboration, presenting implications for and coming at a cost to innovation.¹⁰³

2.69 Australia's Chief Scientist explained that in addition to the ERA rankings, international university ranking systems also place pressure on universities and academics to prioritise publications, stating that these ranking systems are all:

... based on research excellence through publications and citations. Because Australian universities absolutely depend on international students, and because international students in coming here depend in turn on how well Australian universities are ranked internationally, there is this drive towards publications and citations. That means for an average academic that, if you take six months working with a company – even if it is well funded – you do not get any publications during those six months. That is a problem for you personally and it is a problem for your department.¹⁰⁴

2.70 Macquarie University stated that publications are 'really paramount in getting people promoted'.¹⁰⁵ Macquarie University also highlighted the 'structural promotion of publication over patenting', suggesting this was 'counterintuitive', and that there should be 'equality in recognition and reward for these activities.'¹⁰⁶

2.71 The NISA package includes two important measures which are: the changes to university research block grants, and the introduction of an impact and engagement measure. Both aim to reform financial and reputational incentives for universities and academics.¹⁰⁷

2.72 The reforms to the university research block grants will introduce new 'funding arrangements for universities that will give equal emphasis to success in industry and other end-user engagement and to research quality'.¹⁰⁸ The DET explained the significance of this change and stated:

... changes to the research block grant system have given greater weight to what we call category 2 and category 3 research income,

103 Victoria University, *Submission 19*, p. 3.

104 Dr Alan Finkel, Chief Scientist, *Official Committee Hansard*, Canberra, 3 March 2016, p. 5.

105 Professor Lesley Hughes, Pro-Vice Chancellor, Research Integrity and Development, and Distinguished Professor of Biological Sciences, Macquarie University, *Official Committee Hansard*, Sydney, 9 March 2016, p. 48.

106 Macquarie University, *Submission 18*, p. 4.

107 Ms Jessie Borthwick, Acting Deputy Secretary, Higher Education, Research and International Cluster, DET, *Official Committee Hansard*, Canberra, 25 February 2016, p. 10.

108 NISA, *Factsheet 11, Driving Greater Collaboration through University Research Block Grants*.

which is income that universities earn from other sources outside of the competitive grants system – industry-commissioned work, work for state governments and their instrumentalities and that sort of activity. The weight of that in the formulas has been evened up with the competitive funding sources, so the weighting now is fifty-fifty between those two types of money that drive the research support program, which is the main research block grant for enabling the universities to create research capacity in their institutions.¹⁰⁹

- 2.73 The Government is developing a measure of ‘non-academic impact and industry and end-user engagement’ for university research.¹¹⁰ The ARC and the DET are co-chairing two working groups developing the impact and engagement indicators.¹¹¹ The indicators will be developed, in consultation with universities, during 2016. A pilot assessment will take place in 2017 and full national assessment and reporting will begin in 2018.¹¹²
- 2.74 The DET stated that at this stage the impact and engagement measurements would be a reputational rather than financial incentive. The DET explained the rationale for not yet linking funding decisions to these measurements. The DET stated:
- At this point it is just reputational. The funding side is quite potent already. When the new impact of engagement measure was developed we foreshadowed in the innovation statement announcements that we would reconsider the funding formulas to see whether or not the new measure should be brought in. But, I have to say, it would be pretty cavalier of us to announce a new measure coming into the funding system without actually having seen that measure and how it performs over time. So, we do need to do some work to prove the measure up before attaching funding to it.¹¹³
- 2.75 The need to reform incentives so that engaging in collaborative projects with industry was not detrimental to academics’ career progression was widely supported across the university sector. For example, the University of Wollongong stated that ‘improved incentives for university researchers

109 Mr Dominic English, Group Manager, Research and Economic Group, DET, *Official Committee Hansard*, Canberra, 25 February 2016, p. 10.

110 NISA, *Factsheet 16, Measuring Impact and Engagement in University Research*.

111 Australian Research Council, Research Engagement and Impact Working Groups Announced, *Media Release*, <http://www.arc.gov.au/news-media/media-releases/research-engagement-and-impact-working-groups-announced> Accessed 19 April 2016.

112 NISA, *Factsheet 16, Measuring Impact and Engagement in University Research*.

113 Mr English, DET, *Official Committee Hansard*, Canberra, 25 February 2016, p. 11.

to engage with industry would greatly boost collaboration'.¹¹⁴ The University of Melbourne recommended Government 'support universities to create stronger internal incentives and rewards structures for academic researchers to build engagement with end-users and strengthen impact.'¹¹⁵

2.76 The AAS, however, was concerned that the development of metrics to measure research impact outlined in the NISA could result in a 'bias against basic research'. While noting that the impact metrics were yet to be developed, the AAS stated:

... it is likely to be based on existing work which uses research income as a proxy for engagement, so that engagement is only considered where money changes hands. This cannot take into account those situations where academic researchers work with other organisations collaboratively to solve problems which may not have an immediate commercial aspect. In addition, should the research engagement metric be tied to incentives, it is likely that non-commercial but publicly beneficial research would be discouraged.¹¹⁶

2.77 The AAS supported the current method of evaluating research based on the ERA framework, and stated:

The most appropriate assessment of university research is its quality. The ERA process remains the most suitable way to evaluate Australian research effort, and policy decisions should be based on these data. Importantly, the ERA is an appropriate way to assess both basic and applied research.¹¹⁷

Researcher Mobility

2.78 The CSIRO highlighted that only 30 per cent of Australia's research workforce is employed by industry, 'which is very low by OECD standards, and compares particularly poorly with innovation powerhouses US and Japan who have almost 80 per cent of their R&D workforce in industry'.¹¹⁸ The small proportion of researchers employed by industry constrains the ability of Australian business to undertake research and also limits the opportunities for business to collaborate with research organisations to commercialise research outcomes.¹¹⁹

114 University of Wollongong, *Submission 5*, p. 5.

115 University of Melbourne, *Submission 41*, p. 5.

116 AAS, *Submission 3*, p. 10.

117 AAS, *Submission 3*, p. 11.

118 CSIRO, *Submission 43*, p. 4.

119 CSIRO, *Submission 43*, p. 4.

- 2.79 The limitations created by the small proportion of researchers working in industry are exacerbated by the barriers that researchers face when considering moving between academia and industry during the course of their career.
- 2.80 The Chief Scientist compared the opportunities for academics in Australia and in the United States who spend a period of their career working in industry, the Chief Scientist stated:
- If you are a researcher at Stanford University and you want to go and spend three years with a start-up or an established company and you do well, you are welcomed back into the academic community at Stanford University three or five years later. Whereas a typical academic who does that from an Australian university would struggle to get back because they would have a gap in their publication record, which is considered to put at risk their ability to get the next grant.¹²⁰
- 2.81 Western Sydney University (WSU) supported greater mobility for researchers to move between industry and the university sector stating 'industry and university interactions should be fluid, involving not just commercial transfer but the regular exchange of people and the creation of knowledge spill-overs.'¹²¹ The WSU also provided a number of examples of measures that could increase mobility that included work integrated learning programs for undergraduates, 'industry-based sabbaticals for academics, university research placements for those working in industry, and industry co-supervision of PhD students.'¹²²
- 2.82 The concept of industry sabbaticals was also supported by the University of Wollongong which suggested the sabbaticals could involve a half-year placement with industry funded through a competitive grants process.¹²³ The University of Melbourne reported that it was in the process of implementing an industry sabbaticals program.¹²⁴
- 2.83 A number of universities supported greater engagement of PhD students with industry, either through placements or industry supervision. For example, the University of Melbourne saw potential for 'embedding PhD candidates within new and innovating enterprises as a means to facilitate access to high-quality research while providing industry relevant skills to researchers.'¹²⁵ The University of South Australia reported that it had

120 Dr Alan Finkel, Chief Scientist, *Official Committee Hansard*, Canberra, 3 March 2016, p. 5.

121 Western Sydney University (WSU), *Submission 23*, p. 7.

122 WSU, *Submission 23*, p. 7.

123 University of Wollongong, *Submission 5*, p. 4.

124 University of Melbourne, *Submission 41*, p. 9.

125 University of Melbourne, *Submission 41*, p. 16.

identified the need for a 'transformed' PhD that would be 'centred on increasing graduate researchers' capabilities to work collaboratively and productively with end-users, and in multidisciplinary and multi-sectoral research ventures.'¹²⁶

- 2.84 The Regional Universities Network recommended the establishment of a programme of industry PhD scholarships, 'focussing on SMEs and non-commercial partners, to be jointly funded by universities and partner organisations'. The Regional Universities Network also suggested that 'favourable taxation treatment' could be available to industry as an incentive to fund the scholarships.¹²⁷
- 2.85 The University of South Australia recommended that the limited opportunities for researchers to move between the university sector and industry during the course of their career should be addressed by the development of a national initiative 'to encourage greater fluidity of employment between industry and academia'.¹²⁸

Encouraging Business Demand for Collaboration

- 2.86 The ISA was pleased that many universities were actively promoting their business development activities. The ISA was less confident about the level of movement from business to engage with universities in research collaborations.¹²⁹
- 2.87 Western Sydney University highlighted the low demand for university research by Australian with only '3.1 per cent of Australian businesses [identifying] universities as a source of ideas or information about their business.'¹³⁰
- 2.88 The AAS suggested that limited desire for business-university partnerships was a key barrier to improving industry-university collaboration in Australia. The AAS stated:

Engagement between industry and universities is most likely where a business wishes to innovate... It is likely that the main factors impeding greater overall levels of collaboration between universities and industry are a lack of desire among business

126 University of South Australia, *Submission 9*, p. 5.

127 Regional Universities Network, *Submission 11*, p. 5.

128 University of South Australia, *Submission 9*, p. 1.

129 Mr William Ferris, ISA, *Official Committee Hansard*, Canberra, 3 March 2016, p. 7.

130 Western Sydney University, *Submission 23*, p. 3.

owners to engage innovative expertise available in Australian universities, or a lack of means and incentives for them to do so.¹³¹

- 2.89 The AAS further stated that amongst Australian businesses 'between 75 and 92 per cent of innovations were new-to-firm only'.¹³² The AAS suggested that 'low demand from Australian innovators for new knowledge to drive new-to-world products and services' was a root cause of low levels of collaboration and commercial benefits from research and that 'it is important to stimulate demand amongst Australian business for research expertise'.¹³³
- 2.90 Universities Australia stated that 'despite considerable investment by the Australian Government...Australian businesses tend not to pursue innovation as a priority'.¹³⁴ Latrobe University suggested that business demand for collaboration was not increasing despite government support for business R&D stating 'the massive increase in government outlays associated with the R&D tax incentive are not translating to an increase in university income, so something is happening there which needs to be fixed'.¹³⁵
- 2.91 Victoria University suggested many government programs to foster collaboration may be 'considered beyond reach by many small to medium sized enterprises (SMEs), assuming they are aware of the programs existence in the first place'.¹³⁶
- 2.92 The University of South Australia supported the development of collaboration models that were more appropriate for SMEs, and stated:
- Additional funding schemes that support exploratory pilot projects, fast start, short review timelines, would be beneficial to SMEs that are looking to work with research institutions to develop disruptive technologies and solve pressing problems.¹³⁷

131 AAS, *Submission 3*, p. 7.

132 AAS, *Submission 3*, p. 8.

133 AAS, *Submission 3*, p. 8.

134 Universities Australia, *Submission 27*, p. 3.

135 Mr Matthew Brett, Senior Manager, Higher Education Policy, La Trobe University, *Official Committee Hansard*, Melbourne, 10 March 2016, p. 37.

