Queensland Government submission to Senate Economics References Committee on Inquiry into Australia's Innovation System September 2014

EXECUTIVE SUMMARY

The Queensland Government acknowledges the importance of innovation in achieving economic, social and environmental outcomes at the national and state levels. We are committed to working in partnership with different levels of government, and with business, academia and the community to improve innovation and productivity across all sectors.

The key action areas within the *Queensland Science and Innovation Action Plan* (QSIAP) articulate a suite of Queensland Government activities using applied science, technology and innovation in "turning great ideas into great opportunities". A range of initiatives are supported to develop knowledge intensive industries, diversify the state's economic base and drive innovation, and continue to invest in skills and research to leverage our investment and scientific excellence in priority areas. A copy of the QSIAP is available at http://www.qld.gov.au/dsitia/assets/documents/science-innovation-action-plan.pdf

Collaboration between academia and business and linking innovative ideas to market needs are prerequisites for the effective translation of research and innovation. Latest OECD data shows that Australia is last out of 33 nations for the proportion of innovation-active firms collaborating with universities.[1] One of the aims of QSIAP, therefore, is to promote collaboration between universities and industry.

At the Federal level, consideration could be given to linking funding for research and skills development to an articulated investment strategy which is targeted to areas of national importance that will deliver real impact and outcomes. It is important that Australia's significant research investment pays dividends for the benefit of all.

The Queensland Department of Science, Information Technology, Innovation and the Arts, as the lead agency for science and innovation policy in Queensland, has consulted with relevant Queensland Government departments, and key industry and university stakeholders who are members of the Queensland Science and Innovation Advisory Council and the Queensland StartUp Working Group (the reference committee for the Queensland Government on Queensland's startup ecosystem) in formulating its response to the Senate Inquiry.

This submission addresses the terms of reference of the inquiry and outlines areas for consideration, many based on Queensland's experience, for initiatives to support Australia's innovation system. Key areas for consideration include:

- encourage collaboration between industry and research
- apply a stronger focus to the translation of research to create impact and outcomes
- consider taxation reform to support R&D, startup investments, exports and share schemes.
- continue to reduce red tape and duplication
- focus on entrepreneurial and STEAM (Science, Technology, Engineering, Arts and Mathematics) capacity building through education

[1] OECD Science, Technology and Industry Scoreboard 2013, Fig. 3.3.2

- enhance investment in people and projects that focus on areas of competitive advantage and national importance.

The key areas for consideration listed in the Executive Summary are described further in the context of current Queensland Government policy under the terms of reference.

Term of Reference (a) - The need to attract new investment in innovation to secure high skill, high wage jobs and industries in Australia, as well as the role of public policy in nurturing a culture of innovation and a healthy innovation ecosystem

All levels of government have an important role to play in promoting a nation's prosperity by providing a policy environment conducive to innovation. This in turn drives productivity, economic growth and the creation of high skill, high wage jobs.

The Queensland Government is playing an important role in providing a public policy setting that nurtures a culture of innovation through initiatives including:

- the Queensland Plan, which outlines a long term vision across 9 foundation areas, with innovation and knowledge culture as the key enablers of the vision;
- the Innovation Hub initiative (in QSIAP), which enhances innovation in Government service delivery by defining problems and working on prototype solutions with industry;
- the GoDigitalQld Strategy and Action plan, which promotes the adoption and increased use of digital technologies, content and innovative services to deliver better economic outcomes for Queensland and Queenslanders. A copy of this strategy and action plan is available at http://www.godigitalqld.dsitia.qld.gov.au/welcome-to-godigitalqld/documents
- the Queensland Government Procurement Taskforce to transform procurement across the Queensland Government;
- the Queensland Government Open Data initiative and portal for data sharing;
- the Red Tape Reduction initiative to provide a supportive regulatory environment for business and research;
- the Science and Innovation Advisory Council (SIAC), which provides independent guidance and advice and reviews progress with QSIAP against government priorities;
- the establishment of ThoughtLabs to harness the experience of leading thinkers and experts to provide views to inform innovation policy and service delivery;
- participation in the Medical Research Commercialisation Fund (MRCF) and ilab/Artesian capital model, which are attractive to investors and provide opportunities for SMEs to raise venture capital funds; and
- the Accelerate Fellowships program of grant funding to attract, retain and develop early and mid-career researchers.

