Science & Technology AUSTRALIA

2020-21 Pre-Budget Submission

20 December 19

To the Treasury,

Thank you for the opportunity to provide a submission to inform the 2020/2021 Federal Budget.

Science & Technology Australia (STA) is the peak representative body for more than 88,000 scientists and technologists in Australia through our member organisations, including associations and societies, research institutes, and research strategy bodies such as councils of deans. Our mission is to connect science and technology with governments, business, and the community, to enhance the role, reputation and impact of science.

Across the globe almost all countries recognise the important of strong investment in science and technology. This investment, from both private and public sources, ensure global problems can be solved and a nation can create the jobs and economy of the future.

Since the global financial crisis investment in science and technology in Australia has failed to keep pace on a global scale. Falling investment from all sectors and the STEM workforce growing at a lower rate than needed highlight the importance of a national, long-term strategy for science and technology in Australia. With an anticipated budget surplus now is the optimum time to create and invest in this long-term plan

In this Federal Budget submission, STA has outlined the following measures:

- Funding for the Department of Industry, Innovation, and Science to organise and host a science & technology national plan development forum;
- An increase to base funding for national research agencies and government research institutions of 4% each year over the forward estimates;
- Implementing a 20% collaboration premium on the Research and Development Tax Incentive for industries that work with research institutes;
- Developing a non-medical research translation fund to support the translation of Australia's research into innovative new markets;
- Expanding the Inspiring Australia program and continued commitment to supporting Science meets Parliament;
- Making demand driven funding available for STEM courses where skill shortages exist in Australia;
- Investing in an Australian Indigenous Science Network; and
- Provide support to STEM professional societies undertaking diversity and inclusion projects within their field.

Associate Professor Jeremy Brownlie
President
Science & Technology Australia

Kylie Walker
CEO
Science & Technology Australia

Introduction

Over the last 12 months, the national and global landscape has changed significantly. A slowing economic outlook[1] along with global headwinds[2] from international trade wars are working to exacerbate challenges faced by a country affected by drought and fire. Australia cannot rely on its traditional industries in perpetuity, and our reliance on our trade partners to bolster our economy leaves the nation vulnerable to the changing geopolitical landscapes. Australia needs to develop new areas of economic growth through innovation and technology.

While there are challenges confronting Australia, we, as a nation weathered the Global Financial Crisis without entering a recession unlike many nations. Yet without strong investment in future innovations and technologies this advantage is now faltering[3].

Reports from the Reserve Bank of Australia[4], the CSIRO[5], and the Productivity Commission[6] have all highlighted the importance of investing in innovation and future technologies as the way forward for the Australian economy.

While the Australian budget has been in deficit, there has been some reluctance from the government to increase investment in science and technology. However, as the budget moves into surplus, the time to invest in these sectors for the country's future economy has come. Such investment requires three focal areas:

- Long-term investment and a whole-of-government plan Australia can push forward as an innovation hub for the world;
- Investment in our future workforce to ensure it is diverse and equipped with the skills it needs we can ensure Australians can compete on a global scale; and
- Ensuring strong links between scientists, business leaders and decision makers to bring everything together.

[1] "Statement on monetary policy – Economic outlook" Reserve Bank of Australia, May 2019

[2] "Rethink policy for a changing world! OECD Economic Outlook" OECD, November 2019

[3] "Compared with the rest of the world, Australia's economy has deteriorated badly across the board" Alan Austin, Michael West, April 2019

[4] "Statement by Philip Lowe, Governor: Monetary policy decision" Reserve Bank of Australia, October 2019

[5] "Australian national outlook 2019: Securing our nation's future prosperity" CSRIO, June 2019

[6] "PC Productivity bulletin" Productivity Commission, May 2019

Research Planning & Investment

Develop a consultative long-term plan for science and technology

Amongst the 80,000+ STEM professionals Science & Technology Australia represents, there is a desire for a whole-of-government long-term plan for the sector[7]. The National Innovation and Science Agenda[8] was an important initiative which was built on by the Australia's National Science Statement[9], but these plans are now 5 and 3 years-old respectively.

STA has previously advocated for a long-term whole-of-government strategy for science and technology in Australia; one that extends a full decade with revision opportunities at a half-way point. Such a plan is modelled on the long-term National Research Infrastructure Investment Plan[10] which, as an investment strategy, was welcomed by the research sector. As the Federal Budget returns to surplus and the economy needs investment, this is the opportune time to create a long-term plan with the science and technology sector.

The Department of Innovation, Industry, and Science recently hosted a one-day policy development workshop on enabling artificial intelligence in Australia[11]. This workshop brought together wide-ranging expertise from policy makers, experts, and industry to produce and present with a heavy focus on producing and presenting real policy outcomes in artificial intelligence. This workshop was extremely successful and provides a model for future development.

STA considers 2020 the right time for government and the STEM sector to work together to develop a plan through a similar program. However, given the scope of a whole-of-government science and technology plan, it may take longer than a single day workshop.

STA recommends: Funding for the Department of Industry, Innovation, and Science to organise and host a science & technology national plan development forum.