136 Victoria University, *Submission 19*, p. 5.

137 University of South Australia, *Submission 9*, p. 4.

Successful Examples of Collaboration

Overseas Examples

- 2.93 Examples of university-business collaboration in overseas countries include:
- The Dutch Top Sectors Policy – includes a platform where industry and academia meet and negotiate co-investment in targeted research areas;¹³⁸
 - The UK Knowledge Transfer Partnerships – facilitates industry employing research graduates and allows access to the expertise of a graduate’s supervisor;¹³⁹
 - SPARK Stanford – a partnership between university, health care services and industry aimed at: advancing promising research discoveries to the clinic and commercial sector; innovating efficient and cost-effective approaches to drug discovery and development; providing access to specialised knowledge and technical expertise; and supporting translational efforts to deliver products and services for unmet health needs;¹⁴⁰ and
 - Canada’s Waterloo University community-based research and technology park – a partnership including the University, local, State and Federal governments which provides an innovation hub focused on connecting university and researchers.¹⁴¹
- 2.94 Australia’s Chief Scientist compared the work of Israel’s Chief Scientist in supporting innovation and explained that their roles were different. In Israel, the Chief Scientist advanced economic translation through allocating competitive grants to early-stage businesses. In Australia, the Chief Scientist’s role was to promote underlying science research through providing advice to government and to forums across the breadth of science research endeavour.¹⁴²

Australian Examples

- 2.95 Examples of collaboration between universities and business in Australia includes:

138 University of Wollongong, *Submission 5*, p. 7.

139 University of South Australia, *Submission 9*, p. 3.

140 Medical Technology Association of Australia, *Submission 32*, p. 3.

141 University of Newcastle, *Submission 10*, p. 3.

142 Dr Alan Finkel, Chief Scientist, *Official Committee Hansard*, Canberra, 3 March 2016, p. 4.

- The Newcastle Institute for Energy and Resources – the collaboration of industry and academia which provides access to large-scale test bed and pilot plant operations in the area of energy and resources;¹⁴³ and
 - The Southern Manufacturing Innovation Group – comprises the University of Wollongong and 13 Illawarra based manufacturers where industry discussed their innovation processes and challenges, and the University presented information on its research and advanced materials and robotics.¹⁴⁴
- 2.96 The Australian Nuclear Science and Technology Organisation (ANSTO) manages a number of Australia's major research infrastructure facilities. These facilities are made available to academic and industry researchers and ANSTO reported that 'in the last financial year alone, the OPAL research reactor, the Australian Synchrotron and the Australian Centre for Accelerator Science attracted approximately 5000 Australian and international researcher and industry visits and supported 1500 experiments.'¹⁴⁵

Public Sector Commercialisation Strategies

Development of In-house Innovations

- 2.97 The CSIRO described how it recently selected potential commercial opportunities from its research. The CSIRO sought ideas from its staff which resulted in the generation of 200 ideas. These were assessed by a panel of CSIRO people and successful entrepreneurs and reduced down to 80 ideas. The number was shortlisted to 20 which were subjected to two to three days of testing. Nine teams resulted and the CSIRO 'took them off-line through a program for the order of about 12 weeks to rigorously road-test the ideas ... and whether they could be new business opportunities.'¹⁴⁶
- 2.98 The University of Melbourne has a similar process – a venture catalyst model – for commercialisation of its research. The University's business and development people would identify the most prospective

143 University of Newcastle, *Submission 10*, p. 3; Newcastle Institute for Energy and Resources, *About Us*, <https://www.newcastle.edu.au/research-and-innovation/centre/nier/about-us> Accessed 19 April 2016.

144 University of Wollongong, *Submission 5*, p. 2.

145 Dr Adrian Paterson, Chief Executive Officer, Australian Nuclear Science and Technology Organisation, *Official Committee Hansard*, Sydney, 8 March 2016, p, 52.

146 Mr Craig Roy, Deputy Chief Executive, CSIRO, *Official Committee Hansard*, Canberra, 3 March 2016, p. 14.

opportunities and put together a founding management team.¹⁴⁷ The University added:

Initially you would put relatively modest funds in – it might be \$200 000 or \$300 000 – designed around a proof of concept, proof of principle, and depending on the nature of the invention prototyping. Essentially what you are trying to do is put in enough money to enable the catalyst management to start to prove out and package that opportunity.¹⁴⁸

- 2.99 Depending on its contribution, the university would own 10 or 20 per cent of the company of which the inventor would own 30 per cent.¹⁴⁹

Collaboration with Business

- 2.100 The University of Melbourne has a second avenue to commercialise its research through collaboration with CSL Ltd. CSL Ltd stated that it was ‘doubling the size of [its] commitment to the University of Melbourne and the Parkville medical research institutes and hospitals’ by increasing the number of scientists in the Bio21 Institute from 70 to 150. The Bio21 Institute would become CSL Ltd’s ‘global centre for research and translational medicine.’¹⁵⁰
- 2.101 Deakin University also has a strong relationship with an industry sector. While motor car manufacturing by the Ford Motor Company is closing, Ford’s R&D activities remain in Geelong. Currently, Deakin University has seven projects funded by Ford and is attracting overseas funds through this relationship.¹⁵¹
- 2.102 Deakin University’s Geelong Innovation Precinct comprises research facilities, co-located industry partners including ‘a number of early-stage spinouts ... located adjacent to fibre processing and laboratory facilities.’¹⁵²
- 2.103 One of the businesses is Carbon Revolution which ‘started as a student project with a lecturer.’ The company makes one-piece carbon fibre wheels

147 Mr Doron Ben-Meir, Executive Director Research, Innovation and Commercialisation, University of Melbourne, *Official Committee Hansard*, Melbourne, 10 March 2016, p. 55.

148 Mr Doron Ben-Meir, University of Melbourne, *Official Committee Hansard*, Melbourne, 10 March 2016, p. 56.

149 Mr Doron Ben-Meir, University of Melbourne and Professor James McCluskey, Deputy Vice-Chancellor, Research, University of Melbourne, *Official Committee Hansard*, Melbourne, 10 March 2016, p. 56.

150 Dr Andrew Cuthbertson, Chief Scientific Officer and R&D Director, CSL Ltd, *Official Committee Hansard*, Melbourne, 10 March 2016, pp 9, 10.

151 Professor Peter Hodgson, Deputy Vice-Chancellor Research Interim, Deakin University, *Official Committee Hansard*, Melbourne, 10 March 2016, p. 50.

152 Deakin University, *Submission 35*, p. 2.

and employs 200 people.¹⁵³ Carbon fibre composite manufacturer Quickstep Holdings has recently decided to establish its Automotive Division and global research and development centre at the Geelong Innovation Precinct.¹⁵⁴

- 2.104 The Geelong Innovation Precinct is also the site of the Centre for Advanced Design in Engineering Training (CADET). Deakin University stated that CADET was:

... a fulcrum for small to medium enterprise (SME) engagement via the Industry Innovation Program (IIP) managed by the Geelong Manufacturing Council (GMC). The IIP is a vehicle to identify specific research and development projects of relevance to GMC members and match these two engineering research groups, including students, building small-scale innovation into the SME community.¹⁵⁵

- 2.105 Final year CADET students will be encouraged through 'innovation and entrepreneurship programs' to start 'their own companies as well as taking their ideas to market.'¹⁵⁶

Incubators and Accelerators

- 2.106 Deakin University is also building a manufacturing incubator and accelerator to support the increased industry involvement. This will support 150 innovation and entrepreneurial positions.¹⁵⁷
- 2.107 Both Macquarie University¹⁵⁸ and La Trobe University¹⁵⁹ advised they too were moving towards establishing incubator and accelerator frameworks.
- 2.108 Curtin University drew attention to its Curtin Accelerate program which provides 10 week structured mentoring to students, staff and alumni who have an innovative business idea. Selection was 'extremely competitive' and successful applicants received a \$5000 equity free grant, access to co-

153 Professor Peter Hodgson, *Official Committee Hansard*, Melbourne, 10 March 2016, p. 48.

154 Deakin University, *Quickstep brings global R&D to Geelong – Deakin's 'carbon cluster' will gain a major boost with Quickstep's high tech centre.* https://www.deakin.edu.au/research/story?story_id=2015/08/10/quickstep-brings-global-rd-to-geelong Accessed 11 April 2016.

155 Deakin University, *Submission 35*, p. 2.

156 Professor Peter Hodgson, *Official Committee Hansard*, Melbourne, 10 March 2016, p. 48.

157 Deakin University, *Submission 35*, p. 2.

158 Professor Lesley Hughes, Pro-Vice-Chancellor, Research Integrity and Development, Macquarie University, *Official Committee Hansard*, Sydney, 9 March 2016, p. 50.

159 Mr Matthew Brett, La Trobe University *Official Committee Hansard*, Melbourne, 10 March 2016, p. 38.

working space and facilities, and networks including commercialisation experts, investors and potential partners.¹⁶⁰

- 2.109 The University of Wollongong advised that it had 29 start-ups on its innovation campus. In late 2016 the university will open its iAccelerate building which will provide 'space for up to 280 start-ups.' The start-ups will be provided with advice on business planning, legal and financial matters, and on marketing from 'local entrepreneurs and experts'. The university has also established an early-stage venture capital fund which will invest in iAccelerate start-ups. Start-ups which received funding will have to commit to maintaining a presence in the Illawarra region when they leave the iAccelerate incubator.¹⁶¹
- 2.110 The University of Melbourne also has a well-established start up incubator program, the Melbourne Accelerator Program. University of Melbourne stated:
- ... in 2012 we provided four companies with \$20 000, office space and mentoring. The whole idea there was to give young entrepreneurs an opportunity to test out a business idea in a fail-safe environment. ...
- ... our program has evolved to include a range of pre-accelerator activities designed to help upskill and, really importantly, connect aspiring entrepreneurs. Last year alone we had over 5000 people attend those events. We have also continued to increase the intake size of our accelerator program. This year we will have 10 start-ups come through ...¹⁶²
- 2.111 Potential start-ups were selected by a panel of 'venture capitalists and successful angel investors' from the university's 'mentor and advisory board network.' The criteria used included whether the proposal involved groundbreaking technology, whether the proponents could 'execute upon their vision',¹⁶³ and whether they could explain the business to the selection panel:
- If you are judging an entrepreneur in building a business ... and they cannot explain it to you, they have a problem, not you. ... Part of them running a business is the capacity to explain it to people who are not necessarily deep in their domain.¹⁶⁴

160 Curtin University, *Submission 20*, p. 4.

161 Mr Paul Scully, Chief Operating Officer, Australian Institute for Innovative Materials, University of Wollongong, *Official Committee Hansard*, Sydney, 9 March 2016, p. 9.

162 Mr Rohan Workman, *Official Committee Hansard*, Melbourne, 10 March 2016, p. 54.

163 Mr Rohan Workman, *Official Committee Hansard*, Melbourne, 10 March 2016, pp 57, 58.

164 Mr Doran Ben-Meir, University of Melbourne, *Official Committee Hansard*, Melbourne, 10 March 2016, p. 58.

2.112 Being able to fully explain the business was also fundamental to venture capital company, Reinventure's start-up selection process:

... if as an entrepreneur you cannot hustle your own cash, if you cannot front an investor directly, then you probably cannot do all the other things that are necessary to build a great company. ... If you cannot convince them of your dream, you get nowhere.¹⁶⁵

Concluding Comments

- 2.113 In comparison with other OECD countries Australia has a strong research sector and performs well during the initial stages of the innovation system. Australia performs relatively poorly, however, in university-business collaboration and in commercialising research and innovation.
- 2.114 The Committee welcomes the creation of Innovation and Science Australia and the development of a strategic plan for science research and innovation for the next 15 years.
- 2.115 Focusing on Australia's existing strengths and competitive advantages, as suggested by some universities, should not have the effect of excluding other emerging areas of strength where, if Australia moves quickly, it could become a world leader.
- 2.116 To prosper, Australia's innovation sector must have a continuous supply of skilled people who are willing to drive research and innovation and in so doing create a competitive workforce. The Committee welcomes the NISA initiatives which aim to increase STEM skills and also encourage the participation of women, but considers that the effectiveness of these initiatives needs to be monitored, evaluated and continuously improved.
- 2.117 Further, Australia should focus on other skills in addition to STEM such as creativity, problem solving, and capitalising on the experience of workers over the age of 50.
- 2.118 Representatives of the university sector largely welcomed the changes to funding arrangements announced in NISA. The new funding arrangements should provide an incentive for universities to place a greater focus on undertaking research in collaboration with industry. Once implemented it is important that there is a period of policy stability in this area to enable universities to adjust to the new arrangements and make long-term investments in research capacity.

165 Mr Danny Gilligan, Co-Founder and Managing Director, Reinventure, *Official Committee Hansard*, Sydney, 9 March 2016, p. 8.

- 2.119 The Committee recognises that SMEs can experience difficulties in finding suitable research partners and financing collaborations with universities.
- 2.120 The introduction of metrics to take into account university-business collaboration should encourage a change in research culture with a move away from the publish-or-perish approach to a concept/research to commercialisation approach.
- 2.121 The Committee has identified a number of overseas models which are designed to facilitate university-business collaboration. These and other models could provide important insights into strategies which could be introduced to nurture innovation in Australia.
- 2.122 More universities are introducing education courses, incubators and accelerators to foster entrepreneurial talent. The Committee welcomes this change, recognising that it indicates universities are adopting a greater focus on innovation and commercialisation.