As a further example, Queensland is home to a range of creative industry businesses (such as gaming and fashion) built on innovative approaches to business. The success of creative entrepreneurs such as Half Brick Studios provides benchmarks for Queensland creative business aiming for an international profile, while retaining their local networks. The attraction of the right investment at the right time for startups will assist industries to grow beyond local users, audiences and consumers whilst maintaining a local base.

The Federal Government has an additional range of policy levers at its disposal, particularly in relation to taxation that can help attract new investment in innovation.

Areas for Federal Government consideration

- Attracting new investment could be supported by maintaining and enhancing tax benefits for early stage investors such as business angel and venture capital investors.
- Consideration could also be given to capital gains tax incentives for early stage risk capital investments to attract new and larger early stage investment pools.
- As a policy principle, an increased level of funding should be linked to applied R&D, collaboration between research and business, research translation and outcomes.
- Encourage peak industry bodies to drive greater collaboration between established and emerging businesses, including engagement with startups.
- Encourage established businesses to consider more internal spending on innovation and entrepreneurial ventures as a source of growth.
- Consider extending the MRCF[2] model to relevant Federal Government initiatives.
- Consider streamlining ethical and governance processes through a national approach to clinical trials[3] where appropriate (recognising that national approval may not be suitable in all situations). Approval in one jurisdiction could enable an organisation to conduct clinical trials in all jurisdictions. This would reduce red tape, as approvals would not have to be sought for each jurisdiction. Further work would be needed to scope out a national approach, given the range and diversity of clinical trials.

Term of Reference (b) - The Australian Government's approach to innovation, especially with respect to the funding of education and research, the allocation of investment in industries, and the maintenance of capabilities across the economy

The Queensland Government supports the policy goal of having a world-class education and research capability that underpins Australia's growing economy. This is evidenced by our significant and continued investment in world-class research facilities; the development of our science and research capability, the support of collaborative research projects, and the attraction and retention of skilled researchers.

[2] The MRCF model is based on government paying the administration fees for the running of a fund that attracts superannuation funds for investment. These fees are not passed onto investors, thus making their investment more attractive. That model could provide long term certainty and be "leveraged" to raise additional venture capital funds. An alternative option could be to have a flat subsidy to provide better incentives.

[3] "Clinical trials" is a term used here in a broad sense. The World Health Organization (WHO) definition for a clinical trial is **"**any research study that prospectively assigns human participants or groups of humans to one or more health-related interventions to evaluate the effects on health outcomes".

Under the *Queensland Science and Innovation Action Plan* and the Mentoring for Growth initiative of the Department of Tourism, Major Events, Small Business and the Commonwealth Games, the Queensland Government provides a range of initiatives to help businesses grow through capability development, assistance with intellectual property management, business mentoring and skill development.

The Queensland State Schools' Curriculum into Classroom (C2C) is developed in line with the Australian Curriculum, which includes the Technologies strand.

Complementing this initiative, the Queensland Government is calling on universities and industry to help create a Queensland Coding Academy to provide inspirational learning opportunities for our children, and develop a pipeline of world class talent to drive the digital economy of the future. This is consistent with the Economy section of the Queensland Plan.

