Science & Technology AUSTRALIA

2021-22 Pre-Budget Submission

29 January 2021

EXECUTIVE SUMMARY

Over the past year, the world has faced a crisis unprecedented in modern history.

The coronavirus pandemic has claimed more than two million lives, wreaked havoc on national economies, and dramatically changed the way people live, work, and interact.

Even as many other countries continue to battle widespread infections and high death rates, Australia has – by comparison – weathered the storm enviably well. It has done so because, at all levels of government, our political leaders and policymakers have made science their lodestar.

Science has been the guide by which we have navigated the COVID crisis. The deep expertise of Australia's scientific researchers, leaders and institutions has saved lives and livelihoods. It has enabled us to return to a relative normality of life which is the envy of the world.

The scientific capability that has guided Australia so successfully through this crisis is a product of long-term investments in the country's scientific workforce and architecture. Science investments made over decades have come into their own in this moment of need.

Yesterday's investments in the CSIRO and Australian Synchrotron secured today's expert capabilities to test vaccines and guide a local manufacturing and rollout strategy. Yesterday's investments in giant supercomputers at the Pawsey and the National Computational Infrastructure secured today's ability to crunch vast datasets to design strategies to contain the spread of COVID-19. And yesterday's investments in educating scientists and researchers at our universities and medical research institutes secured their ability to nail key insights on how to stop the virus in its tracks.

With the crucial role of science front and centre in the public mind, now is the time for the Australian Government to secure the future science capability we will need to face the next crisis – and the one after that. None of us can predict the form the next crisis may take. That is why the expert capability of our scientific architecture must be both wide and deep.

We urge the Australian Government to seize this historic opportunity to secure Australia's future safety by making a once-in-a-generation seismic investment in science in the 2021 Budget. This would be a defining legacy for the Government and the nation. A 'Science Future Fund' or 'Research Translation Fund' would be a powerful vehicle to deliver this ambition.

Science & Technology Australia proposes the Government use the May 2021 Budget to make long-term reforms that create a powerful legacy. These include:

- Secure Australia's capability to respond to future crises by establishing a new 'Science Future Fund' or 'Research Translation Fund' to help turn more of Australia's science into rapid applications;

- Tackle the urgent need to stop the brain drain of young people out of STEM and boost future STEM talent for Australia with a new strategic initiative to inspire more Australian school students into science, technology, engineering and maths;

- Tap into deep Indigenous knowledge in science, technology, engineering and maths by investing $4 million over four years to support the establishment of an Australian Indigenous Scientists/STEM Network;

- Invest in a comprehensive long-term national plan for Australian science and technology with funding for a major stakeholder engagement forum organised by the Department of Industry, Science, Energy and Research;

- Continue the commitment to nurture expert STEM advice and connections for policymakers with a long-term endowment to support Science Meets Parliament;

- Instigate an initiative to track the loss of researchers and scientists from Australia's university sector and a program to provide workforce bridging for those affected;

- Secure the future of rapid real-time science expertise to policymakers through an investment in the Rapid Research Information Forum;

- Boost base funding for national research agencies and Government research institutions by 4% each year over the forward estimates;

- To keep STEM talent in the national workforce and economy, STA recommends the Government add a 20% premium rate to the existing R&D tax incentive for firms who hire STEM talent lost from our universities and public research bodies during COVID-19;

- Institute demand-driven funding for places in STEM courses where skill shortages exist in Australia; and

- provide support to STEM professional societies to broaden diversity and inclusion in their fields of STEM.

Science & Technology Australia (STA) is the peak representative body for more than 88,000 scientists and technologists in Australia. We connect science and technology with Governments, business and the community to enhance science's role to solve some of humanity's greatest challenges.

We commend these proposals to you for the May 2021 Budget.

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INTRODUCTION

Across the globe, the coronavirus pandemic has taken more than two million lives, caused seismic shocks to economies, and caused untold disruption and damage to peoples' lives and livelihoods.

Yet here in Australia, infection rates have remained resolutely low, many of the jobs lost in the initial stages of the pandemic have come back, and Australians' trust in government has risen.

This comparatively successful outcome is not the result of luck or fluke. It is because at all times, at all levels of government, policymakers have heeded scientific advice, communicated it to the public, and used it to guide and inform policy. The rich quality of scientific advice and evidence that Australia has been able to call upon in the crisis is a result of sustained investment in its scientific architecture, institutions, and knowledge.