Recommendation 1

- 2.123 **The Committee recommends that Innovation and Science Australia identify emerging industries where strategic research investment could enable Australia to become a world leader.**

Recommendation 2

- 2.124 **The Committee recommends that the Department of Education and Training review overseas models of university-business collaboration with a view to identifying strategies which could be introduced in Australia.**

Nurturing Innovation

Introduction

- 3.1 The Department of Foreign Affairs and Trade (DFAT) stated that start-up companies are often Australia's 'fastest growing' and 'most innovative' companies.¹ Three quarters of start-ups fail, but the DFAT added:

It is quite important to make the right economic settings so that they can form and then disband, because a lot of the innovators and entrepreneurs actually go on and start up another business.²

- 3.2 The University of Melbourne provided an example of the failure and rebirth of start-up companies by relating the history of one of its four 2012 start-up companies – where a company had failed and then created another start-up, which then also failed, but was followed by a third start-up which was 'looking good.'³
- 3.3 Innovative ideas created by existing companies are also subject to a culling process. CSL Ltd stated that it reviewed 'over 100 new product opportunities each year' and only chose '5 to 10 per cent for full evaluation and then fewer still for licensing.' CSL Ltd commented that some ideas which were not pursued might have resulted in significant economic benefits to Australia had they been further developed, but they were not sound candidates for commercial development by CSL Ltd, or were not sufficiently advanced to transition to commercial development.⁴

1 Mr Robert Owen-Jones, Assistant Secretary, Economic Advocacy and Analysis Branch, Department of Foreign Affairs and Trade (DFAT), *Official Committee Hansard*, Canberra, 25 February 2016, p. 15.

2 Mr Robert Owen-Jones, DFAT *Official Committee Hansard*, Canberra, 25 February 2016, p. 15.

3 Mr Rohan Workman, Director, Melbourne Accelerator Program, University of Melbourne, *Official Committee Hansard*, Melbourne, 10 March 2016, p. 57.

4 CSL Ltd, *Submission 37*, p. 9.

Developing the Start-up Sector

- 3.4 The Export Council of Australia (ECA) observed there was often limited awareness about how to commercialise a product. The innovator had not developed the original idea with a view as to how it could be progressed through to commercialisation. The ECA emphasised that even at the earliest stages the right processes needed to be in place.⁵
- 3.5 La Trobe University acknowledged that while universities conducted high-quality research they had 'not as yet been able to translate that into commercial products and services.' La Trobe University added that universities were increasingly becoming aware that this was an issue and were changing their efforts and priorities to address the problem.⁶

Co-location

- 3.6 The Commonwealth Scientific and Industrial Research Organisation (CSIRO) considered it 'fundamentally important' to bring people together so that ideas could be workshopped to spawn new innovations. This could be achieved through 'smart digital platforms' which could facilitate the input of information, new ideas, and insights from a wider geographic area.⁷
- 3.7 Cochlear Ltd commented that it was very difficult to move things from Research and Development (R&D) into manufacturing, but it had co-located its R&D and manufacturing activities:
- 3.8 You bump into something in your manufacturing process, you walk down the corridor and you talk to the engineer who has developed it. Yes, it is becoming easier with technologies, but we find that link very important, so we co-locate our manufacturing and R&D.⁸
- 3.9 Eighteen04, which runs a co-working space based at CSIRO Energy Centre in Newcastle,⁹ agreed that collaboration between co-located start-ups maintained the commercialisation momentum:

We are all the same: if a problem is too hard, the first thing we do is try to push it aside. It gets into the too-hard basket. You cannot

5 Mr Andrew Hudson, Director, Export Council of Australia (ECA), *Official Committee Hansard*, Sydney, 8 March 2016, p. 5.

6 Mr Matthew Brett, Senior Manager, Higher Education Policy, La Trobe University, *Official Committee Hansard*, Melbourne, 10 March 2016, p. 36.

7 Mr Craig Roy, Deputy Chief Executive, Commonwealth Scientific and Industrial Research Organisation (CSIRO), *Official Committee Hansard*, Canberra, 3 March 2016, p. 13.

8 Mr Neville Mitchell, Chief Financial Officer, Cochlear Ltd, *Official Committee Hansard*, Sydney, 8 March 2016, p. 24.

9 Eighteen04, *Submission 38*, p. 1.

allow that to happen in a start-up. They have no time to waste, because every day they are burning cash, usually. So every moment counts for start-ups and scale-ups.

... those of us who have got involved with trying to set [the working space] up are offering our time to support the entrepreneurs and provide experience and support where we can. Collaboration is absolutely critical both within a space and then connecting outwards ...¹⁰

Private Sector Incubators and Accelerators

- 3.10 Stone & Chalk was established in August 2015 with the aim of becoming ‘the fintech hub of Asia’. The hub provides start-ups with a physical location, ‘a high quality fintech peer group, access to capital, extensive education and mentorship’. There was also ‘opportunity to partner with and co-create’ with Stone & Chalk’s local and international partners.¹¹ The hub houses ‘some 65-odd start-ups in the City of Sydney.’¹²
- 3.11 Cloud Insurance P/L, a member of Stone & Chalk, described the incubator:
- [It] has been beyond my expectations as a runway into government conduits and in ensuring that I have the right sponsors giving advice on legal issues and a range of matters – cyber security, you name it. ...
- The incubator is an environment. I have a desk as a resident. Rather than me having one desk somewhere else in the world, I get to be in an environment where I am surrounded by change agents and people who are also trying to build solutions for the future. For me, that is a very positive thing because it inspires me¹³
- 3.12 Eighteen04 is another incubator, located in Newcastle and is focusing on early-stage start-ups in the clean-tech and smart-city technology area. The incubator has 10 seats and has attracted six start-ups from Canberra and Sydney.¹⁴ Eighteen04 is seeking to expand by moving to a larger location in Newcastle.¹⁵

10 Dr Gunilla Burrowes, Chair, Eighteen04, *Official Committee Hansard*, Sydney, 8 March 2016, p. 33.

11 Stone & Chalk, *Submission 30*, p. 1.

12 Mr Danny Gilligan, Cofounder and Managing Director, Reinventure, *Official Committee Hansard*, Sydney, 9 March 2016, p. 1.

13 Ms Joanne Cooper, Director, Cloud Insurance P/L, *Official Committee Hansard*, Sydney, 8 March 2016, pp 39, 41.

14 Dr Gunilla Burrowes, Eighteen04, *Official Committee Hansard*, Sydney, 8 March 2016, p. 28.

15 Dr Gunilla Burrowes, Eighteen04, *Official Committee Hansard*, Sydney, 8 March 2016, p. 31.

Attracting Finance

- 3.13 Reinventure described the four stages in financing a typical start-up company, from building a product through to establishing a global company:

[The] first phase of building a product is generally what we call 'family, friends and fools'. ... That is generally a couple of hundred thousand dollars that you need to pull together your initial technical team and build your first version of a product. [They are] people who put money in because they like you and they want to see you try something and be successful. They only put in an amount that they are happy to lose. ... The fail rate around that is incredibly high. ...

The next stage is what we generally call seed funding or angel funding, and it might be around half a million dollars. ... the best source of that capital is angel investors – high net worth individuals, professional angel investors, who might invest across 10 or 15 different ideas. ... They have surplus cash ... Each individual might cut a \$25 000 to \$50 000 cheque.

Then you qualify for what we call 'series A' capital ... your first institutional capital. ... Series A is between \$2 million and \$6 million. At that stage you have built a product, you have customers, you have revenues and you have traction. ... You build a more significant team and you start to gain scale. ...

And then you move into big institutional capital – series B and series C – which tends to be \$10 million to \$20 million cheques. ... That is really about scaling your company to a very large scale globally.¹⁶

- 3.14 The Department of Industry, Innovation and Science (DIIS) commented that:

... almost a third of innovative Australian businesses have identified a lack of access to additional funds as their biggest barrier to innovation. Innovation-active small and medium sized enterprises are also much more likely to seek debt or equity finance compared to their non-innovation-active counterparts.¹⁷

- 3.15 The DFAT also identified 'access to finance [as] a key constraint to business-led innovation,' particularly for small to medium sized enterprises (SMEs). Unfortunately, SMEs often had poor or no credit
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16 Mr Danny Gilligan, Reinventure, *Official Committee Hansard*, Sydney, 9 March 2016, pp 6–7.

17 Department of Industry, Innovation and Science (DIIS), *Submission 31*, p. 25.

ratings and was often without 'the resilience that diversification affords larger enterprises and... the depth of resources to withstand a downturn.'¹⁸

- 3.16 The DFAT added that traditional sources of finance such as bank lending would continue to be the majority of finance available to SMEs, but there were also 'a number of non-traditional' finance sources such as 'alternative debt (corporate bonds), crowd funding, hybrid finance instruments and equity finance (venture capital and business angels).'¹⁹

Debt Financing

- 3.17 In seeking out options for attaining start-up capital, Eighteen04 commented that 'banks are not the first place start-ups tend to go to look for finance'. Eighteen04 added:

Part of the reason why banks cannot become involved at that stage is that often you are giving away equity in the start-up itself.

Banks are not usually at that place, because all the start-up has to offer is equity in this potential company. When you start growing and employing critical people within the start-up, there may be a little salary or wage, but you are also generally offering some equity in your company.²⁰

- 3.18 The Australian Chamber of Commerce and Industry (ACCI) explained that there are many different problems with access to finance and that there are different types of finance in different industries. The ACCI stated:

For a knowledge based industry, the big problem is lack of collateral. You do not have anything you can give to the bank which says, 'If we go belly up, you can sell this off.' That is the problem they face.

For manufacturing, because you generally have plant and equipment, the problem is more one of cash flow. When you are growing really fast, you have to make the investment in building the product and buying the inputs before you get the money from selling it. The question then is whether the government can do anything to make it better. In a perfect world a bank would make a decision based on which business proposition sounded the best, that had the most potential. But they have to think about their loss

18 DFAT, *Submission 44*, p. 10.

19 DFAT, *Submission 44*, p. 10.

20 Dr Gunilla Burrowes, Chair, Eighteen04 Inc., *Official Committee Hansard*, Sydney, 8 March 2016, p. 29.

if their borrower defaults. If the choice is between a really amazing business with no collateral or an average business with collateral, they are going to pick the one that has the collateral. If government were to guarantee that, maybe the banks would be more even-handed, but there is also the risk that that guarantee would encourage them to undertake riskier investments without taking into account the potential for loss. So it is not a simple issue to solve. But there is that role for improved intermediation, improved expertise. Often the businesses we talk to just have problems with the application process. It is very long, it can be very complicated and it is different from what they do day to day.²¹

Equity Financing

- 3.19 The *Australian Innovation System Report 2015* confirmed that 'innovation active start-ups are particularly reliant on equity finance', but that the 'limited scale and scope of venture capital, in particular, may be hindering these start-ups in reaching their full potential.'²²
- 3.20 The DIIS reported that unlike 'in the United States, Israel and many other countries' Australian venture capital investment had not recovered since the global financial crisis (GFC):
- In 2014 such investment was 40 per cent of its level in 2007, with a substantial decrease in the amount being put into new companies. The success rate of firms applying for venture capital investment has fallen from three per cent in 2005–06 to just over one per cent in 2013–14 even though the number of proposals has recovered to pre-GFC levels.²³
- 3.21 The DIIS added that Australia has the 'lowest proportion of venture capital invested in high-risk, early-stage venture capital (ie seed, start-up and other early-stage investment) compared with other OECD countries.' While investments are most numerous in start-up and early expansion stages, the bulk of investment is in late expansion and turnaround²⁴ stages.²⁵

21 Mr Tim Hicks, Acting Director, Economics and Industry Policy, Australian Chamber of Commerce and Industry (ACCI), *Official Committee Hansard*, Sydney, 8 March 2016, p. 22.

22 DIIS, Office of the Chief Economist, *Australian Innovation System Report 2015*, p. 12.

23 DIIS, *Submission 31*, p. 25.

24 Turnaround investment enables the financial recovery of a company that has been performing poorly for an extended time. Investopedia, *Turnaround*, <http://www.investopedia.com/terms/t/turnaround.asp> Accessed 6 April 2016.