Areas for Federal Government consideration

- Consider maintaining funding of fundamental research (discovery/blue sky research) within the university sector independently from funding for teaching.
- Consider initiatives to connect strategically important research disciplines and industry-relevant science capacity with the university sector's higher degree training programs (ie research linkage and PhD programs).
- Consider a national entrepreneurial and investor exchange and visiting experts program.
- Consider federal initiatives to develop cultural tourism as an emerging and growing market to stimulate innovation and support tourism services.
- Continue the one stop shop approach to managing information on regulatory requirements through the Australian Business Licence Information Service and Australian Business Account.
- Consider the industry need for a Silicon Valley Landing Pad to assist Australian startups in getting established in Silicon Valley.
- Consider the application of Easy Access IP to facilitate knowledge exchange between universities and industry. Easy Access IP involves the granting of knowledge and expertise from universities to industry, so that it can be developed for the benefit of the economy and society.

Term of Reference (c) - The importance of translating research output into social and economic benefits for Australians, and mechanisms by which it can be promoted

Translating research into tangible outcomes is critical. Collaboration between industry, research, government and education is vital for the translation of research into commercial, social and economic outcomes that benefit the community.

The Queensland Government has implemented a number of initiatives aimed at translating research into tangible benefits for Queenslanders. These include the Translational Research Institute, which brings together researchers with hospitals, clinicians, and drug development companies. Translation is also a key criterion in determining the allocation of Queensland government funding in Accelerate Fellowships and Partnerships programs.

Areas for Federal Government consideration

The following mechanisms are possible ways to translate and promote research outlets.

- Consider establishing a "Health Translation Program" from within the $20 billion Medical Research Future Fund recently announced by the Federal Government.
- Consider linking federal funding awarded to grant recipients to research translation and impact.
- Ensure federal programs include key performance indicators (KPIs), which focus on research impact and its public benefit.
- Consider the requirement for federal funding to be linked to industry and research collaboration and the translation of research. This may be facilitated through existing translational infrastructure.
- Include "co-creation with end-users" requirements within policy and program development to support the co-creation of research ideas/projects.
- Ensure that a proportion of the research undertaken is relevant to industry i.e. demand driven.
- Consider the merits of social marketing, which can be used to facilitate the translation of research, uptake of results and ideas and change behaviours.
- Consider honorary rewards for researchers for successful translation to recognise their research achievements.

Term of Reference (d) - The relationship between advanced manufacturing and a dynamic innovation culture

Many traditional areas of manufacturing are disappearing. Australia must look to niche areas of manufacturing where we continue to have a competitive advantage or can create a competitive advantage, in areas such as those in which we can utilise advanced technologies and our highly skilled workforces to produce high value add products.

The Minister for Education, Training and Employment is the Queensland member on the Council of Australian Governments (COAG) Industry and Skills Council. On 3 April 2014, the Council agreed to work together to foster internationally competitive manufacturing by focusing on regulatory reform, access to infrastructure, attracting investment, skills development, export facilitation and innovation and support of enabling industries such as information and communication technology. The agreement that manufacturing opportunities include advanced manufacturing is a positive step towards the development of an innovation culture in this sector.

Areas for Federal Government consideration

The initiatives below could be considered to support and foster an innovation culture in the advanced manufacturing sector, in addition to the work of the COAG Industry and Skills Council.

- Invest in telecommunications and broadband infrastructure to optimise digital innovation to attract international investment to grow Australia's digital services and advanced manufacturing sectors.

- In light of the consultations occurring for the Industry Skills Fund and similar programs, consider establishing within federal programs mechanisms to assist workers to move from traditional manufacturing to advanced manufacturing. In particular, assistance could be prioritised in areas where technology and skills make Australia internationally competitive such as defence industries, advanced materials, unmanned systems, robotics or high value-add component or medical device manufacturing.

- Consider using the network of incubators to provide an alternative career path for university students to commence startups and increase the number of entrepreneurs in Australia.

- Encourage peak industry bodies to drive greater collaboration between established and emerging businesses, including engagement with startups.

