

AUSTRALIA AS A STEM SUPERPOWER

POLICY VISION

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INTRODUCTION

Science and technology will enable us to seize the future.

Together, they are key to solve humanity's most complex challenges – and to forge new opportunities for Australia.

To enable them to play this pivotal role, we need to safeguard and strengthen our sovereign science, technology, engineering, and maths (STEM) capabilities.

Our competitor nations have a clear-eyed strategic understanding about how a strong STEM system unleashes economic growth and creates jobs, seeds new industries, and leads to major breakthroughs to save lives.

Australia should be every bit as ambitious in its STEM capabilities as other nations across the globe.

We should aim for Australia to become a global STEM superpower.

In this blueprint, we outline a bold policy vision for how Australia can achieve this.

Through clever strategic investments, leveraged global collaboration, and a coordinated national strategy, we can seize advantages for our nation – and keep pace with the world.

This will enable us to tackle the next big challenges we face at home and abroad.

Science and technology have been at the forefront of Australia's approach to managing intensifying bushfire seasons and a global pandemic. They are essential in the urgent rebuilding of our economy.

A stronger STEM capability will help to save and improve lives – and translate more of our world-leading research into products, services, jobs and industries in Australia.

This blueprint offers Science & Technology Australia's policy vision on:

- A national strategy to extend crucial science and technology capabilities;
- An ambitious target of levelling-up R&D investment to 3 per cent of GDP to keep pace and compete with our international rivals;
- A new \$2.4 billion research translation and commercialisation fund to turbo-charge more of Australia's ideas and innovations into products, services, and jobs;
- A major new initiative to inspire school students to grow their skills, knowledge, and love of STEM in order to arrest the alarming slide in maths and science skills among school students;
- Policy deeply informed by research and evidence;
- Increased and deepened internationally collaborative research and engagement; and
- A diverse and inclusive STEM workforce;

The policies are mutually reinforcing, and of equal importance to the STEM sector.

We commend this policy vision to you.

A COORDINATED STEM STRATEGY

Seizing competitive opportunity

Australia's science and research sector is a powerful national asset.

We rely on it for deep expertise and skill to guide our nation through complex challenges, and to secure our future.

Its strength is essential to safeguard public health and our unique Australian environment, drive recovery, and create new jobs, business and industries.

We must nurture a strong, well-funded, and co-ordinated STEM sector, or we risk our global competitors seizing advantages over us.

We cannot afford to see Australia miss out on opportunities for jobs, industries and stronger sovereign capability here at home.

A coordinated approach to STEM policy is crucial. It offers us the chance to consolidate our natural strengths, generate even stronger economic returns and jobs growth, and become a global STEM superpower.

The Australian Government has an enduring responsibility to articulate an ambitious vision for the STEM sector – and fund it commensurately – to seize the advantage for Australia.

*"If I have seen further,
it is by standing on the
shoulders of giants"*

Sir Isaac Newton

A COORDINATED STEM STRATEGY



Long-term funding stability, security, and confidence are key to maximise this competitive edge.

One of the most powerful contributions Governments can make to Australian research is to lead a coordinated long-range national STEM policy.

The nature of science and discovery requires an approach that extends beyond short-term funding and political cycles.

Taking the long view and setting bold goals is key. The moon race in the 1960s inspired, energised, and focused national efforts in the US. Government should be a cheerleader, advocate, and champion for STEM.

The success of the STEM sector requires a long-term plan and a whole-of-government approach, with strong cross-party support, developed in close consultation with industry and the STEM sector.

A national STEM strategy would maximise our STEM strengths to generate clever solutions to national challenges, drive economic growth, and help Australia stay ahead of major changes in education, jobs, and technology.

Cohesive and comprehensive coordination in STEM policy would secure long-term support for knowledge creation, and its translation.

It would better leverage and coordinate investment across the public and private sectors.

And it would improve the regulatory environment to encourage investment in STEM research and development.