Expected Investment: $400,000 for the forum and production of a national plan.

---

[7] "Forging opportunities for Australia" Science & Technology Australia, July 2019

[8] "National Innovation and science agenda report" Department of Industry, Innovation and Science, November 2015

[9] "Australia's national science statement" Department of Industry, Innovation and Science, March 2017

[10] "Facilities for the future: Underpinning Australia's research and innovation" Department of Education, May 2018

[11] "Techtonic: Shaping Australia's AI future" Department of Industry, Innovation and Science, November 2019

Investing in Australia's research agencies and funding bodies

While the grants provided by Australia's research funding bodies have continued to be increased along with the Consumer Price Index in recent years[12], they have yet to recover from the downturn from the Global Financial Crisis. This previous cut, combined with staffing caps on Australia's national research agencies like the CSIRO[13], is putting strain on the important work undertaken by these agencies.

With the Federal Budget returning to surplus it is now time to consider investing in Australia's long-term future. Countries like Israel[14], South Korea, Sweden[15], and Germany[16] have all shown the benefits of long-term investment in science and technology for a future-facing economy. Even China regularly invests in science and technology as part of its long-term economic strategy[17].

In the recent speech from Her Majesty Queen Elizabeth II the importance of science and innovation investment to the British economy was also outlined. The British Government will be raising investment in research and development to 2.4% of GDP by 2027[18]. A large part of this investment will be a focus on visionary high-risk, high pay-off ideas in science and innovation.

Australia may never be able to invest in research at the same absolute quantum as China, but there is capacity to return funding to the peak levels seen in 2011-12. Since then total Australian government R&D investment has fallen approximately 12% (when adjusted for CPI)[19]. This decline in public investment in science and technology research puts the Australian economy at risk, but also jeopardises the health, wealth and wellbeing of our nation, and our natural environment and resources.

---

[12] "Science, research and innovation budget tables" Department of Industry, Innovation and Science, September 2019

[13] "Staff association builds pressure on Marshall to act against CSIRO staffing cap" CSIRO Staff Association, October 2019

[14] "From Israel's 'start-up nation', 4 lessons in innovation" World Economic Forum, September 2019

[15] "South Korea and Sweden are the most innovative countries in the world" World Economic Forum, February 2018

[16] "Germany is the world's most innovative economy" World Economic Forum, October 2018

[17] "The thousand talents plan" The organizing department of the Central Committee of the Communist Party of China, 2008

[18] "Her Majesty's most gracious speech to both Houses of Parliament" Cabinet and Prime Minister's Office, 2019

[19] "Science, research and innovation budget tables" Department of Industry, Innovation and Science, September 2019

A budget surplus is an important goal for any government, but only if it allows a government to invest in Australia's future and improve the lives of its people.

STA Recommends: An increase to base funding for national research agencies and government research institutions of 4% each year over the forward estimates.

Building multi-sectoral support for science and technology

Research collaborations premiums

The review into the research and development tax incentive recommended that a 20% collaboration premium on research undertaken in conjunction with research institutes[20]. This premium would provide industry with financial incentives to work with research institutions and universities.

While large companies may have their own research and development teams, small-medium enterprises do not typically have access to the fundamental research outputs and expertise that exist within Australia's research institutes. A 20% collaboration premium would enable small and medium enterprises to engage with research institutions. Of all the recommendations that arose from the review, this was the most heavily supported by the research sector who recognise the importance of engaging with industry.

STA recommends: Implementing a 20% collaboration premium on the Research and Development Tax Incentive for industries that work with research institutes.

Expected Investment: $305 million over forward estimates

Long-term investment in research translation through a Research Translation Fund

Stimulating business investment in research continues to be a challenge for Australia's research and development sector. The Research and Development Tax Incentive continues to be the largest single source of research funding in the economy yet fails to turn Australia's fundamental research outputs into real world applications[21].

Since the review of the Research and Development Tax Incentive there have been at least two major legislative attempts to change the incentive and kickstart the research translation. The current proposed changes tighten the language around what is considered research & development to discourage the use of the tax incentive by businesses that are undertaking work they would do anyway.

---

[20] "Review of the R&D tax incentive" Department of Industry, Innovation and Science, April 2016

[21] "Science, research and innovation budget tables" Department of Industry, Innovation and Science, September 2019

That is, the Research and Development Tax Incentive should stimulate *new* research and development.

Innovations that are still 7-10 years away from being market ready require stable investment above what industry research and development can provide. Direct public investment into research translation is necessary if Australia wants a vibrant R&D sector that spans both industry and academia.

Australia has already seen the benefits of such investment within the biomedical sector and the success of the Medical Research Future Fund[22]. The MRFF encourages public investment, along with business investment in research translation, both short and long-term. Such a fund provides clear signals to industry investors that this research will translate into real-world applications, thus encouraging investment.

Tinkering around the edge of the Research and Development Tax Incentive may provide some budgetary saving, but STA believes that such savings should be channelled into a Research Translation Fund, implemented by the Australian Research Council in the same way that the MRFF is implemented within the National Health and Medical Research Council.