This year has been a clear demonstration of the value of Australian science, and highlights the importance of continued strategic investment to ensure the country is similarly well-prepared for the next crisis.

The proposals in this pre-Budget submission represent sensible, affordable, and practical ways that we can both secure our current scientific expertise, and prepare ourselves for the future.

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

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 to ensure Australia can compete on a global scale; and
- Ensuring strong links between scientists, business leaders and decision makers to identify and seize new opportunities for Australia.

The proposals submitted here address significant challenges and opportunities, and ensure Australian science can continue to provide and build on the research, development, and innovation that have served us so well in our moment of need.

A RESEARCH TRANSLATION FUND

RECOMMENDATION: Create a non-medical research translation fund to support the translation of Australia's research into innovative new products, services and jobs.

INVESTMENT: $2.4 billion over the forward estimates

COVID-19 has presented major challenges beyond the medical threats it poses. It has also highlighted an urgent need to bolster Australia's sovereign capability. A decline in traditional manufacturing over several decades and missed opportunities to innovate have left us at the mercy of other countries. This pandemic has forced deep reflection across Australian industry about supply chain reliance on overseas suppliers, and focused minds on building stronger sovereign capability in Australia. To keep up with global competitors, we need a strengthened Australian advanced manufacturing capability underpinned by high quality Australian research and development.

The Medical Research Future Fund (MRFF) has come into its own in 2020. The fund not only provides long-term funding stability, but can be used to rapidly address national emergencies like the COVID-19 pandemic and the effects of the pandemic and bushfires on mental and physical health. It also helps prepare the country for the next crisis to come.

To improve Australia's sovereign capability and our economic recovery, investment in medical research translation won't be enough. The model of the MRFF, however, points Australia to a solution to our economic and sovereign capability challenges. A new Research Translation Fund would be a vehicle to enable "almost there" research insights to be developed and made here in Australia. Applying this research would create new local jobs, and generate new markets to boost Australia's economic recovery. They would drive our national strategy to bolster our sovereign capability.

There are two clear options to fund the creation of a new Research Translation Fund. STA's recommendation is that any savings from changes to the Research & Development Tax Incentive could be used to create a new Research Translation Fund. While most comparable countries rely on a combination of direct support (grants and interest free loans) and indirect measures (tax incentives) to encourage business investment in research, Australia relies heavily on indirect measures (the R&D tax incentive). A research translation fund from any savings from the RDTI would create extra policy levers to encourage investment and bring Australia closer into line with our economic competitors.

The second option for funding the Research Translation Fund would be to endow a Research Translation Future Fund. The benefits of this measure would be to create a long-term and more stable research funding resource - just as the MRFF does in medical research. However, a future fund model would mean resources would not immediately be available to aid in Australia's urgent need for economic recovery and sovereign manufacturing capability.

STA also sees a strong and expanded role in this economic recovery plan for Government support for industry-led research programs such as Cooperative Research Centres Projects (CRC-Ps) grants program. A boost to funding for this program would help to kick-start the

recovery and strengthen Australia's sovereign manufacturing capability. To the surprise of industry, the most recent CRC round - round 10 - was only open to smart recycling projects, and the money is only half the level of the previous round. This CRC program should be boosted and open to the breadth of industry sectors.

ESTABLISH AN INDIGENOUS SCIENTISTS/STEM NETWORK

RECOMMENDATION: Tap into deep Indigenous knowledge in science, technology, engineering and maths by investing $4 million over four years to support the establishment of an Australian Indigenous Scientists/STEM Network

Australia has deep STEM expertise in the Aboriginal and Torres Strait Islander knowledge systems of this continent. This is expertise on which our country can and should draw more deeply, particularly in our policy approaches to fire, land, water, and ecology. Yet Aboriginal and Torres Strait Islander people remain seriously under-represented in formal STEM study and STEM professional careers. As a nation, we would benefit strongly from deepening Indigenous participation in STEM and drawing more deeply on Indigenous knowledge.