Term of Reference (e) - Current policies, funding and procedures of Australia's publicly-funded research agencies, universities, and other actors in the innovation system

The proposed de-regulation of university fees and the opening up of competitive pricing for university courses will result in some initial funding uncertainty for universities. Competition will drive innovation in terms of what courses are offered, how they are offered and at what price. Revenue from fees will continue to be an important source of university funding.

It is recognised that the Federal Government is the primary investor of funds into the Australian research sector, as it has a much larger financial capacity than State and Territory governments.

The Queensland Government plays its part in providing competitive grant funding for industry and researchers to partner and for early and mid-career researchers to develop their careers.

This is encapsulated in the *Queensland Science and Innovation Action Plan*. Queensland also has a Science and Innovation Advisory Council, to provide independent guidance and investment advice.

Areas for Federal Government consideration

- Acknowledging a challenging fiscal policy setting, there is a strong argument to strive to increase funding levels on a per capita basis to similar levels in many other leading OECD countries.
- In a tight fiscal environment, it is imperative to focus funding decisions that maximise tangible economic and public good outcomes for the benefit of Australia. This means investment in people and projects with a strong emphasis on collaboration and translation.
- Continue federal government support for existing research and innovation programs where possible. The Federal Government has a more significant capacity to provide large block grants that give ongoing funding certainty as well as a pool of competitive funding.

Term of Reference (f) - Potential governance and funding models for Australia's research infrastructure and agencies, and policy options to diversify science and research financing

Successive Federal Governments have contributed significant amounts of funding into research infrastructure. Oftentimes this has been leveraged with State government funding and in some instances philanthropic donations have leveraged both State and Federal government funding. Many world class research institutes in Queensland have been built through such arrangements.

Attracting science investment outside the traditional sources of Federal and State funding requires research groups to participate in local and global supply chains in both science and industry. There is a need for a greater focus on building collaboration between industry and the public research base. For example, the National Collaborative Research Infrastructure Scheme (NCRIS) has proven to be a successful, efficient scheme.

The *Queensland Science and Innovation Action Plan* articulates Queensland's continued focus on supporting skills and research to leverage past investments and the state's scientific excellence in priority areas to deliver outcomes for Queensland. The Queensland Government will also maintain momentum by focusing its R&D investment in priority areas through initiatives such as the Australian Institute of Tropical Health and Medicine and the Centre for Ageing Dementia Research.

Areas for Federal Government consideration

- Consider involving the Queensland Government in reviews and consultation on future policy directions and mechanisms in the innovation system, such as the Federal Government's review of the National Collaborative Research Infrastructure Scheme (NCRIS).
- Consider placing greater emphasis on research impact and translation, commercialisation and end user engagement within appropriate federal funding incentives and programs.
- Implement policies that recognise research impact as the key mechanism for benefits from research capabilities, and that avoid creating more red tape for universities.
- Implement a national investment strategy that includes funding for research that includes a mix of risk tolerance[4] levels.
- Provide tax deductions for private/philanthropic and corporate donations used to fund third party research infrastructure and research programs.
- Consider incentives for funding infrastructure and research programs. This suggestion addresses an existing market failure in supporting such programs.
- Consider "crowd funding" models and "citizen science"[5] to support scientific research.
- Consider seeking international funding from overseas corporates, government or universities to co-invest in infrastructure and research programs. International collaboration and co-investment may facilitate the sharing of facilities, intellectual property and staff.
- Seek opportunities in areas of common priority with philanthropic sources in order to consider matching philanthropic donations to fund infrastructure and science programs, on a case by case basis.
- Consider introducing policies and programs that support collaboration between industry and the public research base.
- Consider programs that facilitate research groups participation in local and global science and industry supply chains to attract science investment from sources other than federal and state government funding.

[4] The degree of variability in investment returns that an individual / entity is willing to withstand.

[5] Socientize Project (2013). Green Paper on Citizen Science: Citizen Science for Europe - Towards a better society of empowered citizens and enhanced research refers to "the general public engagement in scientific research activities when citizens actively contribute to science either with their intellectual effort or surrounding knowledge or with their tools and resources".