25 DIIS, *Submission 31*, p. 26.

- 3.22 The CSIRO stated that, in contrast to the ‘approximately \$30 billion expended on R&D and over \$2 trillion in capital investment for established businesses’, there was ‘only \$0.3 billion in venture capital funds available and \$1.96 billion in private equity.’ The CSIRO added that just 0.1 per cent of the capital invested in established businesses would provide an approximate tenfold increase in available venture capital and private equity.²⁶

Crowd-Sourced Equity Funding

- 3.23 The DIIS advised that the National Innovation and Science Agenda (NISA) included the introduction of a new regulatory regime which would allow companies to access crowd-sourced equity funding (CSEF).²⁷
- 3.24 On 3 December 2015, a bill to amend the *Corporations Act 2001* was introduced to Parliament²⁸ to enable ‘entrepreneurs to raise funds online (up to \$5 million per year) from a large number of individuals in return for equity in their company.’ Individuals could use CSEF to contribute up to \$10 000 per company per year across multiple companies, provided that the companies were public companies. Concessions provided to companies which became public in order to access CSEF included ‘up to a five year exemption from obligations to hold Annual General Meetings, produce audited financial statements and provide an annual report to shareholders.’²⁹
- 3.25 The Corporations Amendment (Crowd-Sourced Funding) Bill 2015 was passed by the House of Representatives on 10 February 2016,³⁰ and was introduced into the Senate on 22 February 2016.³¹ The Bill lapsed due to the prorogation of the Parliament on 15 April 2016.
- 3.26 Reinventure cautioned those who might wish to respond to crowd funding requests and stated:
- ... one of the risks I see around crowd funding is that the kinds of ventures that pursue crowd funding are the ones that could not attract institutional capital and, therefore, is there a risk of negative selection bias[?] ... I personally think crowd funding is better directed to ... the good businesses that would deliver a two

26 CSIRO, *Submission 43*, p. 6.

27 DIIS, *Submission 31*, p. 27.

28 House of Representatives, *Votes and Proceedings No. 166*, 3 December 2015, p. 1806.

29 National Innovation and Science Agenda (NISA), *Factsheet 29, Making it easier to access crowd-sourced equity funding*.

30 House of Representatives, *Votes and Proceedings No. 172*, 10 February 2016, p. 1895.

31 Senate, *Journals of the Senate, No. 138*, 22 February 2016, p. 3758.

to three times return. There is a much lower risk of failure, but a much lower likelihood of a major outcome.³²

Angel Investment

- 3.27 Angel investors are less risk-averse than venture capitalists and are now beginning to deal with the risk associated with early stage start-up companies. Eighteen04 observed that once these start-up ventures have 'emptied their pockets, and the pockets of the family members who are willing to put some cash up, they then move towards angel investors.' Such investors are 'a very important part of the [innovation] ecosystem that is only really beginning to develop in Australia.'³³
- 3.28 Eighteen04 stated that individual angel investors often operate as a group because this 'not only helps de-risk the decision process a little it also allows an angel investor to spread their investments across more start-ups (to help de-risk their portfolio).' Eighteen04 added that:
- Individual angels invest from \$10k to \$100k which are often incorporated with other angel investors to obtain the typically investments of up to \$500k.
 - Angel investors take an equity stake in the company – generally less than 30%.
 - Typical agreements take the form of an ordinary share structure.
 - Angel investors tend to become an active part of the company, either as a director, advisor and will provide networks, expertise and skills needed in the company.
 - Angel investors typically make two new investments a year.³⁴

Venture Capital Funding

- 3.29 Like angel investments, venture capital fund investments are usually high risk. Reinventure explained:

Within the VC community, only one or two VCs will make all the returns in industry and the rest will probably lose capital. Within the portfolios of those VCs, only one or two companies will return all the returns of the fund. ... generally two or three or five great companies emerge each year. If you are not an investor in those great companies, you are almost guaranteed to lose money across your portfolio.³⁵

32 Mr Danny Gilligan, Reinventure, *Official Committee Hansard*, Sydney, 9 March 2016, p. 3.

33 Dr Gunilla Burrowes, Eighteen04, *Official Committee Hansard*, Sydney, 8 March 2016, pp 28–29.

34 Eighteen04, *Submission 38.1*, p. 1.

35 Mr Danny Gilligan, Reinventure, *Official Committee Hansard*, Sydney, 9 March 2016, p. 3.

- 3.30 Reinventure recounted two adages concerning the difficulty of becoming a successful venture capitalist:

One is: 'This is the last job you'll ever have, not the first,' as in you need to accumulate a lot of different life skills to gain the pattern of recognition and the scar tissue that you need to be able to advise companies through this generally very emotionally challenging journey. The second one is: 'It takes \$50 million to train a VC,' as in you need to make \$50 million of mistakes and to have learnt from those mistakes before you can start being a good VC. ...

Generally, it is other people's money, but if you lose \$50 million of other people's money you often do not get another shot at it.³⁶

- 3.31 Reinventure funded about four companies each year from about 200 applicants.³⁷ Selection was based on negotiation between the entrepreneur and the venture capital Reinventure stated:

They sell you the dream and you try and pop the bubble. You land at a point in the middle. Once you have made that investment, you are both trying to sell the dream.³⁸

- 3.32 Many people, Reinventure observed, are unaware about where their idea or product fits in the commercialisation pathway and also whether they are candidates for venture capital fund investment. Reinventure explained:

A lot of people have ideas for companies. That is not the same as a company. So a lot of people who seek funding seek it too early, and they are just not fit to be funded in any capacity, whether it be by a bank, a VC, angel investors et cetera. ... even if people do build a product or an idea, it might be a good business but it does not mean it is venture capital backable. ... we tend to work at the high-risk end of the start-up spectrum, which means we are looking for things that are going to be true game changers. We take a lot of risk in our portfolio, and about half of the things that we invest in will fail completely. To make the economics of that fund work, the other half have to make absolutely stellar returns. ... just backing a good business that is going to give you two or three times your return is not suitable for venture economics. ... There are other forms of finance, particularly from high-net-

36 Mr Danny Gilligan, Reinventure, *Official Committee Hansard*, Sydney, 9 March 2016, p. 3.

37 Mr Danny Gilligan, Reinventure, *Official Committee Hansard*, Sydney, 9 March 2016, p. 2.

38 Mr Danny Gilligan, Reinventure, *Official Committee Hansard*, Sydney, 9 March 2016, p. 8.

worths, family offices or angel investors, who are better suited to funding those kinds of businesses.³⁹

- 3.33 Reinventure added that it aimed to make an internal rate of return of 'somewhere between 25 and 35 per cent over five to seven years [or rather] turn \$50 million into \$200 million.'⁴⁰
- 3.34 Start-up financial services technology (fintech) company, LOKE Digital P/L commented that 'a lot of the venture funds in Australia either do not have any funds available right now or are investing a lot overseas.' LOKE Digital suggested that about 30 per cent of Australian venture capital funds are investing overseas, and that overseas companies 'are scared to invest into Australia' because of its isolation and small sized market.⁴¹
- 3.35 Reinventure, agreed that 'generally speaking there is a shortage of venture capital in this market',⁴² but there was 'absolutely no lack of funding for great companies'. In fact, a number of companies within its portfolio were raising money and there was 'an oversupply of capital trying to get into those companies'.⁴³ Reinventure observed that more overseas investors are focusing on the Australian market and visiting Australia, and that global investors are needed for businesses with global aspirations.⁴⁴
- 3.36 The ANZ Bank agreed, stating that to realise the full potential of Australia's technology and innovation capabilities requires Australian companies to invest in and grow businesses offshore⁴⁵ The ANZ Bank Stated:
- Ninety-eight per cent of the world economy is outside Australia's shores. So if you have an innovative technology-based Australian company, it has got to operate offshore. ... Born global, die local.⁴⁶
- 3.37 LOKE Digital P/L agreed that it was very important to 'make your product global from day one.'⁴⁷

39 Mr Danny Gilligan, Reinventure, *Official Committee Hansard*, Sydney, 9 March 2016, p. 2.

40 Mr Danny Gilligan, Reinventure, *Official Committee Hansard*, Sydney, 9 March 2016, p. 8.

41 Mr Thomas Booth, Managing Director, LOKE Digital P/L, *Official Committee Hansard*, Melbourne, 10 March 2016, p. 42.

42 Mr Danny Gilligan, Reinventure, *Official Committee Hansard*, Sydney, 9 March 2016, p. 5.

43 Mr Danny Gilligan, Reinventure, *Official Committee Hansard*, Sydney, 9 March 2016, p. 4.

44 Mr Danny Gilligan, Reinventure, *Official Committee Hansard*, Sydney, 9 March 2016, p. 7.

45 Mr Rob Lomdahl, Head of Government and Regulatory Affairs, ANZ Bank, *Official Committee Hansard*, Melbourne, 10 March 2016, p. 2.

46 Mr Rob Lomdahl, ANZ Bank, *Official Committee Hansard*, Melbourne, 10 March 2016, p. 6.

47 Mr Matthew Khoury, Managing Director, LOKE Digital P/L, *Official Committee Hansard*, Melbourne, 10 March 2016, p. 46.

- 3.38 The ANZ Bank were of the view that offshore companies that bring their profits back to Australia should not pay taxes twice. The ANZ Bank explained:

We are talking about where you go out and establish a real, legitimate business, earn profits and pay tax, and bring the profits home and give them to Australian shareholders. The profits should not be taxed again because they have already been taxed.⁴⁸

Involvement of Superannuation Funds

- 3.39 Reinventure suggested one of the challenges to obtaining the growth capital needed to drive innovation was the need to provide dividends, especially to superannuation funds:

... this is one of the core problems with super funds, particularly with the concentration of our superannuation industry. ... We are an economy that invests for the short term so that we can get our dividends, so that we can pay them back to super funds, because that is how they get their incentive. In the dividend imputation scheme, combined with the company tax rate, we have created a culture of addiction to dividends. What you need to drive innovation is growth capital, not yield capital.⁴⁹

- 3.40 The Australian Industry Group stated the problem was not 'unwilling capital'. For example Australian Super had close to \$100 billion in assets, but the amounts of investment needed by the start-up sector was 'a couple of million dollars here and there.' These amounts were too small. There was an opportunity, however, 'for intermediaries to jump in and aggregate many small potential businesses'.⁵⁰

- 3.41 The Australian Manufacturing Workers' Union (AMWU) agreed there was merit in the involvement of intermediaries to bundle projects into investment grade products. A problem, identified by the AMWU was the high management overheads arising from a portfolio of 'a lot of little SME investments'.⁵¹

48 Mr Jim Nemeth, Group General Manager, Taxation, ANZ Bank, *Official Committee Hansard*, Melbourne, 10 March 2016, p. 3.

49 Mr Danny Gilligan, Reinventure, *Official Committee Hansard*, Sydney, 9 March 2016, p. 5.

50 Dr Peter Burn, Head of Influence and Policy, Australian Industry Group, *Official Committee Hansard*, Sydney, 8 March 2016, p. 21.

51 Mr Tom Skladzien, National Economist, Australian Manufacturing Workers' Union (AMWU), *Official Committee Hansard*, Sydney, 8 March 2016, p. 16.

- 3.42 Reinventure stated that superannuation funds were beginning to consider participating in the venture capital market as they saw 'emerging new managers who they think are worth backing.'⁵²
- 3.43 An example is the \$200 million biotech venture capital fund recently established by Brandon Capital Partners with four superannuation funds as investors. The fund is different from other venture capital funds because:
- ... the superannuation funds will be able to participate directly, in addition to their initial commitment, into later stage companies that [the fund] has invested, where the commercialisation risk has been significantly diminished.⁵³
- 3.44 Brandon Capital Partners stated that its fund was 'a transformative and unique investment model for the superannuation funds where private companies will get access to this type of funding.'⁵⁴
- 3.45 The fund had 'a first right to invest in discoveries' from approximately fifty Australian medical research institutes and hospitals which were collaborative partners of the fund. All partners would 'get a small share of the profits when one of the other partners earns a windfall' which would provide an incentive for collaboration.⁵⁵

Government Support for Innovation and Commercialisation

Innovation Hubs and Incubators

- 3.46 Professor Roy Green stated that Australia, when compared to other countries, had 'paid very little attention' to local innovation ecosystems. Professor Green stated:

We see many very successful local innovation systems around the world – the most obvious and public example is Silicon Valley, but also in large cities like New York with its Cornell Tech initiative and London with Tech City UK. We are seeing the growth of interesting clusters and technology hubs in our cities as well,

52 Mr Danny Gilligan, Reinventure, *Official Committee Hansard*, Sydney, 9 March 2016, p. 5.

53 Blake Industry & Market Analysis P/L, *Bioshares* Edition 597, April 2015, *Why the Fibrotech Acquisition Was a Pivotal Event for Australian Biotech*, p. 1.

54 Blake Industry & Market Analysis P/L, *Bioshares* Edition 597, April 2015, *Why the Fibrotech Acquisition Was a Pivotal Event for Australian Biotech*, p. 1.