Towards this goal, in 2020, Science & Technology Australia worked closely with our two Indigenous member societies – Deadly Science and the Aboriginal and Torres Strait Islander Mathematics Alliance (ATSIMA) and Kamilaroi water scientist Associate Professor Bradley Moggridge to issue a callout for people interested in forming a network of Aboriginal and Torres Strait Islander STEM professionals. An historic first gathering of this network was held in November 2020, with organisational support from STA and Indigenous facilitation supported by the Australian Academy of Science and the Academy of Technology and Engineering. A second gathering is planned for February 2021 – but resourcing is needed to help formally establish a network which would be Indigenous-led and Indigenous-run. A network would better support Aboriginal and Torres Strait Islander people in STEM, which in turn will help tackle underrepresentation in recruitment, participation and retention.

Science & Technology Australia recommends the Australian Government include a new policy proposal in the 2021 May Budget to resource the establishment and first few years of operations of an Indigenous Scientists/STEM Network. If it is the wish of the network, STA would be pleased to auspice funding and staff employment through a grant agreement between us and the Australian Government – but with clear expectation from all that this work will be Indigenous-led and Indigenous-run.

By developing a new professional network, Aboriginal and Torres Strait Islander peoples can inspire more young Indigenous people into STEM, foster mentoring connections, and strengthen support for Indigenous people to seek to work in, and stay in, STEM careers.

Funding would be used to support Indigenous staff to drive the development of the network – reporting to an interim Indigenous leadership group drawn from the fledgling network – and support Aboriginal and Torres Strait Islander STEM professionals to participate.

Should this investment be made, STA would offer to continue playing a supporting role in the development of the network which would be Indigenous-led and Indigenous-run.

LIFELINE FOR SCIENTISTS LOST FROM THE UNIVERSITY SECTOR

RECOMMENDATION: Instigate an initiative to track the loss of STEM talent from Australia's university sector and deliver COVID-19 workforce bridging for the lost generation of scientists by adding a 20% premium rate to the R&D tax incentive for companies that hire STEM professionals who have lost jobs from our public research system.

The university sector has been hit hard over the last year with the loss of international students, forcing many Australian universities into major restructuring and job losses.

Modelling last year from Universities Australia predicted 21,000 jobs would be lost in the second half of 2020 amid the plunge in income from international students. As we enter 2021, the short-term outlook for international students returning to pre-pandemic levels continues to be uncertain, which could risk further job losses in the university science research community.

But while modelling has been done on the potential impact from the decline in international student numbers, and unions have been keeping track of restructuring plans at Australian universities, the true scope of job losses in the university STEM sector is unquantified.

To bounce back strongly from the pandemic, and prepare ourselves for the next crisis to come, Australia needs to do all it can to retain and support its STEM researchers - and to do that, it needs clear data.

STA recommends the Australian Government launch an initiative to collect data and track the numbers of job losses in the university science research community, and provides workforce bridging services to those affected to retain the country's scientific capability.

Australia cannot afford to have a lost generation of scientists. Having invested significantly in the education and expertise of these STEM researchers who face job losses at universities, it would be clever for the Australian Government to adopt a workforce bridging strategy.

To keep STEM talent in the national workforce and economy, STA recommends the Government add a 20% premium rate to the existing R&D tax incentive for firms who hire STEM talent lost from our universities and public research bodies during COVID-19.

Companies could qualify for the premium rate on the salary costs of employing these STEM professionals for a fixed term - initially two years - as a bridging strategy to stop this loss of STEM talent to our economy.

Such an initiative would also help to deliver the Australian Government's and Prime Minister's strong desire for closer industry-university researcher ties - and ensure Australian industry benefits at much greater scale from the STEM expertise our nation has trained.

INSPIRE MORE AUSTRALIAN STUDENTS INTO STEM

RECOMMENDATION: Tackle the urgent need to stop the brain drain of young people out of STEM and boost future STEM talent for Australia with a new strategic initiative to inspire more Australian school students into science, technology, engineering and maths.

2020 has demonstrated to Australians the importance of science, with policymakers clearly relying on scientific evidence to inform the public and guide policy. Around the world, leaders have given regular press briefings accompanied by Chief Scientific Officers, reinforcing the value of science in the minds of the public.

However, despite the increased prominence of science in the public eye, this is not translating into greater numbers of Australian students studying STEM subjects. A lack of specialist STEM teachers in high schools - particularly in rural and regional areas - means many young people are not being encouraged or inspired into studying these subjects.