Term of Reference (g) - The effectiveness of mechanisms within Australian universities and industry for developing research pathways, particularly in regard to early and mid-career researchers

The Queensland Government has invested significantly in the construction of world-class research facilities. The key now is to attract and retain talent. This can be achieved by ensuring researchers work on solving interesting and intellectually challenging problems that advance the state of knowledge and create outcomes that make a difference.

The Queensland Government has done this by focusing support for funding on research areas that are important to the state and have an impact through collaboration and translation. This is articulated in our *Science and Innovation Action Plan*. One of the initiatives in the Plan is the Fellowships program. The Queensland Government has allocated $3 million to the Accelerate Fellowships program to support the research and career development of early to mid-career scientists. Early career Fellowships are up to $180,000 over 3 years and mid-career Fellowships are up to $300,000 over 3 years.

Areas for Federal Government consideration

- Continue to focus research on interesting and challenging problems that are a national priority, and have a clear impact.
- Consider support for a mentoring program so scientists can discuss their research and careers with a trusted third party.
- Investigate support for staff exchange programs in industry, government and internationally.
- Provide rewards and recognition for research that has impact.

Term of Reference (h) - Policy actions to attract, train and retain a healthy research and innovation workforce

A skilled workforce is a key contributor to and component of the innovation system. It is a key factor of production that can create an international competitive advantage. There is, however, a concern about a looming shortage of skilled workers with Science, Technology, Engineering, Arts and Mathematics (STEAM)[6] qualifications. Significant gaps exist in the STEM skills pipeline from primary to tertiary education levels,[7] with declining Australian performance in key performance measures in mathematical and science literacy and participation.

On the one hand, assuming markets are efficient, STEAM skills shortages will drive up the demand and hence price (salaries) for people with such skills. This will attract more students into such courses or attract more workers with such skills from overseas or force the outsourcing of such work to overseas jurisdictions. This argument would conclude that government has little justification to intervene.

[6] The Queensland Plan includes rates of student participation in STEAM as a measure of success in education.
[7] Australian Government Chief Scientist STEM: Australia's Future – Facing up to the Task p.10.

On the other hand, markets can be inefficient and the playing field is not always level. If there is too much of a lag in market signals to induce greater intakes of STEAM students, our domestic labour market capacity to solve highly complex problems in areas where we have a competitive advantage will be diminished. As a nation or a state, we stand to lose skilled workers and a case for government intervention exists.

The Queensland S*cience and Innovation Action Plan* includes actions that aim to increase STEM participation in schools and improve teaching skills. The Action Plan also includes initiatives such as the Queensland Government PhD Employment Experience program, to help to connect research, industry and business to produce work ready postgraduates.

In addition, the Queensland Department of Education, Training and Employment (DETE) is currently progressing a number of strategies to address the shortage of skilled STEAM workers. The DETE STEM Education Strategy outlines actions for STEM professional excellence, through key teacher capability initiatives such as the Queensland Government's Great teachers = Great results and Fresh Start strategies that aim to lift the standards of Queensland's STEM teachers and school leaders. The Department has also funded a current research trial that aims to increase teacher confidence, knowledge and capability in teaching science curriculum in the primary school years.

Areas for Federal Government consideration

- Consider revising the tax treatment of Employee Share Option Plans (ESOPs).They are a key way to attract, retain and motivate key staff. For startups that are cash flow poor, offering ESOPs is often the only way to attract and retain skilled staff and experienced executives. [8]
    - The current tax treatment of ESOPs is having a perverse effect. Options should not be taxed at the time of issue. This requires payment of tax prior to a liquidity event. Option holders may not have sufficient funds to pay such tax and therefore opt not to take up equity in the startup. By doing so, key staff have less of an incentive to stay and build value in the company.
    - Tax payment should only be triggered upon a liquidity event when option holders are in receipt of funds and able to pay tax.
    - Startups are particularly risky and there is a high probability that tax gets paid up-front, yet no liquidity event ever occurs.
- A similar argument exists for the Federal Government to consider reforming the way in which the transfer of physical shares to employees is handled by the taxation system.
- Consider expanding the skilled occupations list to ensure that the skills available meet demand.
- Consider policy mechanisms that encourage universities to work with industry to engage local university graduates and undergraduates (i.e. short-term internships) in growth oriented small to medium enterprises (SMEs).

