The Australian National Science Statement – A plan for a plan?

by Andrew Gregory and Mark Teoh

The Australian Government has released the National Science Statement setting out its long term vision and objectives for Australian science as part of the overarching National Innovation and Science Agenda.

Australia has a proud legacy of innovation, with Australians being integral to the development of many key technological advances, ranging from the bionic ear to Wi-Fi technology.

It is clear from the release of the Statement, along with the development of both the innovation agenda and 2030 Strategic Plan, that the Government wants to build upon this legacy, in part by increasing both public private investment in research and development (R&D), but also by ensuring that an appropriately skilled workforce is available to work in the various STEM areas.

The Science Statement is aimed at providing an enduring framework to guide Government decisions relating to science. This will complement the work of Innovation and Science Australia, which is developing a long-term 2030 Strategic Plan for innovation, science and research that is expected to be released later in 2017. Submissions for the Strategic Plan are due by 31 May 2017.

Although in one sense, the Science Statement is in itself the Government's plan for a plan, it is encouraging to see a clear commitment to science and recognition of the role science plays in our society and economy.

In this article, we summarise the Science Statement, consider the implications for intellectual property rights, and explore the more practical question of "What does this mean for us?"

1. The Past: A Legacy of Success

The Science Statement recognises that Australia has a rich history at the forefront of science, with many Australians playing a key role with innovations that have changed many lives around the world. Notable Australian innovations, to name a few, include:

- The world's first electronic heart pacemaker developed by Dr Mark Lidwill and Edgar Booth.
- The Cochlear implant (bionic ear) developed by Professor Graeme Clark.
- Professor Fiona Wood's spray-on skin treatment for burns victims.

FB RICE

The IP Navigators

- Wi-Fi technology developed by John O' Sullivan and the CSIRO.
- Howard Florey's work on penicillin as a practical medical treatment.

What does this mean for us?

We Australians are an innovative bunch. We have already shown that we can produce world-changing products that can help in many aspects of life. As Steve Jobs once said:

> *"The ones who are crazy enough to think they can change the world are the ones who do."*

So…innovate, innovate, innovate.

2. The Present: Australia's Science System

Government, businesses, universities, research institutions, schools and other education providers all play important roles in shaping Australia's science system.

Australian Businesses

Australian businesses contribute more than half of the total of investment in research and development (R&D) in Australia. Businesses drive innovation by generating commercial returns from research and delivering economic benefits from science.
**In 2013-14, Australian businesses spent $18.8 billion on R&D.*

Australian Universities

Australian universities develop the nation's scientific workforce across the full spectrum of science ranging from basic to applied research. Crucially, universities represent a critical transfer of knowledge and skills from the research sector to the wider economy.
**In 2014, Australian universities spent more than $10 billion on R&D.*

Research Institutions

Research institutions are at the cutting edge of science and technology and focus on delivering improved social outcomes from research. Research institutions frequently collaborate with universities, business and the community to solve key issues facing the nation and the world. Australia's publicly funded research agencies include the Commonwealth Scientific Industrial Research Organisation (CSIRO), Australian Nuclear Science and Technology Organisation (ANSTO), the Bureau of Meteorology and the Australian Centre for International Agricultural Research.
**In 2014-15, Australian research institutions spent more than $1 billion on R&D.*

Schools and Other Education Providers

Schools and other education providers, such as museums, science centres and extra-curricular science engagement activities, all help to create a scientifically aware culture by introducing children to science and keeping them engaged with science throughout the education system.

Government

The Government's contribution to R&D has increased in the past decade from $6.6 billion in 2006-07 to $10.1 billion in 2016-17. As part of this, the Government has made a number of significant long-term commitments, which include the Medical Research Future Fund and $2.3 billion over 10 years towards supporting research infrastructure through the National Innovation and Science Agenda (NISA).

The Science Statement does, however, reveal some worrying trends.

- Over recent decades, Australia's overall investment in R&D was on a steady rise, peaking at 2.25% in 2008-09. However, recent investment has been declining, falling to 2.12% in 2013-14.
- Synonymously, recent overall decline in investment has also seen a slight fall in Australia's ranking relative to other OECD countries from 14th in 2008 to 15th in 2015.
- Recent overall decline in investment was mainly due to a fall in business investment from 1.3% to 1.2%.