Additionally, at university level there is a significant disparity at postgraduate level between Australian students studying STEM subjects and their international counterparts. While many international postgraduate students will go on STEM careers in Australia, the imbalance highlights greater capacity to further encourage Australian students, and creates a vulnerability for the country should international students instead choose careers in the home countries or elsewhere.

STA recommends the Australian Government use the groundswell of support for science seen over the last year to launch a strategic initiative to inspire more Australian school students into studying science, technology, engineering and mathematics.

This initiative should take a twin-track approach. Firstly, to fund a communications campaign to excite and inspire students into studying STEM. STA would be happy to provide input into this process. Secondly, to provide funding to Teach for Australia to undertake specific campaigns designed to boost the numbers of specialist STEM high school teachers and deploy them to regional and rural areas.

A NATIONAL PLAN FOR SCIENCE AND RESEARCH

RECOMMENDATION: Invest in a comprehensive national plan for Australian science and research with funding for stakeholder development forums organised by the Department of Industry, Science, Energy and Research.

INVESTMENT: $400,000 for the forum and production of a long-term national plan.

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. The National Innovation and Science Agenda was an important initiative which was built on by Australia's National Science Statement, but these plans are now 5 and 3 years-old respectively.

STA recommends 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 an approach is modelled on the long-term National Research Infrastructure Investment Plan which, as an investment strategy, was welcomed by the research sector.

An Australia 2035 STEM strategy would be a powerful vehicle to seek input from the best minds in our science and technology sector to identify and seize opportunities of strategic value for Australia.

The Department of Innovation, Industry, and Science recently hosted a one-day policy development workshop on enabling artificial intelligence in Australia. This workshop brought together wide-ranging expertise from policymakers, experts, and industry to produce, present and develop policy on artificial intelligence. This workshop was extremely successful and provides a model for a stakeholder development forum.

STA considers 2021 the right time for the Government and the STEM sector to work together to develop a whole-of-government science and technology plan drawing on the expertise of sector stakeholders.

A RAPID REAL-TIME EVIDENCE BASE TO SUPPORT POLICY DECISION-MAKING

RECOMMENDATION: Secure the future of rapid real-time science expertise to policymakers through an investment in the Rapid Research Information Forum.

The COVID-19 pandemic has made the value of a real-time expert evidence base clearer than ever. The success of Australia's pandemic responses has been due to guidance by strong expert evidence. The Rapid Research Information Forum has highlighted how effective the research sector can be at providing advice to assist the Australian Government on urgent national priorities. During the pandemic, it has consistently published high-quality research papers synthesising complex evolving research and evidence to help decision-makers across the Australian Government and the National COVID-19 Commission.

The Office of the Chief Scientist initiated this forum which oversaw this rapid real-time evidence gathering process. It is not only on COVID-19 that strong links between Government decision-makers and the nation's brilliant researchers can be beneficial. The bushfire disaster at the start of the 2020 highlighted exactly how important it is to be able to gather scientific expertise quickly.

This capacity to gather experts and scientific evidence should not be limited to times of national challenges and disasters. The science and research community can provide evidence-based solutions on many more of the nation's current and future challenges. The Office of the Chief Scientist already does an admirable job at providing such evidence-based support. An expansion of this office would, however, allow evidence-based advice to be provided on a much wider array of topics.

The importance of evidence to guide decision-making is also recognised by Chief Scientist roles in some Government departments. But there are thousands more researchers nationwide whose expertise can be harnessed to help the nation to navigate major national challenges.

STA recommends that in this budget, the Australian Government announces funding to expand the Office of the Chief Scientist. This expansion will allow for funding specific short term projects supported by the Rapid Research Information Forum.

A key aspect of this measure would be to include the capacity to liaise with Government departments. STA acknowledges that many Government Departments have a Chief Scientist/science liaisons within them. By expanding the capacity of the Office of the Chief Scientist to support these Departments, the model of Rapid Research Information Forum can be extended across all areas of Government.

The success of Australia's handling of the COVID-19 pandemic has been largely due to the expertise brought together through vehicles like the Rapid Research Information Forum. The opportunity now exists to capture this success and translate it to other urgent national challenges. The STEM community stands ready, willing and able to assist.

LONG-TERM SUPPORT FOR SCIENCE MEETS PARLIAMENT

RECOMMENDATION: Continue the commitment to nurture expert STEM advice and connections for policymakers with a long-term endowment to support Science Meets Parliament.