STA recommends: Developing a non-medical research translation fund to support the translation of Australia's research into innovative new markets

Expected Investment: $2.4 billion over the forward estimates

Linking science, business, and decision makers

Collaboration premiums and direct public investment in translational research are great ways to better link business with science and research. However, there is always a need for better relationships between business, science and decision makers. The Inspiring Australia program and other support mechanisms for decision-maker engagement continue to be a success by funding the Prime Minister's Prizes for Science, Science meets Parliament, and National Science Week[23]. Through programs such as these relationships are forged between these sectors.

The 2019 Science meets Parliament saw meetings occur between STEM professionals and more than 60 parliamentarians in a single day[24]; National Science Week hosted more than 2,000 events nationwide[25]; and the PM's Prizes

---

[22] "Medical Research Future Fund" Department of Health, Accessed December 2019

[23] "Inspiring Australia: Science engagement in Australia" Department of Industry, Innovation and Science, October 2019

[24] "Science meets Parliament 2019: Science has so much to say" Science & Technology Australia, December 2019

[25] "Thank you to all who contributed in 2019" National Science Week, August 2019

for science saw Professor Cheryl Praeger recognised for her contributions to group theory, permutation groups and combinatorics[26]. These events should be celebrated as great events within the STEM sector, but also opportunities that bring the nation together under the banner of science.

The success of these initiatives in bringing STEM to schools, the public, and parliament house shows how important they are to the future of STEM in Australia. We support increased investment and commitment to these initiatives so that their success grows for both the government and the STEM sector. There are fantastic opportunities within the sector to connect science with business, the public, and STA recommends that the government not only maintain the Inspiring Australia grants but expand this program.

STA recommends: Expanding the Inspiring Australia program and continued commitment to supporting Science meets Parliament

Expected Investment: Increase support for Inspiring Australia and Science meets Parliament to a total of $2.5 million over forward estimates.

STEM Education Investment

Targeted demand driven funding for areas of skill shortages

Australia still faces a skills shortage in engineering and information technology, which risks Australia's puts our contributions to the digital revolution. STEM qualified workers are currently increasing at a rate of 15% per year (non-STEM qualified workers are increasing by 26% per year) this is insufficient given STEM jobs are increasing 1.5 times the rate of non-STEM jobs[27].

By replacing the demand driven system with performance-based funding, there is a risk that universities will focus on enrolling students in courses that are more financially rewarding rather than where graduates are needed. STA has previously expressed concerns that commonwealth funding caps would mean universities priorities enrolling students in programs like business instead of more financially intensive science courses[28].

While STA was a supporter of the demand driven system, we acknowledge that performance funding is the current government policy. However, the success of the demand driven system in increasing student enrolments cannot be overlooked. STA, therefore, considers the use of demand driven funding for

[26] "Prime Minister's Prizes for Science 2019" Department of Industry, Innovation and Science, October 2019

[27] "Perspectives on education and training: Australians with qualifications in science, technology, engineering and maths" Australian Bureau of Statistics, 2015

[28] "Performance-Based Funding for the Commonwealth Grant Scheme" Science & Technology Australia, February 2019

areas of skills shortages such as information technology and engineering to be a useful policy lever to address these shortages.

STA recommends: Making demand driven funding available for STEM courses where skill shortages exist in Australia.

Diversity and Inclusions in STEM

Investment in Indigenous networks for the STEM community

A significant challenge for the science, research and education sectors is engagement of Aboriginal and Torres Strait Islander peoples. While some strategies are being implemented through Universities Australia[29] to increase the number of Indigenous students participating in universities, there is still more work to do.

A major barrier to participation for Aboriginal and Torres Strait Islanders is the racial and cultural divide that exists in universities[30]. To overcome feelings of division and isolation, there needs to be investment in developing networks of Indigenous STEM professionals. Through developing professional networks, Aboriginal and Torres Strait Islander peoples can create more appropriate mentor relationships, have a better sense of place, and receive support for the unique challenges they face.

While developing a professional Indigenous STEM network is already being considered, investment from the government is required to overcome challenges in setting up such a national network.

STA recommends: Investing in an Australian Indigenous Science Network

Expected Investment: $4 million over the forward estimates

Supporting professional societies to improve diversity and inclusion at a grassroots level

Along with developing a unique Aboriginal and Torres Strait Islander STEM network, the need for STEM professional societies to undertake diversity and inclusion projects should be explored. Professional societies are central to the STEM sector and they assist in developing policies and professional guidelines and help shape the careers of STEM professionals. Driving change through these professional societies from the ground up would provide a significant opportunity to improve diversity and inclusion within the STEM sector. To

[29] "Indigenous Strategy 2017-2020" Universities Australia, 2017

[30] "Why many high achieving indigenous students are shunning university" Professor Jenny Gore, The Conversation, 2017

support these initiatives, the Federal government must provide support and incentives.

STA recommends: Provide support to STEM professional societies undertaking diversity and inclusion projects within their field.

Expected Investment: $260, 000 per year over the forward estimates