- The Science Statement suggests that an indicator of the underlying problem of declining investment is that a low 4.8% of businesses collaborate with a university or publicly funded research institution.
- Enrolment in science, technology, engineering and mathematics (STEM) subjects in Australian schools has been declining and is at its lowest level in 20 years.
- Australia's performance in STEM subjects are also slipping.

What does this mean for us?

Whilst Australia has strong rates of researcher-to-researcher collaboration, more is needed to support and improve researcher-to-business and business-to-business collaboration (both of which have been indicated as being weaknesses of the Australian science system). Although R&D tax incentives are in place to help encourage businesses to engage in R&D, based on recent trends discussed above, it is clear that more needs to be done to incentivise industry to collaborate more broadly in research, rather than reliance on tax incentives alone.

IP arrangements offer opportunities for creators of new and valuable innovations to secure returns to motivate their endeavour or investment. For example, IP rights are a powerful tool for new businesses to attract investors and gain revenue streams through strategic licensing.

That being said, Australia has however seen a decline in the Global Innovation Index for 2016, moving from 17th place in 2015, to 19th in 2016. Intellectual property (IP) filings can provide an indication of innovative activity. In the World Intellectual Property Indicators 2016, only 8% of patent applications filed in Australia were by domestic applicants.

This contrasts with the 49% of US patent applicants belonging to US based parties. When developing the various innovative polices, the Government needs to determine the reason for the lower filings by Australian inventors.

A continuing decline in participation and performance in STEM subjects in our schools will inevitably lead to a skills shortage in Australia. Therefore, more is needed to ensure that Australians have the skills required to innovate. Arguably, recent cuts to the budget of CSIRO and politically-driven changes to the scientific agenda have only strengthened the younger generation's belief that career prospects in science are poor.

3. The Government's Vision

The Government's vision: "*is for an Australian society engaged in and enriched by science*".

To realise this vision, the Government sets out four broad objectives.

- **Engaging all Australians with science** by ensuring that science is interesting, relatable and valued, opportunities in science are rife, and policies and decisions are evidence-based.
- **Building Australia's scientific capability and skills** by ensuring that scientific education is of high-quality and relevant for multidisciplinary careers, all Australians have basic scientific knowledge and skills, and flexible career pathways are supported between research and industry sectors.
- **Producing new research, knowledge and technologies** by ensuring that high-quality, world-leading research takes place across Australia, Australian scientists have access to research infrastructure and landmark research facilities both domestically and internationally, and research organisations transfer high-quality knowledge.
- **Improving and enriching Australians' lives through science and research** by ensuring that science leads to increased productivity, improved social, economic, health and environmental outcomes, and challenges are faced through science.

What does it mean for us?

The Government recognises that a holistic view should be taken and that all areas of Australia's science system are important for overall performance.

4. The Role of Government

The Government's primary role in supporting research in the STEM sector comes in the form of funding primary research and development. The Science Statement acknowledges the importance of this funding and, critically, as identified in a previous Productivity Commission report, although research may be *"complex, long-term and [result in] uncertain outcomes"* ultimately, public investment in STEM develops *"important economic, social and environmental benefits"*[1] for Australia.

The report promotes the Government as an active participant in science. The Government directly funds research agencies, such as CSIRO, and supports the development of scientific infrastructure, including the Synchrotron, in part to help foster collaboration via schemes such as the National Collaborative Research Infrastructure Strategy. It also utilises scientific developments to provide technical solutions in areas such as health and defence, therefore research based on scientific discoveries can help in both domestic and foreign matters.

In order to develop an appropriate framework and series of policies to support an innovative market, the Government intends to draw from a number of sectors and areas of expertise. By listening to the voices of a diverse array of parties, the Government intends to build upon known strengths and identify and reduce perceived gaps in Australia's scientific capabilities.

In order to organise a strategic direction for Australia's innovative future, the Science Statement focusses on a number of principles, including:

- recognising that science is fundamental to the economy and social wellbeing, and core to the mission of the Government
- focusing on high-quality research;
- providing stable and predictable support for basic and applied research;
- encouraging collaboration across sectors both domestically and internationally;
- maximising opportunities for all Australians to engage with science;
- measuring and reporting performance of the science system as a whole and for individual Government agencies; and
- seeking advice from experts in their respective fields in assessing priorities and research quality and in making policy.