A COORDINATED STEM STRATEGY

Key policy goals

1. A coordinated national plan for STEM that strengthens public investment and maximises opportunities for Australia in knowledge creation, research translation, and public-private partnerships in research.
2. Review and curb regulatory obstacles on STEM to streamline activities and stimulate investment – including cutting duplication in paperwork for medical research ethics approvals or grant applications.
3. Invest in national STEM capability in our publicly-funded research institutions, research infrastructure, and an expanded Office of the Chief Scientist.

Resources and data

- [UK Research and Development Roadmap](#)
- [STA's 2020-21 Supplementary Pre-Budget Submission](#)
- [STA's 20 Pre-Budget Submission](#)
- [National Innovation and Science Agenda report](#)
- [Australia's National Science Statement](#)
- [OECD - Global Knowledge Flows and Economic Development](#)

Key messages

- A strong STEM sector is key to a strong economy and flourishing society.
- Our STEM strength enables us to solve our most complex challenges, strengthen economic growth, and generate jobs now and in future;
- We should aim for Australia to become a global STEM superpower;
- There is a key role for the Australian Government to craft a long-term coordinated plan for STEM investment in Australia – similar to the UK model;
- This would strengthen public funding for research, and facilitate collaboration between Government, researchers and the private sector;
- STEM policy should set long-term goals that extend beyond short-term political and budget cycles;
- State and federal policy and regulatory settings should assist and not inhibit the STEM sector; and
- Investment in Government and publicly-funded research agencies delivers strong returns to Australia far in excess of the levels of investment.

STRONG INVESTMENT IN **RESEARCH AND TRANSLATION**

“Most scientific research, whether in the academic world or in industry, is a hybrid of new knowledge generation and subsequent exploitation. Major innovation is rarely possible without prior generation of new knowledge founded on basic research. Strong scientific disciplines and strong collaboration between them are necessary both for the generation of new knowledge and its application.”

International Council for Science

Investing today to secure tomorrow's wealth

The outlays that nations make today in research and development will shape the returns they see tomorrow.

In recent years, **Australia's international competitors have moved decisively to lift their R&D outlays to generate future income streams for their nations. The United States, Japan, Germany, and Korea accounted for much of that increase.**

Australia invests just 1.8 per cent of its GDP in R&D. This compares to China's 2.1 per cent, the US' 2.8 per cent, Germany's 3.1 per cent, Japan's 3.8 per cent, Korea's 4.5 per cent and Israel's 4.9 per cent. The average investment across the Organisation for Economic Co-operation and Development (OECD) economies is 2.4 per cent.

In the global race to keep pace with the world's best in key science and technology capabilities including in quantum computing, AI and machine learning, Australia needs to make a strategic decision to ramp up its national investment in R&D.

STRONG INVESTMENT IN **RESEARCH AND TRANSLATION**



Setting a bold but achievable target to lift R&D outlay to 3 per cent would be a clever move. It would seize future innovations for Australia as other OECD countries do.

Government, industry, and the research sector would have a role in this expansion. It would be a gamechanger for our future economy.

Science & Technology Australia advocates for a strong balance between 'discovery' and 'applied' research. Discovery research enables us to make major breakthroughs in new knowledge and capabilities.

Translational research takes those breakthroughs and applies them to create new products, services, processes and startups – often in close partnership with industry.

The two parts of the research system enhance and rely on each other.

There is a key role for the Government not just to set a bold strategic vision for R&D and invest in it – but also to facilitate strong connections for research collaboration with industry.

Global innovation powerhouses like Germany and Israel achieve success through strong public and private investment. This is a lesson we can apply in Australia.

Research stakeholders are spread throughout the Government, academic, and private sectors. Each of these parts of the research system should be supported to collaborate.

Australia must have a consistent and clear direction for the STEM sector, aided by a vision set by Government, which lifts public investment towards the goals set by other advanced economies.

STRONG INVESTMENT IN **RESEARCH AND TRANSLATION**

Target policy goals

1. A long-term strategy and an investment plan to lift research funding to a minimum of 3 per cent of GDP.
2. Create a Research Translation Fund to turbocharge Australia's capacity to translate our world-leading research into new innovations and products – and train a skilled cohort of 'bench-to-boardroom scientists'.
3. Include the ongoing costs of maintenance and staffing for research infrastructure and facilities in Government funding.
4. Maintain federal funding to research granting agencies and research institutions; and
5. Increase support to research funding agencies to raise success rates of grant schemes to improve talent retention and avoid lost effort.