55 The Sydney Morning Herald, *Brandon Capital raises \$200 million from four industry funds for medical VC*, 20 April 2015, <http://www.smh.com.au/business/brandon-capital-raises-200m-from-four-industry-funds-for-medical-vc-20150417-1mn3vl.html> Accessed 7 April 2016.

around the University of Melbourne in Carlton and around my university, UTS, with our creative digital precinct. These are important developments. They are partly spontaneous but require nurturing from universities, but also from policies and programs.⁵⁶

- 3.47 Eighteen04 stated that there was a 'recognised need to support incubators for start-ups' and that angel investing groups should be able to 'access grants and government support programs.' Such support could be in the form of administrative support and office rental, and the encouragement of academics and researchers to take secondments to support start-ups.⁵⁷
- 3.48 The Australian National University stated there was a case for the 'establishment of Research Translation Centres similar in nature to the UK Catapult Centres. These centres have long-term funding allowing new technologies, methods and processes to be developed.'⁵⁸ The eleven Catapult Centres have been established and managed by Innovate UK.⁵⁹
- 3.49 The University of Newcastle supported regional innovation hubs stating it would help fill the gap between the ideas generated by researchers and local capital providers. This would enable the creation of new products and services.⁶⁰
- 3.50 The University of Tasmania stated that its innovation agenda included 'building student entrepreneurs' and 'nurturing a "high through put" commercialisation culture to ensure rapid exploitation of [intellectual property].' The university advised that it was intending to have a key role in partnering with the Tasmanian Government to establishing:
- ... Entrepreneurship and Innovation Hubs in Hobart and Launceston to develop a pipeline of would-be entrepreneurs who may continue progressing spin-out enterprises supported at these hubs.⁶¹
- 3.51 The NISA has recognised the importance of incubators and included an Incubator Support Programme which was a new component of the Entrepreneurs' Programme.⁶² The DIIS stated that the Entrepreneur's Programme:

56 Professor Roy Green, Dean, UTS Business School, University of Technology Sydney, (UTS) *Official Committee Hansard*, Sydney, 9 March 2016, pp 28–29.

57 Eighteen04, *Submission 38.1*, p. 2.

58 Australian National University, *Submission 2*, p. 2.

59 Innovate UK, *How Catapults can help your business innovate* <https://www.gov.uk/government/publications/innovate-uk-how-catapults-can-help-your-business-innovate> Accessed 11 April 2016.

60 University of Newcastle, *Submission 10*, p. 4.

61 University of Tasmania, *Submission 34*, p. 3.

62 NISA, *Factsheet 7, The Incubator Support Programme*.

... will be able to support development of new incubators and accelerators in regions or sectors of high potential, boost the effectiveness of existing high-performing incubators, including support to expand their services and engage with commercialisation advisers to facilitate access through to other government services and programs. ... the measure will provide access to top quality research and technical talent through three to 12 months secondments ...⁶³

Direct Business Assistance

- 3.52 Eighteen04 suggested there are various possible ways to support start-ups:
- government guarantees enabling start-ups to borrow money from banks;
 - a scheme where borrowed money is returned as part of profits made in future years;
 - government co-investment with angel investors;
 - a centre link payment to entrepreneurs in their first year to provide a minimum salary; and
 - more workplace flexibility as start-ups begin to build their staff.⁶⁴

Manufacturing Finance Corporation

- 3.53 The AMWU advocated for the creation of a Manufacturing Finance Corporation (MFC)⁶⁵ and drew parallels with the Clean Energy Finance Corporation:

Advanced manufacturing technologies are also new and their potential and functioning is also little understood by the finance industry. Whether they be additive manufacturing, new forms of computation, design and censoring, new materials and their applications or advanced applications of biological breakthroughs, a large raft of new technological fields are revolutionising manufacturing globally, but Australian financial institutions are understandably reluctant to invest in these technologies ...⁶⁶

- 3.54 The AMWU added that a MFC would constitute an equity injection by government and stated that 'similar loan programs/corporations exist in

63 Mrs Jane Urquhart, Head, Science and Commercialisation Policy Division, DIIS, *Official Committee Hansard*, Canberra, 25 February 2016, p. 8.

64 Eighteen04, *Submission 38.1*, p. 2.

65 AMWU, *Submission 24*, pp 17–20.

66 AMWU, *Submission 24*, pp 17–18.

the UK, targeting SME businesses'. An example of this is the UK's Capital for Enterprise program.⁶⁷

- 3.55 The AMWU added that a MFC could also ensure that each firm receiving support entered a network of supportive institutions, businesses and researchers by providing a link to 'the relevant Industry Innovation Precinct, Enterprise Connect and the CSIRO industry liaison division.'⁶⁸
- 3.56 The AMWU recommended that the Government establish a MFC 'with an equity injection from government of at least \$5 billion.'⁶⁹

Entrepreneurs' Programme

- 3.57 Innovation and Science Australia commented that the Entrepreneurs' Programme 'is targeted at SMEs that are established, have prospects, and are interested and engaged in wanting to take their business to the next level.' A private sector adviser could be engaged to assess the business and whether it wanted to invest in having a researcher in the business. The adviser might also help with 'supply chain facilitation, or capital raising.'⁷⁰
- 3.58 The Entrepreneurs' Programme also provides access to Accelerating Commercialisation grants. To be eligible for a grant, a business had to have a 'combined annual turnover of less than \$20 million for each of the three years prior' to lodgement and have 'a novel product or service that [they are] looking to commercialise and trade to customers outside of the state or territory of [their] principal place of business.' Grants could be 'up to 50 per cent of eligible project costs.'⁷¹
- 3.59 LOKE Digital P/L was of the view that assistance with grant applications would have been useful and stated:

We do not have enough time to sit there and put 30 or 40 hours into applying for a grant that could potentially help us grow and not need funding from a VC firm. We are trying to run our business; every day, we have to try to sell our product. If we knew

67 AMWU, *Submission 24*, p. 18. In 2013, Capital for Enterprise became part of the British Business Bank, which states that it works through more than 80 finance partners, to unlock up to £10 billion of new finance' to provide greater 'choice and information on finance options to smaller businesses.' British Business Bank, *What We Do*, <http://british-business-bank.co.uk/what-the-british-business-bank-does/>. Accessed 12 April 2016.

68 AMWU, *Submission 24*, p. 18.

69 AMWU, *Submission 24*, p. 20.

70 Mr William Ferris, Chair, Innovation and Science Australia, DIIS, *Official Committee Hansard*, Canberra, 3 March 2016, p. 10.

71 DIIS, *Factsheet, Entrepreneur's Program: Accelerating Commercialisation*, <http://www.business.gov.au/advice-and-support/EIP/Accelerating-Commercialisation/Documents/AC-Factsheet.pdf>. Accessed 12 April 2016.

a contact within the right accounting firm who could help us put a grant application together, we would have applied for it many years ago.⁷²

- 3.60 The Incubator Support Programme (a part of the Entrepreneurs' Programme which is due to commence on 1 July 2016) will provide an online portal to 'help entrepreneurs access information on start-up support opportunities, activities and events across Australia.'⁷³
- 3.61 LOKE Digital P/L supported an online portal but was unsure how comprehensive it would be. LOKE Digital P/L suggested the portal would be useful if, when it provided information on:
- ... the type of business we are or filled out some sort of assessment sheet, it then provided a plan for the support that you can get. That would be not only grants or employee subsidies etc but also links to incubators, accountancy firms, lawyers or patent attorneys. People who come into this industry, even if they are fresh out of uni, do not understand how to commercialise their idea. So we need that basic step-by-step guide of who the partners are and how to build a business from the ground up.⁷⁴

Landing Pads Program

- 3.62 The Landing Pads Program is an initiative under the NISA which provides access for selected market ready start-ups 'to a workspace for up to 90 days within an established start-up accelerator located overseas.'⁷⁵ There will be up to five landing pads which will be supported by Austrade 'in conjunction with existing non-government programmes in that location'. The program is due to commence on 1 July 2016.⁷⁶
- 3.63 LOKE Digital P/L drew attention to internet payments infrastructure company, Stripe⁷⁷ which has released Stripe Atlas which assists companies who want to access the United States market. Businesses can use Stripe Atlas to incorporate in Delaware, open a business bank account, obtain tax and legal advice, and accept payments through Stripe.⁷⁸ LOKE Digital P/L

72 Mr Matthew Khoury, LOKE P/L, *Official Committee Hansard*, Melbourne, 10 March 2016, p. 46.

73 NISA, *Factsheet 7, The Incubator Support Programme*.

74 Mr Matthew Khoury, LOKE P/L, *Official Committee Hansard*, Melbourne, 10 March 2016, p. 46.

75 Australian Government Business, *Landing Pads Program*, <http://www.business.gov.au/grants-and-assistance/grant-finder/Pages/landing-pads-program.aspx> Accessed 12 April 2016.

76 NISA, *Factsheet 12, Australia's Global Innovation Strategy*.

77 Stripe, *Payments infrastructure for the internet*, <https://stripe.com/#> Accessed 12 April 2016.

78 Stripe, *Introducing Stripe Atlas. A new way to start an internet business anywhere*, <https://stripe.com/atlas> Accessed 12 April 2016.

suggested that the Australian government should provide similar support to Australian companies wishing to go overseas.⁷⁹

Encouraging Equity Investment

- 3.64 Eighteen04 suggested they needed to be new approaches to provide incentives for those investing and supporting start-ups, such as:
- income tax relief for investment losses;
 - a restructure of the capital gains tax so that angel investors could ‘obtain good returns from good investments to make up for other failed investments’;
 - variations to the regulation of directors of start-ups because they were dealing with different risks than those in the corporate sector; and
 - ‘tax relief for angel investors taking on directorships of start-ups’ to recognise the voluntary and risky nature of the position.⁸⁰
- 3.65 The DIIS drew attention to new initiatives in the NISA which provide tax incentives for early-stage investors, and new arrangements for early stage venture capital limited partnerships (ESVCLPs).⁸¹
- 3.66 Tax incentives for early-stage investors include:
- a 20 per cent non-refundable tax offset on investments, capped at \$200 000 per investor per year
 - a ten-year exemption on capital gains tax, provided investments are held for three years⁸²
- 3.67 The tax incentive applied to companies that:
- were incorporated for less than the three previous years;
 - were not listed on any stock exchange;
 - had expended less than \$1 million in the previous income year; and
 - had income of less than \$200 000 in the previous income year.⁸³
- 3.68 The new arrangements for ESVCLPs stipulated that:
- partners in a new ESVCLP will receive a 10 per cent non-refundable tax offset on capital invested during the year
 - the maximum fund size for new ESVCLPs will be increased from \$100 million to \$200 million
 - ESVCLPs will no longer be required to divest a company when its value exceeds \$250 million⁸⁴

79 Mr Matthew Khoury, LOKE P/L, *Official Committee Hansard*, Melbourne, 10 March 2016, p. 46.

80 Eighteen04, *Submission 38.1*, p. 2.

81 DIIS, *Submission 31*, p. 27.

82 NISA, *Factsheet 1, Tax incentive for early-stage investors*.

83 NISA, *Factsheet 1, Tax incentive for early-stage investors*.

- 3.69 The NISA also included other measures to assist start-ups and encourage start-up investment:
- Relaxation of the 'same business test' which would allow a businesses to access losses from previous years when they have entered into new transactions or businesses, where the business 'while not the same, uses similar assets and generates income from similar sources.'⁸⁵
 - Providing a 'new option to self-assess the tax effective life of acquired intangible assets that are currently fixed by statute' to 'better align tax treatment of the asset with the actual number of years the asset provides an economic benefit.' Faster depreciation enabled a start-up's intellectual property and other intangible assets to become a more attractive investment option.⁸⁶
 - Changing insolvency laws to reduce 'the current default bankruptcy period from three years to one year'. Protecting directors 'from personal liability for insolvent trading if they appoint a restructuring adviser to develop a turnaround plan for the company', and preventing contracts being terminated because of insolvency, provided the company is undertaking a restructure.⁸⁷
 - Establishing 'five "landing pads" (in Silicon Valley, Tel Aviv and three other locations)' to provide a location where 'entrepreneurial Australians and market-ready start-ups' can 'access the talent, mentors, investors and a wider connected network of innovation hubs in those locations.'⁸⁸
- 3.70 The DFAT highlighted the introduction of the Significant Investor Visa (SIV) and the Premium Investor Visa (PIV) which are intended to 'offer accelerated pathways to Australian residency in return for significant investments in Australia.' Applicants for a SIV would be:
- ... required to invest at least \$5 million over four years in complying investments, which must now include at least \$500 000 in eligible Australian venture capital or private equity (VCPE) fund(s) investing in start-ups and small private companies.⁸⁹
- 3.71 The PIV was an Australian Government invitation-only visa, designed 'to attract a small number of highly talented and entrepreneurial individuals who can translate those skills and talents into areas which deliver a long-