INVESTMENT: Provide secure funding for a decade for Science meets Parliament through the Inspiring Australia program with a $2.3 million grant in 2021.

Science meets Parliament - which this year celebrates its 21st birthday - forges deep and invaluable connections between Parliamentarians, policymakers and Australia's leading STEM professionals. It plays a unique and crucial role to ensure our Parliament and public service can tap into the strong STEM expertise in our country to inform their work.

Since its inception, the Australian Government has been a strong backer of this outstanding event, with the Department of Industry as foundation sponsor.

This annual event is the biggest single vehicle for deep engagement between our science community and the nation's policymakers. It brings together the full diversity of Parliamentarians with brilliant talent in science, technology, engineering and mathematics to deepen STEM knowledge among policymakers of major scientific advances and promising new technologies and cures.

This annual event develops the policy engagement skills of STEM professionals, and connects them to decision-makers to nurture strong relationships and information flow between the STEM sector and Government and Parliament.

The event has led to enduring relationships between politicians and science and technology leaders; sparked valuable policy change to the benefit of STEM business; catalysed vital skills for a range of Australia's STEM leadership; and has helped to jump start funding and support for important fields of research.

Science meets Parliament has delivered major benefits over the past two decades.

STA recommends the Australian Government continue its support to Science meets Parliament through a long-term grant to secure its financial future for the next decade.

INVEST IN AUSTRALIA'S RESEARCH AGENCIES

RECOMMENDATION: Boost base funding for national research agencies and Government research institutions by 4% each year over the forward estimates.

In 2018, legislation was passed to guarantee increases in investment for the ARC to match the consumer price index. This indexation should be the standard for every Federal Budget, and STA believes all research funds and institutes should have similar increases enshrined in legislation. Without this protection, public research agencies and research funding agencies are required to reduce costs rather than focusing on expanding and enhancing Australia's ability to create and translate knowledge.

Long-term investment in these research institutions and funding agencies is a key component to ensure a balanced approach to research. Investing in translational research may be considered more cost effective in the short-term, when quick outputs are desired, but research translation requires a foundation of blue-sky research to be successful. The "eureka moment" that comes from translation research is achieved thanks to decades of blue-sky research.

Because national research institutions and funding agencies are funded through public investment, they are able to undertake blue-sky research free from conflict and ulterior motives. This can then be used to develop great Australian innovations. For example, the research regularly undertaken by the Bureau of Meteorology is vital to almost all agriculture-related translational research being undertaken in Australia.

It is essential that investment in these research agencies along with investment in the national funding bodies is restored and costs from rising inflation are met.

DEMAND-DRIVEN FUNDING TO TACKLE STEM SKILLS SHORTAGES

RECOMMENDATION: Institute demand-driven funding for STEM courses where skill shortages exist in Australia.

Australia still faces a skills shortage in engineering and information technology, which puts at risk the country's digital economy. STEM qualified worker numbers are currently growing at a rate of 15% per year (and non-STEM qualified workers by 26% per year). This is insufficient given STEM jobs are growing by 1.5 times the rate of non-STEM jobs.

By replacing the demand-driven system, 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 prioritise enrolling students in programs like business and law instead of more financially-intensive science courses.

STA, therefore, recommends the Australian Government restore demand-driven funding for areas of STEM skills shortages such as information technology and engineering as a further policy lever to address these shortages.

STEM DIVERSITY AND INCLUSION PROJECT SUPPORT

RECOMMENDATION: Provide support to STEM professional societies undertaking diversity and inclusion projects in their fields.

INVESTMENT: $260,000 per year over the forward estimates

Along with developing a unique Aboriginal and Torres Strait Islander STEM network, STEM professional societies undertaking diversity and inclusion projects should be supported.

Professional societies are central to the STEM sector. 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.

STA recommends the Australian Government provide support and incentives to STEM professional societies to broaden diversity and inclusion in their fields.

To deliver this, the Australian Government could operate a small grants scheme similar to those for National Science Week grants under the Inspiring Australia program.

Alternatively, STA would be delighted to administer a small grants program on the Government's behalf - leveraging our unique breadth of networks across the Australian STEM sector - to disperse such grants. This would be administered through a rigorous competitive application process using STA's expertise and networks - on a similar basis to how the Australian Academy of Science hosts the Department of Foreign Affairs and Trade's regional collaborations grants program.