Resources and data

- [OECD Main Science & Technology Indicators](#)
- [OECD GERD statistics](#)
- [Germany's framework to lift R&D to 3.5 per cent of GDP by 2025](#)
- [UK strategy to lift R&D to 2.4 per cent GDP by 2025](#)
- [China's strategy to lead the world in science & innovation](#)
- [Australia 2030: Prosperity through innovation](#)



STRONG INVESTMENT IN **RESEARCH AND TRANSLATION**



Key messages

- The investments we make in research and development now will shape our return on investment in the level and sources of our future national income;
- Australia should set an ambitious national goal to lift our investment in R&D to 3 per cent of GDP over the long-term like our key economic competitors;
- An immediate move to this goal would be a Research Translation fund to turbocharge our capacity to translate research into new innovations and products - and training a skilled cohort of 'bench-to-boardroom scientists';
- This will enable us to seize competitive advantages in our areas of STEM strength, leveraging this capability to create new jobs and industries;
- Funding for Australia's major research infrastructure facilities should include the costs of ongoing maintenance and staffing to run them;
- We need to keep funding levels at least where they are now in our major grants programs and research institutions;
- STA advocates for an ongoing balance between 'discovery' and 'applied' research;
- Public good research plays an important role and needs to be supported;
- Translational research often relies on major breakthroughs in 'blue sky' or 'basic' research - which can then be applied in industry;
- That's why we need to invest at both ends of this research spectrum; and
- A new Research Translation Fund and more highly-skilled bench-to-boardroom scientists will help turn more clever Australian science and research into products, services, jobs and startups.

POLICY THAT DRAWS ON **EVIDENCE AND RESEARCH**

Without evidence, policymakers must fall back on intuition, ideology, or conventional wisdom—or, at best, theory alone ... policies that haven't been informed by good evidence and analysis fall prey more easily to the 'Law of Unintended Consequences'—in popular parlance, Murphy's Law—which can lead to costly mistakes.

**Gary Banks,
Former Productivity Commission Chair**



Drawing on strong research expertise to inform policy

Policies informed by robust evidence and research are – by design – more effective, efficient, and deliver stronger value for money to taxpayers and the nation.

Australia has a highly skilled expert community of researchers, statisticians, and social scientists willing to share their expertise with policymakers.

The nation should tap into this 'brains trust' more often and more widely to strengthen policymaking processes – and deliver more effective policy.

The Science Policy Fellowship program – which recruits STEM professionals into public service roles – is just one example of how this can be achieved.

The best argument for evidence-based policy is the counterpoint of evidence-free policy – shaped by anecdotes, gut-feeling or vested interests.

The risks are that material information can be overlooked, and policies may have the opposite effect to that intended.

Conversely, embedding research and evidence in policy-making helps to deliver better services to all Australians.

It can help us to create more jobs, strengthen families, and improve our healthcare, our education system, and safeguard Australia's unique environment.

POLICY THAT DRAWS ON EVIDENCE AND RESEARCH

An evidence-based culture should inform decisions at every level of Government and the public service.

[The Rapid Research Information Forum](#) has shown anew how such expertise can guide more informed and effective policy – including in rapid real-time situations.

Peer-reviewed science highlights a weight of evidence to help design good policy. It is an invaluable tool for public servants and decision-makers – but accessing it can be hard. Stronger ties between researchers and policymakers can help bridge this gap.

Real-time research can add value to taxpayer spending across all areas of government.

To deepen the ties between the research community and policymakers, we need to bolster the opportunities and resources for such connections to be forged.

In the science workforce, hiring and promotion decisions should reward policy-shaping engagement – just as it rewards publications and ‘impact and engagement’ activities.

Universities and funding agencies should champion and reward policy contributions. They could be incentivised to do so through the Excellence in Research for Australia and Engagement and Impact benchmarks.

With its unique reach of membership, Science & Technology Australia is a connector for the STEM community and policymakers.