84 NISA, *Factsheet 2, New arrangements for Venture Capital Limited Partnerships*.

85 NISA, *Factsheet 3, Increasing access to company losses*.

86 NISA, *Factsheet 4, Intangible asset depreciation*.

87 NISA, *Factsheet 8, Insolvency reform*.

88 DIIS, *Submission 31*, p. 20.

89 DFAT, *Submission 44*, p. 18.

term economic benefit to Australia.’ The program would initially involve Australia’s top two-way investment market, the United States, but would then expand to ‘other top two-way investment markets.’⁹⁰

Research and Development Tax Incentive

3.72 In considering the mix of public and private sector investment in commercialising research, the National Health and Medical Research Council (NHMRC) commented:

... the tax system is the way for the Australian people to benefit from profitable companies. So what is needed is to support companies to develop and be profitable. Of course, that is the purpose behind the R&D tax incentive as well, that there is a tax incentive for companies to invest in their own R&D and become profitable. I think one of the negative aspects of taking a slice [of the equity of a new company] is that, the more you carve out of a business, the less attractive it is to other investors. At the earlier stages, with clear ownership of IP and clear dilution of equity as new investors come in, there has to be a good financial argument for the investor. If you slice out too much by returning to government too early then I think you potentially get in the way of an attractive investment to people, whether they are shareholders in a public company or private investors in a private company.⁹¹

3.73 The NHMRC considered that the tax system is the appropriate way for Australia to benefit from profitable companies, and the R&D tax incentive is a way to encourage companies to invest in their R&D and become profitable.⁹²

3.74 The R&D tax incentive is designed to encourage companies to undertake R&D, and comprises:

- a 45 per cent refundable tax offset for eligible entities with an annual aggregated turnover of less than \$20 million, (not controlled by income-tax exempt entities) for expenditure on eligible R&D activities in Australia; and
- a 40 percent non-refundable⁹³ tax offset for all other eligible entities for eligible R&D expenditure.⁹⁴

90 DFAT, *Submission 44*, p. 18.

91 Professor Anne Kelso AO, Chief Executive Officer, National Health and Medical Research Council (NHMRC) *Official Committee Hansard*, Canberra, 17 March 2016, p. 5.

92 Professor Anne Kelso AO, NHMRC, *Official Committee Hansard*, Canberra, 17 March 2016, p. 5.

93 A non-refundable tax offset can be carried forward to a later year if it meets the standard tax offset carry-forward rules. Australian Taxation Office, *Research and development tax incentive – refundable and non-refundable tax offsets*, <https://www.ato.gov.au/business/research-and->

- 3.75 The incentive applies to R&D expenditure of up to \$100 million. Beyond this, companies can claim a tax offset at the company tax rate.⁹⁵
- 3.76 In 2015–16, the Australian Government spent \$9.7 billion on science, research and innovation. Of this, the R&D tax incentive measures amounted to \$3.2 billion.⁹⁶ Professor Roy Green stated that the R&D tax concession had ‘increased from about 15 percent to about 30 percent’ of the overall research and innovation spend.⁹⁷
- 3.77 The Chief Scientist for Australia (Chief Scientist) commented that Australia was ‘unusual amongst OECD countries in the predominance of indirect – that is, tax-based – support for business R&D.’ The provision of tax incentives liberated businesses from grant funding cycles enabling them to undertake research at any time. Tax credits, however, were generally untargeted so reduced the government’s capacity to strategically focus R&D investment on priority areas and specific players.⁹⁸
- 3.78 Innovation and Science Australia, however, approved the fact that the scheme was ‘agnostic to sector and is entitlement based.’ If someone was spending money on legitimate R&D it was a great incentive.⁹⁹
- 3.79 CSL Ltd supported the tax concession as ‘a very significant incentive for commercial operations like CSL Ltd to conduct R&D onshore and maximise this investment.’¹⁰⁰ Sendle also commented that for start-ups like Sendle, the incentive was ‘a really excellent thing.’¹⁰¹
- 3.80 The Australian Industry Group (AIG) highlighted the value of the incentive, but called for stability:
- The incentive plays an important role for many of our members and other businesses in enabling a higher level of R&D investment than might otherwise occur. While there are always areas for improving the incentive or targeting it more effectively, the policy

[development-tax-incentive/in-detail/fact-sheets--ato/research-and-development-tax-incentive---refundable-and-non-refundable-tax-offsets/](#) Accessed 13 April 2016.

94 DFAT, *Submission 44*, p. 14.

95 DFAT, *Submission 44*, p. 14.

96 DIIS, *Submission 31, Figure 1*, p. 4.

97 Professor Roy Green, UTS, *Official Committee Hansard*, Sydney, 9 March 2016, p. 32.

98 Chief Scientist for Australia (Chief Scientist), *Submission 49*, pp 2, 3.

99 Mr William Ferris, DIIS, *Official Committee Hansard*, Canberra, 3 March 2016, p. 8.

100 CSL Ltd, *Submission 37*, p. 8.

101 Dr James Chin Moody, Chief Executive Officer, Sendle, *Official Committee Hansard*, Sydney, 9 March 2016, p. 16.

has been through a lot of changes in recent years and stability is badly needed.¹⁰²

- 3.81 Connexion P/L drew attention to the changes in the requirements of R&D applications and the demands of writing applications especially for small companies:

We go for R&D every year. The R&D application five years ago and the terms in the R&D application today are so vastly different that you really do need an expert in research and development writing to be able to help you put that together. ... it is becoming more and more challenging to be able to present that what you have does constitute research and development. ... It is a real challenge to try and write those things. The big companies are okay. They have good lawyers to do it. Yes, we pay for lawyers to prepare ours, but that again comes back to the small business side of it, where your focus is on providing jobs for a number of people and your focus is not [solely] about making money. When you have to take that money away, shareholders and board members look at you quizzically as to why you keep investing in those things. ...

This will probably be the last year we do it because, if they change the rules again, it becomes more and more difficult.¹⁰³

- 3.82 La Trobe University suggested that the R&D tax incentive rates are quite important for the 'make or break' points for small businesses. Small changes in the rate are less of an issue for large multinational companies.¹⁰⁴
- 3.83 The Australian Academy of Science stated that the tax incentive does not favour small start-up companies. Instead the incentive encourages companies with 'sufficient existing capital to establish or undertake new research and development activities.' Small start-ups or spin out companies do not have access to such capital. As well, the incentive 'can be of limited use unless there is a strong expectation that the company will incur a tax liability from concurrent or future profit.'¹⁰⁵
- 3.84 Cochlear Ltd was concerned about the \$100 million cap on eligibility for the R&D tax incentive:

102 Dr Peter Byrne, Head of Influence and Policy, Australian Industry Group (AIG), *Official Committee Hansard*, Sydney, 8 March 2016, p. 17.

103 Mr Graeme Harrison-Brown, Chief Executive Officer, Connexion P/L, *Official Committee Hansard*, Sydney, 9 March 2016, p. 44.

104 Mr Matthew Brett, La Trobe University, *Official Committee Hansard*, Melbourne, 10 March 2016, p. 40.

105 Australian Academy of Science, *Submission 3*, p. 9.

We spend about \$130 million a year, of which about \$100 million qualifies for the R&D tax concession. We want to continue to invest; but, obviously, if you have a look at somewhere like the UK, they have concessions which would kick in for that incremental amount. ... The issue with that is long-term. Your new R&D starts getting done outside of Australia and over time – 10 years or so – the value is attributed to somewhere else.¹⁰⁶

- 3.85 The ECA considered there should be a continuum in tax arrangements from the research phase, through development, to the commercialisation phase:

... if a particular program has met those first two elements of the taxation R&D program and is an approved project, the commercialisation of that project should be an as-of-right, automatic roll on and have access to the same taxation benefits as the research and the development currently have, rather than phasing into a completely new competitive grant application.¹⁰⁷

- 3.86 La Trobe University commented that the eligibility rules for the tax incentive excluded not-for-profit enterprises or those that are majority owned by not-for-profits. The exclusion limited the ability for the tax system to drive start-up businesses that were collaborations between a student and the university. There was the opportunity to design better ways to support graduates or PhD students who wanted to take cutting edge ideas into spin out companies.¹⁰⁸

- 3.87 The R&D tax incentive eligibility rules also exclude research in the humanities and social science. The Australasian Council of Deans of Arts, Social Services and Humanities,¹⁰⁹ and the Australian Academy of the Humanities did not support this exclusion. The Australian Academy of the Humanities stated that the efficacy of these provisions should be reviewed:

... to ensure that cultural industries, digital R&D, design for social innovation, and future service oriented industries embracing social enterprises are not disadvantaged by these tax arrangements.¹¹⁰

106 Mr Neville Mitchell, Cochlear Ltd, *Official Committee Hansard*, Sydney, 8 March 2016, p. 23.

107 Mr Paul Cooper, Deputy Chair, ECA, *Official Committee Hansard*, Sydney, 8 March 2016, p. 5.

108 Mr Matthew Brett, La Trobe University, *Official Committee Hansard*, Melbourne, 10 March 2016, p. 38.

109 Australasian Council of Deans of Arts, Social Services and Humanities, *Submission 22*, p. 2.

110 Australian Academy of the Humanities, *Submission 33*, p. 3.

- 3.88 Several universities supported modifying the R&D tax incentive scheme to encourage collaboration between businesses and universities.¹¹¹
- 3.89 The Australian Technology Network (ATN) suggested that university/business links would be enhanced 'if businesses were able to claim the R&D tax incentive for work undertaken by a PhD graduate for a period of three years post-graduation'. The ATN acknowledged that this 'would be a significant shift for the Australian government to take'.¹¹²
- 3.90 The University of Melbourne suggested that:
- The R&D tax incentive could be modified to:
- Make it easier for SMEs to benefit from the tax incentive, especially where they utilise established research providers to solve their problems.
 - Encourage and leverage collaboration with public research providers and public research infrastructure.
 - Direct skills, resources and other supports for research in the catalytic phase of commercialisation, including in public research institutions.¹¹³
- 3.91 The Australian Government is currently undertaking a review of the R&D tax incentive scheme. The review panel comprises the Chair of Innovation and Science Australia, the Chief Scientist, and the Secretary of the Treasury.¹¹⁴

Intellectual Property

- 3.92 IP Australia stated that a 'well-functioning and effective intellectual property (IP) system is important to underpin Australia's innovation, trade and investment efforts' and the NISA.¹¹⁵ To this end, IP Australia provided the following online services:
- the Patent Analytics Hub containing over '80 million patent records', providing the information 'in a form that allows for an understanding of relationships and trends to inform business strategy';

111 Australian Technology Network, *Official Committee Hansard*, Sydney, 8 March 2016, p. 59; Curtin University, *Submission 20*, p. 1; La Trobe University, *Submission 39*, pp 4–5; Regional Universities Network, *Submission 11*, p. 2. University of Adelaide, *Submission 39*, p. 3; University of Melbourne, *Submission 41*, p. 19; University of Tasmania, *Submission 34*, p. 3; Western Sydney University, *Submission 23*, p. 3.

112 Ms Renee Hindmarsh, Executive Director, Australian Technology Network (ATN), *Official Committee Hansard*, Sydney, 8 March 2016, p. 59.

113 University of Melbourne, *Submission 41*, p. 19.

114 Australian Government Business, *R&D Tax Incentive Review*, <http://www.business.gov.au/grants-and-assistance/innovation-rd/RD-TaxIncentive/Pages/randd-tax-incentive-review.aspx> Accessed 13 April 2016.