What does this mean for us?

The following statement is important:

> *"Science outside Government does not happen in isolation from it—it is shaped by Government policy settings, leadership, institutional arrangements, rules and regulations."*

Whilst there is a good intention with regards to the focus of the Science Statement, is the term "innovation" being used as a management buzzword?

The approach to scientific policy needs to be apolitical, especially with regards to the research priorities. Advances with R&D and technology do not happen overnight, and the creation of an environment that inspires, supports and encourages innovation requires time. It is therefore imperative that we see sustained financial investment in businesses that are based on research developments in their infancy.

Long term plans need to be put in place and successive Governments need to build upon the plans instead of reinventing the system every three or four years in order to give researchers, investors and organisations a sense of certainty around STEM arrangements. Although the Science Statement acknowledges this, all political parties, along with the various R&D stakeholders, will need to come to

[1] *Public Support for Science and Innovation, March 2007, p. XVI*

the metaphorical table in order to undertake positive actions, as opposed to mere "talk":

> *"Realising the Government's vision will require secure, predictable and patient investment in all parts of the science system, with support for the development of knowledge and skills, reliable and accessible enabling infrastructure, and a commitment to sharing and applying new discoveries."*

Commissioning agencies to prepare reports is one thing; utilising these reports to actually take some tangible action is another matter entirely. In order to foster an innovative environment where researchers, investors and businesses are willing to engage with one another and develop new products and services, they need some security. From an economic perspective, the Government should accept that some financial investment can pay dividends in the future. A short-term "hit" to Government funds can be a great long term investment in order to produce "important economic, social and environmental benefits." The old adage "short term pain [possibly in a budget sense], long term gain", can show all parties that Australia has a long term plan and an investment in the country (in terms of time, resources, expertise, i.e., not just financial investments) is an advantageous strategy.

The Science Statement is surprisingly silent on one important aspect of innovation, that being IP rights and its role in the proposed initiatives. This omission is strange given that IP Australia is a government agency, and one that is ideally placed to promote and encourage innovation.

The Government should ensure that a robust and effective system exists for the protection of IP rights. This is especially important given the release of the Productivity Commission's report "Intellectual Property Arrangements", which provides a number of recommendations for "improving" Australia's IP system. With respect to the patent system, recommendations include, amongst other things: raising further the bar on inventive step to a level which is higher than major jurisdictions such as the US or Europe; raising fees for granted patents; and abolishing the innovation patent system (as opposed to modifying and improving the innovation patent system). Arguably, each of these proposals renders an Australian patent a less desirable investment.

IP Australia offers a raft of tools that can be used by patent applicants to help with protecting their inventions, including expedited examination of patent applications directed to, for example, green technology, and providing a search report for provisional applications which can help patent applicants decide whether a patent application will be difficult to prosecute in Australia and overseas. The latter tool may be useful to attract financial support if the report identifies a potentially favourable outcome.

The Government therefore needs to be mindful of IP rights given how these assets are intrinsically tied to innovation.

5. Areas of Government Focus

So what are the priorities of the Government with regards to their support of research and the associated infrastructure?

NISA outlines areas of action, including the advancement of quantum computing technology, helping the funding of early stage innovations, tax incentives, and promoting women in STEM environments.

As mentioned earlier, the Government has commissioned Innovation and Science Australia to develop a 2030 Strategic Plan in order to help guide investment in the Australian innovation, science and research system.

Submissions for the plan are open until 31 May 2017. The plan focusses on a raft of topics including:

- **collaboration** with rising economic powers such as China and India;
- **regulatory reform** to foster innovation;

- **creating a cohesive education and training system** which is tied to the innovation and research system; and
- **increasing people and idea exchanges** between industry and research.

One area of particular importance is the development of skills in the STEM field. In order to encourage individuals to gravitate towards jobs in the STEM area, the Science Statement highlights the importance of promoting the relevance and application of science and technology in all areas of life, by all levels of Government, regardless of the state or territory. This ensures that the public is fully aware that science, engineering and mathematics are not stand-alone academic areas which affect a minority of individuals, but that these areas do play in an important role in our lives.