As well as championing the value of an evidence-based approach, STA will continue to connect policymakers with high-quality research and expertise, and support investments that bolster the uptake of science into policy.



POLICY THAT DRAWS ON EVIDENCE AND RESEARCH

Target policy goals

1. Embed research and evidence more deeply in public policy-making to strengthen policy effectiveness and delivery – to better serve the whole Australian community.
2. Boost the returns to Australia by drawing especially on scientific research to guide the development, implementation, and evaluation of policy.
3. Consolidate Science & Technology Australia’s unique role as a connector for the STEM community to forge links, identify opportunities, and collaborate with policymakers.

Resources and data

- [Evidence-based policy: Australian Public Service Commission](#)
- [Evidenced-based policy-making: Productivity Commission](#)
- [Ten ways to optimise evidence-based policy: ANZSOG](#)
- [A Toolkit for Progressive Policymakers in Developing Countries](#)
- [Governing better through evidence-informed policy-making: OECD](#)

Key messages

- Drawing on robust evidence and research to design policy maximises the effectiveness of policies and their ability to deliver intended goals;
- Evidence-based policy ensures precious taxpayer funds are spent with the greatest effectiveness and value for money;
- Australia has deep skill in its research community – in STEM and beyond– with researchers, statisticians, and social scientists willing to share their expertise with public policymakers.
- The nation should tap into this ‘brains trust’ more often and more widely to strengthen policymaking through robust evidence;
- The [Rapid Research Information Forum](#) has shown anew how such expertise can guide more informed and effective policy – including in real-time situations.



QUALITY STEM EDUCATION FOR OUR **NEXT GENERATIONS**

"We look at science as something very elite, which only a few people can learn. That's just not true. You just have to start early and give kids a foundation. Kids live up, or down, to expectations."

Mae Jemison
(first African American woman in space)



Ensuring our kids can compete for the jobs of tomorrow

STEM education is crucial to set Australia up for the opportunities of the future.

The skills gained in a high-quality STEM education will be essential in many of the new jobs in the years and decades ahead.

STEM jobs are being created at 1.5 times the rate of non-STEM jobs. Yet the STEM-qualified workforce is growing at only half the rate of the non-STEM-qualified workforce.

At the same time, Australia has seen a long-term decline in reading, maths, and science achievement by our students compared to other advanced economies.

The average PISA test results of an Australian 15-year-old in 2018 were more than one full year of schooling behind in maths compared to 2003.

They were almost a full year of schooling behind in science compared to 2006.

Australia urgently needs to boost the performance of our school students in the foundational skills of maths and science right from the earliest years of education.

To achieve this, we need to fix a chronic shortage of specialist skilled maths and science teachers in schools with more effective incentives and recruitment programs.

QUALITY STEM EDUCATION FOR OUR **NEXT GENERATIONS**

Australia needs a renewed national push to promote the excitement, opportunities, and wide applicability of STEM. We must encourage more students to choose STEM study and careers.

Science & Technology Australia would be pleased to partner with the Australian Government to design and deliver such an initiative.

Aboriginal and Torres Strait Islander and regional and rural students have significantly fewer opportunities to engage in STEM education than those based in major cities.

Girls also remain significantly under-represented in STEM education from high school onwards, and the latest STEM Equity Monitor shows girls overall are less confident about their STEM skills than boys.

Addressing these disparities should be key in a new initiative to promote STEM in schools.

The STARportal developed by the Office of the Chief Scientist includes high-quality STEM education resources for families and teachers, but there is not yet wide knowledge of its existence.

Wider promotion and awareness of this portal should be enabled with a specific investment.

In higher education, legislative change in late 2020 cut the cost to students to do STEM degrees and subjects under the HECS-HELP loans scheme.

However, overall resourcing for each student in STEM degrees fell under the new funding formulas introduced from January 2021.

The promised review of the new formula by the Australian Government in mid-2022 should be done sooner and assess the adequacy of resourcing for STEM degrees under the new formulas. It should identify and fix any setbacks for STEM swiftly.

Australia needs a committed strategy to boost STEM skills and STEM graduates, to ensure we have the skilled workforce we need to seize future opportunities.