115 IP Australia, *Submission 15*, p. 1.

- Source IP, a 'portal for information sharing, licensing preferences and facilitating contact in relation to IP rights generated by Australia's public research sector'; and
 - the IP Toolkit for Collaboration which 'provides tools and guidance to simplify discussions relating to the use and management of IP in collaborative ventures.'¹¹⁶
- 3.93 IP Australia also participated in the global patent prosecution highway initiative which:
- ... provides fast-track patent examination in 20 countries, on the basis of a decision taken in any of those countries, allowing Australian inventors the option to quickly acquire rights across the major global markets such as Japan, Germany, the UK and the USA.'¹¹⁷
- 3.94 Australia is also a signatory to the Patent Cooperation Treaty which allows the filing of an international patent and subsequent protection in 148 countries.¹¹⁸
- 3.95 IP Australia commented that a patent did not inhibit innovation. The patent granted a monopoly, but in return 'must disclose the invention, how it operates and the best method of operating it.' This was 'partly to ensure that follow-on innovation can occur.'¹¹⁹ The ability to use patented material and goods for research was confirmed in the *Intellectual Property Laws Amendment (Raising the Bar) Act 2012*. Once researchers started commercialisation, however, they had to look at obtaining a licence.¹²⁰
- 3.96 In comparison to the cost of filing, the substantial cost of obtaining a patent lay in writing the specification which had to describe the invention and 'the part that is novel, inventive and useful that you will claim exclusive right for.' IP Australia summarised the costs:
- It costs you a couple of hundred dollars to file, it costs you a couple of hundred dollars to get it examined but the total cost, and these are rough estimates ... is between \$8000 to \$12 000 to get a

116 IP Australia, *Submission 15*, pp 2, 3.

117 IP Australia, *Submission 15*, p. 3.

118 IP Australia, *Submission 15*, p. 3; World Intellectual Property Organisation, *PCT – The International Patent System*, <http://www.wipo.int/pct/en/> Accessed 14 April 2016.

119 Dr Andrew Wilkinson, Director, Domestic Policy, IP Australia, *Official Committee Hansard*, Canberra, 17 March 2016, p. 17.

120 Dr Frances Rowden, Acting General Manager, IP Australia, *Official Committee Hansard*, Canberra, 17 March 2016, p. 17.

patent through the system in Australia. We will make up maybe five to six per cent of that cost.¹²¹

- 3.97 Once a patent was granted in Australia, the global patent prosecution highway could be used to fast track patenting in other jurisdictions.¹²² The market where patent protection was needed determined where the patent was lodged. For example, IP Australia noted that there were Australian universities choosing to patent abroad because they considered that would be their major market.¹²³ A further example was provided by CSL Ltd which commented that when it decided to manufacture products in Switzerland it had transferred the IP for those products to that country.¹²⁴
- 3.98 In sectors where Australia comprised an important market, for example in mining, pharmaceutical, chemical, and heavy machinery, overseas companies were filing patents in Australia.¹²⁵
- 3.99 IP Australia commented that ‘90 percent of the patent applications in Australia are filed by non-residents’ – companies were importing their technology for use in Australia.¹²⁶ In the Australian start-up sector, about 50 companies patented in a year.¹²⁷
- 3.100 LOKE Digital P/L commented that it was difficult to patent software and its strategy was to be a first-mover into the market, ‘strengthening our core technology through integrations with other businesses and becoming a backbone of their technology and/or business as well.’¹²⁸ Sendle agreed that speed was important for success:
- ... it used to be that the big eat the small; now it is that the fast eat the slow. The key thing for a lot of businesses is: how fast can you move?¹²⁹

121 Dr Benjamin Mitra-Khan, Acting General Manager, Chief Economist, IP Australia, *Official Committee Hansard*, Canberra, 17 March 2016, p. 13.

122 Dr Benjamin Mitra-Khan, IP Australia, *Official Committee Hansard*, Canberra, 17 March 2016, p. 13.

123 Dr Benjamin Mitra-Khan, IP Australia, *Official Committee Hansard*, Canberra, 17 March 2016, p. 14.

124 Ms Sharon McHale, Head of Public Affairs, CSL Ltd, *Official Committee Hansard*, Melbourne, 10 March 2016, p. 13.

125 Dr Benjamin Mitra-Khan, IP Australia, *Official Committee Hansard*, Canberra, 17 March 2016, p. 15.

126 Dr Benjamin Mitra-Khan, IP Australia, *Official Committee Hansard*, Canberra, 17 March 2016, p. 15.

127 Dr Benjamin Mitra-Khan, IP Australia, *Official Committee Hansard*, Canberra, 17 March 2016, p. 13.

128 Mr Matthew Houry, LOKE P/L, *Official Committee Hansard*, Melbourne, 10 March 2016, p. 45.

129 Dr James Chin-Moody, Sendle, *Official Committee Hansard*, Sydney, 9 March 2016, p. 18.

Patent Boxes

- 3.101 Patent boxes are policies which apply to the 'income generated from certain types of qualifying intellectual property, particularly patents.' The policy targets the final stage of the innovation pathway, namely commercialisation. 'Tax relief can be given either as a reduced tax rate or a tax break for a portion of the patent box income.'¹³⁰
- 3.102 The DFAT stated that 11 European countries and China had introduced patent boxes while other countries including the United States were considering their introduction.¹³¹
- 3.103 The Australian Innovation and Manufacturing Incentive (AIMI) proposed 'a system based on the UK's patent box, but tailored for Australia.' The AIMI stated that recently there had been an 'international focus on patent box regimes to ensure they are not contributing to "base erosion and profit shifting."' Consequently a number of jurisdictions have committed to ensuring any patent box tax benefits are directly related to R&D activity carried out in the host country. The AIMI stated that its policy is consistent with these developments.¹³²
- 3.104 The proposal would:
- ... provide an offset against the tax payable on profits derived from the innovation and manufacture in Australia of qualifying patented/licensed products. The patents/licenses would have to [have] a connection to Australia to qualify. ...
- ... qualifying IP profit would be taxed at the lower rate (10%) with the standard corporate tax rate to be applied to other income.¹³³
- 3.105 Cochlear Ltd supported the patent box approach, but cautioned that it needed 'to be part of a broad, holistic approach to incentives. It [is] not a panacea on its own'. Cochlear Ltd added that under the UK patent box model, the benefit to business has to be linked to providing extra employment.¹³⁴
- 3.106 The AIG considered patent boxes to have some merit but it needed 'careful examination and design.' The AIG added:
- Something that is well designed, that works simply and effectively, and that takes the best from the experiences of the UK

130 DFAT, *Submission 44*, p. 15.

131 DFAT, *Submission 44*, p. 15.

132 Australian Innovation and Manufacturing Incentive (AIMI), *Submission 25*, pp 1, 2.

133 Australian Innovation and Manufacturing Incentive, *The AIM Incentive*, <http://www.aimincentive.com.au/learn-more/the-aim-incentive/> Accessed 14 April 2016.

134 Mr Neville Mitchell, Cochlear Ltd, *Official Committee Hansard*, Sydney, 8 March 2016, p. 24.

and other European countries is well worth having a go at. I do not think it is a magic cure; it is a part of a bigger story.¹³⁵

3.107 The ACCI considered the concept was worth exploring, but it was a matter of priority. A patent box system would create ‘an artificial measure to counteract some of the other disincentives to locate in Australia.’ The ACCI preferred to instead focus on those framework issues.¹³⁶

3.108 IP Australia stated that research has not shown that patent boxes have increased the overall level of innovation:

In the last 2½ years we have seen about 10 big academic studies come out on the effect of patent boxes. The latest one is from the European Commission. They all seem to say roughly the same thing. ... you are incentivising people to maintain the patent monopoly ... because you are giving them a tax break, unlike R&D tax credits ... there is no good evidence to show that [a] patent box increases innovation or innovative activity in a country. There is decent evidence that says that a small group, mainly of large companies, gain a tax benefit. Within Europe ... there is decent evidence to show that people who can move their taxable IP will do so as a response to it, but they will not necessarily move their R&D.¹³⁷

3.109 IP Australia added that a patent box has been in place in the UK since 2013 and ‘more than 10 years’ in parts of Europe. The patent box has been an expensive policy for the UK, being costed ‘at something like £1.1 billion when they first did impact assessments ... about \$2 billion a year’. The UK has decided to close its current patent box for new entries in July 2016 and redesign the system. IP Australia was unsure as to whether the UK would abolish its patent box system.¹³⁸

Advanced Manufacturing Tax

3.110 CSL Ltd provided a detailed proposal¹³⁹ for an Advanced Manufacturing Tax ‘of not more than 10 per cent on new advanced manufacturing undertaken in Australia’.¹⁴⁰ CSL Ltd stated that, unlike a patent box the ‘proposal would not diminish existing tax revenues, would only apply to

135 Dr Peter Burn, AIG, *Official Committee Hansard*, Sydney, 8 March 2016, p. 21.

136 Mr Tim Hicks, ACCI, *Official Committee Hansard*, Sydney, 8 March 2016, p. 21.

137 Dr Benjamin Mitra-Kahn, IP Australia, *Official Committee Hansard*, Canberra, 17 March 2016, p. 12.

138 Dr Benjamin Mitra-Kahn, IP Australia, *Official Committee Hansard*, Canberra, 17 March 2016, p. 13.

139 CSL Ltd, *Submission 37*, pp 13–15.

140 CSL Ltd, *Submission 37*, p. 14.

investment that would not otherwise take place in Australia, and requires IP to be tied to advanced manufacturing.¹⁴¹

3.111 To qualify as advanced manufacturing for the purposes of the new tax, CSL Ltd suggested:

- There must be new investment in a manufacturing facility.
- The manufacturing facility should generate substantial entrepreneurial value such that the value of its products should be much greater than the costs (including capital costs).
- The value-add must arise from identifiable and valuable IP ...
- The relevant IP should be either developed in Australia or acquired and then significantly enhanced through further development while under Australian ownership.
- The Australian owner must have taken risks in the development of the IP.
- The preferential tax rate would not apply to profits earned on royalties, licence fees or sales of Australian owned IP, as these do not arise from advanced manufacturing in Australia.¹⁴²

3.112 CSL Ltd identified a number of safeguards in its proposal:

- there was no need for government funding or to 'cannibalise existing tax revenues';
- there was the requirement to manufacture in Australia;
- the exclusion of 'most investment in other industries' reduced the likelihood that investment would have occurred in Australia anyway – such as in resource extraction;
- the requirement for substantial value adding in Australia;
- the proposal would not distort business behaviour – a criticism of some types of patent boxes was that IP ownership was transferred from one jurisdiction to another without creating new economic activity; and
- it would be limited to those enterprises which had generated valuable IP and invested in manufacturing in Australia.¹⁴³

Concluding Comments

3.113 The Committee recognises the difficulties and risks of commercialising innovation. The Committee was impressed by the calibre of the start-up

141 CSL Ltd, *Submission 37*, p. 13.

142 CSL Ltd, *Submission 37*, p. 14.

143 CSL Ltd, *Submission 37*, pp 14–15.

and spin-out companies and those in the venture capital sector who contributed to the inquiry.

- 3.114 The Committee agrees that being involved in a start-up or spin-out company is challenging because of the commonly high rates of failure for such entities. Starting a business from scratch, seeing it fail, and relaunching another can be a challenging learning experience and only those who persist will be successful. Similar challenges are experienced by angel investors and venture capitalists.
- 3.115 The Committee acknowledges the move by the superannuation industry towards investing in start-up portfolios created by intermediaries. The Committee anticipates that market forces will determine whether this form of finance will increase and broaden.
- 3.116 The Committee recognises that the Government, through the NISA initiatives is providing support measures for incubators, start-up businesses, and capital providers, with the broader aim of modernising the Australian economy to make it more globally competitive.
- 3.117 The Incubator Support Program is intended to provide information to assist entrepreneurs and prospective entrepreneurs. The Committee acknowledges the comments of LOKE Digital P/L concerning what such a portal might provide and suggests the Government's portal should provide such information.
- 3.118 Taking into consideration the issues raised around NISA such as its adequacy and robustness, the Committee believes the NISA initiatives should be reviewed after an appropriate period to determine their effectiveness and adequacy.
- 3.119 The Committee is attracted to the use of a patent box as a way to encourage R&D and believes that such a measure warrants close examination. The patent box is an expensive measure which can be manipulated, however, the increased innovation outcome is uncertain. The Committee understands that the UK's patent box, introduced in 2013, closed after three years in operation and is currently being reviewed.
- 3.120 If a patent box measure were to be introduced in Australia, it should be subject to a sunset clause followed by a review of its effectiveness and whether it should be extended and for how long.
- 3.121 The Committee has received two separate proposals aimed at encouraging advanced manufacturing in Australia. A Manufacturing Finance Corporation (MFC) which has been proposed by the AMWU could be modelled on the Clean Energy Finance Corporation, but would concentrate on investing in advanced manufacturing.