Collaboration is also another key aspect for the Government. Many businesses can utilise the vast array of knowledge, expertise and equipment at universities and research institutions in Australia. Research institutions can also look to the private sector for financial aid and the promotion and protection of their scientific endeavours.

What does this mean for us?

If the Government wants to develop the STEM sector they will need to ensure that there are enough individuals who are able to take on the various roles which are created. Increasing the number of highly skilled individuals can work on two fronts. On one front, individuals with key experience and skills in STEM areas can be encouraged to move to Australia from overseas. On another front, there needs to be a focus on education and training for domestic parties, both in terms of academic and vocational training. The latter should be part of a long term plan, where education should ensure adequate access to teaching and hands on experience in STEM industries.

Education, training and the creation of jobs in the STEM sector will have to be developed together. Whilst improvements in teaching can generate a large population of skilled individuals with an array of expertise between them, there needs to be sufficient opportunities for these individuals to work in Australia and avoid a "brain drain" due to limited career prospects. In order to retain the domestic talent (and attract skilled parties from overseas), Australia needs to be promoted as a country where businesses and research organisations can develop, test and ultimately utilise the results of their R&D efforts. On the education front, schemes such as *Inspiring Australia* can help promote the role of science and show how the developments impinge on everyday life.

The mechanisms in place for obtaining and protecting IP rights are an integral part of the "research infrastructure" that the Government intends to support. A response to the Productivity Commission's recent report must be considered carefully in light of the proposals outlined in the Science Statement as this will have a strong bearing on the direction that innovation takes in this country.

6. The Future

A number of key events will occur in 2017, including:

- delivery of the 2030 Strategic Plan by Innovation and Science Australia;
- a response to the Productivity Commission's 2016 "Intellectual Property Arrangements" report;
- the Government's response to the 2016 National Research Infrastructure Roadmap;
- the Medical Research Future Fund disbursing funding, and
- release of the National STEM School Education Strategy 2016–2026 which sets out actions to lift foundational skills in STEM learning areas.

What does this mean for us?

Ideally all these developments will work in a synergistic fashion in order to develop and promote the skills and expertise in Australia and identify the

country as an attractive innovative hub that allows the retention of our domestically educated workers and attracts skilled individuals and companies from overseas.

Conclusion

The National Science Statement affirms the Government's support for science as a driver for economic and social advancement. We now need to see this long-term vision and approach to science and innovation in all fabrics of Government, particularly in its policies and principles.

This approach should be developed in tandem with IP policies to ensure that a robust and effective system exists for the protection of IP rights. Although not every R&D development will lead to a patent, design or associated trade mark, the options available for ultimately protecting the fruits of the R&D labour should be promoted so that parties are aware of their options.

The Government is currently considering its final response to the Productivity Commission's report. Clearly, IP and innovation are intrinsically tied, hence this response will have a strong bearing on the course of Australia's innovation landscape and the beneficial outcomes the Government intend to reap.

At this stage it appears that the intention of the Science Statement and the Productivity Commission's report are not aligned. Given the fact that intellectual property and innovation are not mutually exclusive, if Australia is going to move into an "innovative era", all Government agencies, including IP Australia, need to work together on a clearly defined course and start laying the ground work for implementation of an innovation plan.

We now eagerly await the release of the 2030 Strategic Plan and the Government's response to the Productivity Commission's report, which will hopefully provide details on turning vision into action. We will provide updates regarding the Plan and response as they are released.

Andrew Gregory *is an Associate in our Sydney Chemistry team. Andrew provides advice to both domestic and international clients, utilising Australian and New Zealand practice to help with the commercialisation of his clients' products. His client base covers universities to global companies in a range of technological areas including: pharmaceuticals, polymers, veterinary sciences, green technology, inorganic materials and nanotechnology.*

Mark Teoh *is an Associate in our Sydney Medical Technology team. Mark has a range of experience across all areas of mechanical engineering with a particular focus on medical technology and mechatronic systems, including medical imaging, implantable bionics, ophthalmic treatments and devices, surgical devices, medical devices, humanoids, prosthetics, diagnostic devices and industrial robotics.*

For further information on the Australian National Science Statement please call +61 2 8231 1000 or email Andrew or Mark directly at agregory@fbrice.com.au or mteoh@fbrice.com.au.