[8] These areas may be canvassed as part of Australian Government Tax Reform White Paper.

- Consider mechanisms to increase the number of academics with a good understanding of business, industry and the benefits of commercialisation.

- Consider policy mechanisms that promote linkages between educational institutions and the Australian innovation system including sustained engagement of entrepreneurs, business angel investors and venture capitalists as faculty members and mentors.

Term of Reference (i) - Policy actions to ensure strategic international engagement in science, research and innovation

Australia is an open outward facing economy. We rely heavily on trade to fuel our economic growth and equally face competitive pressures from overseas that impact on our domestic economy.

Australia's science, research and innovation system must therefore be internationally focused. Federal and State government policy settings play a crucial role in ensuring Australian research and innovation collaborates and connects internationally to create impact.

Queensland has a number of MOUs with overseas jurisdictions and organisations, such as the Chinese Ministry of Science and Technology and the Chinese Academy of Sciences. These MOUs set the broad strategic framework to foster new science and technology transfer collaborations. Under these MOUs are tangible examples of international collaboration on projects, staff exchanges and technology transfer.

Areas for Federal Government consideration

- Continue to pursue free trade agreements and the opening up of international markets and flows of capital.

- Consider reducing red tape, including visa requirements and streamlining the process to make it easier for Australian researchers to work overseas and international researchers to work in Australia. Researchers are internationally mobile and gaining overseas experience is an important aspect of their career development. This can also lead to significant contributions to research and business through knowledge and technology transfer.

- Continue taxation reforms to further encourage and assist businesses to export overseas. Reforms might include rebates for expenses incurred in developing overseas markets, rebates for expenses incurred by startups raising capital overseas and tax credits for startup companies on their initial international sales.

- Encourage overseas embassies, posts and offices to continue to provide support for Australian researchers and business, including startups, in their endeavours to collaborate, raise capital and do business in overseas markets. Support would assist trade missions, and attendance and presentations at key international conferences, such as BIO, to showcase Australia's R&D capability, build research and business links, and facilitate export deals and new investment into Australia.

- Consider facilitating the connection of Australian researchers with strong international collaborations and multinational research collaborations.

Term of Reference (j) - Policy options to create a seamless innovation pipeline, including support for emerging industries, with a view to identifying key areas of future competitive advantage

Where a nation or state chooses to invest its research effort will depend on many factors that give it a competitive advantage, such as natural endowments, geographic location, infrastructure, workforce capacity and disruptive changes in technology. In conjunction with the Queensland Science and Innovation Action Plan, Queensland's *Science and Innovation Investment Framework* and the science and research investment decision rules (The R.E.D.S.) have been developed. These will help inform and support better assessment in the Queensland Government's decision making on future, targeted investment. A copy of this framework and investment decision rules are available at http://www.qld.gov.au/dsitia/assets/documents/science-innovation-framework.pdf

Areas for Federal Government consideration

- To ensure a seamless innovation pipeline, it is important for funding and momentum to be sustained.
    - Consider a regular review of research priorities, perhaps every 3 years. Competitive advantage criteria should be used to determine research priorities. This will inform science and innovation investment and the extent to which it should be re-calibrated.
- Consider a greater policy focus on developing skills in occupations linked with growth sectors and areas of competitive advantage. This could be addressed within the scope and guidelines of the Industry Skills Fund.