- 3.122 The Advanced Manufacturing Tax (AMT), which can be seen as a taxation variant of the patent box, (as proposed by CSL Ltd) attempts to link tax breaks for advanced manufacturing companies to activity in Australia.
- 3.123 The Committee has received insufficient evidence, however, to thoroughly test the concept of a MFC or an AMT but considers both options warrant close examination by the Treasury. If either option is introduced it should be reviewed after a suitable period to ascertain effectiveness. If an AMT were to be introduced it could have a sunset clause with a review before renewal.

Recommendation 3

- 3.124 **The Committee recommends that the initiatives introduced as part of the National Innovation and Science Agenda be reviewed after three years of operation to determine their effectiveness and whether the programs should be expanded.**

Recommendation 4

- 3.125 **The Committee recommends that the Treasury undertake a close examination of a patent box scheme. If a patent box is introduced, it should be subject to a sunset clause after three years of operation. A review should be undertaken to determine the effectiveness of the patent box scheme and whether it should be extended and for how long.**

Recommendation 5

- 3.126 **The Committee recommends that the Treasury undertake a close examination of the proposal for a Manufacturing Finance Corporation. Should such a corporation be established, it should be reviewed after a period of five years to determine its effectiveness.**

Recommendation 6

- 3.127 **The Committee recommends that the Treasury undertake a close examination of the proposal for an Advanced Manufacturing Tax. Should such a tax be introduced, it should be subject to a sunset clause at which point a review should be undertaken to determine its effectiveness and whether it should be continued.**

Mr Ken O'Dowd MP
Chair
2 May 2016



Appendix A - Submissions

- 1 Associate Professor Stuart Pearson
- 2 Australian National University
- 3 Australian Academy of Science
- 4 The Australasian Centre for Rail Innovation
- 5 University of Wollongong
- 6 The Australian Road Research Board Group Ltd
- 7 Australian Nuclear Science and Technology Organisation
- 8 Ausveg
- 9 University of South Australia
- 10 University of Newcastle
- 11 Regional Universities Network
- 12 Professor James Guthrie
- 13 Charles Sturt University
- 14 Confidential
- 15 IP Australia
- 15.1 IP Australia
- 16 Australia and New Zealand Banking Group Limited
- 16.1 Australia and New Zealand Banking Group Limited
- 16.2 Australia and New Zealand Banking Group Limited
- 17 Australian Centre for International Agricultural Research
- 18 Macquarie University
- 19 Victoria University
- 20 Curtin University

- 21 Optus
- 22 Australasian Council of Deans of Arts, Social Sciences and Humanities
- 23 Western Sydney University
- 24 The Australian Manufacturing Workers' Union
- 25 Australian Innovation and Manufacturing Incentive Group
- 26 Australian Business Deans Council
- 27 Universities Australia
- 28 Association of Australian Convention Bureaux
- 29 Australian Pork Ltd
- 30 Stone and Chalk
- 31 Department of Industry, Innovation and Science
- 31.1 Department of Industry, Innovation and Science
- 32 Medical Technology Association of Australia (SPARK)
- 33 Australian Academy of the Humanities
- 34 University of Tasmania
- 35 Deakin University
- 36 Department of Immigration and Border Protection
- 37 CSL Limited
- 38 Eighteen04 Inc.
- 38.1 Eighteen04 Inc.
- 39 La Trobe University
- 40 Department of Education and Training
- 41 University of Melbourne
- 42 Standards Australia
- 43 Commonwealth Scientific and Industrial Research Organisation
- 43.1 Commonwealth Scientific and Industrial Research Organisation
- 44 Department of Foreign Affairs and Trade and Austrade
- 45 Name Withheld
- 46 Australian Technology Network
- 47 Cochlear Ltd
- 48 Export Council of Australia
- 48.1 Export Council of Australia
- 49 Chief Scientist for Australia

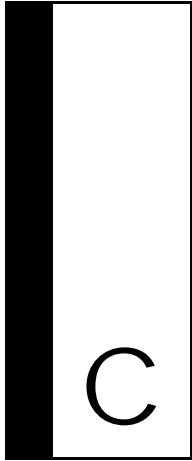
- 50 Swinburne University of Technology
- 51 Dr Barrie Pittock
- 52 National Health and Medical Research Council
- 53 EMC Australia and New Zealand
- 54 Australian Prudential Regulation Authority
- 55 Dr Michael MacCracken



Appendix B - Exhibits

1. Australian Research Council
Review of Research Policy and Funding Arrangements, Report, November 2015
 - a) *The National Innovation and Science Agenda.*
 - b) *State of Australian University Research 2015-16: Volume 1 ERA National Report*
2. Export Council of Australia
2015/16 Trade Policy Recommendations: Building capability and capacity for global expansion.
3. Medical Technology Association of Australia
SPARK Australia: Transforming ideas and research from bench to bedside and ...why we need to do something now.
4. Australasian Centre for Rail Innovation
UK RSSB Level Crossing Safety Report Listing for ACRI Participants, prepared by the UK Rail Safety and Standards Board
 - a) List of ACRI Board Members
 - b) List of ACRI Participants
 - c) List of ACRI International and Domestic Partnerships
 - d) ACRI's Collaborative Working Arrangements
 - e) ACRI Research Summaries – March 2016.
5. Professor Roy Green, Dean, UTS Business School, University of Technology, Sydney
Australia's Innovation Future – A Report on the Structure and Performance of Australia's National Innovation System in Senate Economics References Committee, Australia's Innovation System, Canberra 2015, pp. 41–74

- a) Article: *How Australia got left behind in manufacturing and innovation*, Roy Green, 23 February 2015
- b) *Report to the President Accelerating U.S. Advanced Manufacturing*, Executive Office of the President President's Council of Advisors on Science and Technology, October 2014
- 6. NSW Business Chamber
Report: Thinking Business: Industry-Research Collaboration
- 7. Australian Centre for International Agricultural Research
Impact Assessment Program Strategy
 - a) ACIAR Impact Assessment Series 71: *The economic impact in Indonesia and Australia of investment in plantation forestry research, 1987–2009*
 - b) ACIAR Impact Assessment Series 86: *Returns to ACIAR's investment in bilateral agricultural research*
 - c) ACIAR Impact Assessment Series 67: *The biology, socioeconomics and management of the barramundi fishery in Papua New Guinea's Western Province.*
 - d) ACIAR Impact Assessment Series 80: *Oil palm pathways: an analysis of ACIAR's oil palm projects in Papua New Guinea.*
 - e) *Adoption of ACIAR project outputs 2015*
- 8. Australia and New Zealand Banking Group Limited
ANZ insight - Winning the away game: Australia-based Global Companies and the Economy, Issue 7 August 2015
 - a) Independent Economics: *Taxation of Offshore Dividends*, prepared for ANZ Banking Group Limited, April 2015
 - b) Asialink-ANZ-PWC report, *Australia's Jobs Future: The rise of Asia and the services opportunity*



Appendix C – Hearings and Witnesses

Thursday, 25 February 2016 – Canberra

Department of Industry, Innovation and Science

Mr Mark Cully, Chief Economist

Mrs Jane Urquhart, Head of Science and Commercialisation Policy Division

Dr Antonio Balaguer, Assistant Manager

Department of Education and Training

Ms Jessie Borthwick, A/g Deputy Secretary, Higher Education, Research and International Cluster

Mr Dominic English, Group Manager, Research and Economic Group

Ms Ditta Zizi, Branch Manager, Research Education and Higher Education Infrastructure

Dr Terry Bowditch, Director, Research Funding and Data

Mr Timothy Kane, Senior Economic Adviser, Economic and Market Analysis Branch

Department of Foreign Affairs and Trade

Mr David Holly, Assistant Secretary, Intellectual Property, Aid for Trade and Other Issues Branch, Office of Trade Negotiations

Mr Robert Owen-Jones, Assistant Secretary, Economic Advocacy Analysis Branch

Thursday, 3 March 2016 – Canberra

Chief Scientist

Dr Alan Finkel, Chief Scientist for Australia

Dr William Howard, Deputy Director, Office of the Chief Scientist

Innovation and Science Australia and Department of Industry, Innovation and Science

Mr William Ferris, Chair, Innovation and Science Australia

Mr David Hazlehurst, A/g Deputy Secretary, Department of Industry, Innovation and Science

Ms Ann Bray, Interim Chief Executive Officer, Innovation and Science Australia, Department of Industry, Innovation and Science

CSIRO

Mr Craig Roy, Deputy Chief Executive

Dr Jack Steele, General Manager, Science and Government

Tuesday, 8 March 2016 – Sydney

Export Council of Australia

Mr Paul Cooper, Deputy Chair

Mr Andrew Hudson, Director

Australian Manufacturing Workers' Union

Mr Mike Nicolaidis, Assistant National Secretary

Dr Tom Skladzien, National Economist

Australian Chamber of Commerce and Industry / Australian Industry Group

Mr Tim Hicks, A/g Director, Economics and Industry Policy, Australian Chamber of Commerce and Industry

Mr Hamish Li, Policy Advisor, NSW Business Chamber

Dr Peter Burn, Head of Influence & Policy, Australian Industry Group

Mr Tennant Reed, Principal National Adviser, Public Policy, Australian Industry Group

Cochlear Ltd

Mr Neville Mitchell, Chief Financial Officer

Eighteen04 Inc.

Dr Gunilla Burrowes, Chair

TAFE Directors Australia

Mr Martin Riordan, Chief Executive Officer

Cloud Insurance Pty Ltd

Ms Joanne Cooper, Director

Medical Technology Association of Australia

Ms Susi Tegen, Chief Executive

Ms Roslyn Mitchelson, Industry Policy Manager

Professor Jonathon Morris, Director, Kolling Institute

Australian Nuclear Science and Technology Organisation

Dr Adrian Paterson, Chief Executive Officer

Dr Simone Richter, Group Executive, Nuclear Science and Technology, and Landmark Infrastructure

Dr Jamie Schulz, Operations Manager, Bragg Institute

Australian Technology Network

Ms Renee Hindmarsh, Executive Director

Tuesday, 9 March 2016 – Sydney**Reinventure**

Mr Danny Gillian, Co-Founder and Managing Director

University of Wollongong

Mr Paul Scully, Chief Operating Officer, Australian Institute for Innovative Materials

Sendle

Dr James Chin-Moody, Chief Executive Officer

Australian Centre for International Agricultural Research

Dr Nicholas Austin, Chief Executive Officer

**Professor Roy Green, Dean UTS Business School, University of Technology,
Sydney****SwitchDin Pty Ltd**

Dr Andrew Mears, Chief Executive Officer

Connexion Pty Ltd

Mr Graeme Harrison-Brown, Chief Executive Officer

Mr Mitchell Westra, Management Systems Advisor

Macquarie University

Professor Lesley Hughes, Pro Vice Chancellor, Research Integrity and
Development and Distinguished Professor of Biological Sciences

Tuesday, 10 March 2016 – Melbourne**ANZ Banking Group**

Mr Rob Lomdahl, Head of Government and Regulatory Affairs

Mr Jim Nemeth, Group General Manager, Taxation

CSL Ltd

Dr Andrew Cuthbertson, Chief Scientific Officer and R&D Director

Ms Sharon McHale, Head of Public Affairs

Australasian Centre for Rail Innovation

Mrs Vicki Brown, Chief Executive Officer

Mr Tristan Hogg, Manager – Projects

Australian Road Research Board Ltd

Mr Gerald Waldron, Managing Director

Ausveg

Mr Richard Mulcahy, Chief Executive Officer

Mr Andrew White, Deputy Chief Executive

La Trobe University

Mr Matt Brett, Senior Manager, Higher Education Policy

Loke Digital Pty Ltd

Mr Matthey Khoury, Managing Director

Mr Tom Booth, Managing Director

Mr Benjamin Colley, Chief Product Officer

Deakin University

Professor Peter Hodgson, Deputy Vice-Chancellor Research (Interim)

Dr Ben Spincer, Director Deakin Research Commercial

University of Melbourne

Professor James McCluskey, Deputy Vice Chancellor, Research

Mr Doron Ben-Meir, Executive Director Research, Innovation & Commercialisation

Mr Rohan Workman, Director, Melbourne Accelerator Program

Thursday, 17 March 2016 – Canberra**National Health and Medical Research Council**

Professor Anne Kelso AO, Chief Executive Officer

Universities Australia and Regional Universities Network

Ms Sarah Brown, Policy Director Research and Innovation, Universities Australia

Professor Jan Thomas, Chair, Regional Universities Network

Dr Caroline Perkins, Executive Director, Regional Universities Network

IP Australia

Dr Frances Roden, Acting General Manager

Dr Benjamin Mitra-Kahn, Acting Assistant General Manager, Chief Economist

Dr Andrew Wilkinson, Director, Domestic Policy