QUALITY STEM EDUCATION FOR OUR **NEXT GENERATIONS**

Target policy goals

1. A renewed national push to promote the excitement, opportunities and wide applicability of STEM to encourage more students to choose STEM study and careers – and tackle the dropout rate of girls from STEM education.
2. Address the national shortage of specialist maths and science teachers in schools and boost student choice of advanced maths and science including by girls and Indigenous, regional and rural students.
3. Increase use of resources such as the STARportal with further funding to the Office of the Chief Scientist.
4. Ensure the review of the Job-ready Graduates legislation in mid-2022 has a strong focus to assess the adequacy of resourcing for STEM degrees.

Resources and data

- [Student PISA performance in STEM, ACER](#)
- [Student performance in science remains static](#)
- [TIMSS 2019](#)
- [Job-ready Graduates Review needs to focus on STEM funding](#)
- [Australia's STEM Workforce](#)
- [STEM Equity Monitor 2021](#)
- [The Global Innovation Index](#)



QUALITY STEM EDUCATION FOR OUR **NEXT GENERATIONS**



Key messages

- The skills gained from a high-quality STEM education will be essential in many of the new jobs in the years and decades ahead;
- STEM jobs are being created at a rate of 1.5 times the rate of non-STEM jobs. Yet the STEM qualified workforce is only growing at half the rate of the non-STEM qualified workforce;
- High-quality STEM education needs teachers from STEM backgrounds who can impart their knowledge and build enthusiasm for students in STEM;
- The STARportal is a free resource for STEM professionals to provide programs that encourage more students to take up STEM;
- There are many excellent science teachers in Australia and STA will back the Science Teachers Association to provide support and expertise;
- Girls and Aboriginal and Torres Strait Islander and regional and rural students have significantly fewer opportunities to engage in STEM education than those based in major cities.
- Addressing this disparity should be key in a new initiative;
- Australia needs a committed strategy to boost STEM skills and graduates, to ensure we have the skilled workforce we need to seize future opportunities.

A DIVERSE AND INCLUSIVE **STEM WORKFORCE**

“If you want to build teams or organisations capable of innovating, you need diversity. Diversity enhances creativity. It encourages the search for novel information and perspectives, leading to better decision-making and problem solving. Diversity can improve the bottom line of companies and lead to unfettered discoveries and breakthrough innovations. Even simply being exposed to diversity can change the way you think.”

Katherine W Phillips

A strong business case for diversity and inclusion

To deliver the strongest possible STEM capability for Australia, we need to draw on the widest talent pool from across our nation and around the globe.

Diversity is not only inherently important; it is crucial for excellence – and for innovation.

A wide and growing body of research confirms diverse teams and organisations innovate more readily, turning a diversity of insights and questions into stronger design-thinking.

This leads to products and services designed with stronger safety and efficacy for a wider array of people.

Promoting equity, diversity, and inclusion in STEM is a strategic priority for Science & Technology Australia.

As the sector’s peak body, we play a leadership role in creating a welcoming environment for STEM professionals from a diversity of life experiences and demographics.

We encourage organisations that employ STEM professionals to advance this goal.

Women remain under-represented in the STEM workforce – just one in three public sector STEM staff and only one in four private sector STEM workers are women.

A DIVERSE AND INCLUSIVE STEM WORKFORCE

Women in STEM are more likely to be employed in roles that are less senior and less secure – and therefore more vulnerable to job insecurity. The pay gap between men and women is higher in the STEM sector than for the average Australian professional.

And women remain under-represented at the most senior leadership levels in STEM, and more likely to experience sexual harassment.

Game-changing initiatives such as STA's acclaimed Superstars of STEM program – strongly supported by the Australian Government – are crucial to make further strides towards equity and to boost the visible leadership of women in STEM.

Australia has a long tradition of sophisticated STEM knowledge in the songlines and knowledge systems of the diverse First Nations cultures of this continent. Indigenous STEM knowledge should be included in STEM curriculum, research, and partnerships.

More work needs to be done to welcome Aboriginal and Torres Strait Islander people into STEM study and careers. Only 1 in every 200 Indigenous Australians has a STEM qualification – compared to 1 in 20 non-Indigenous Australians.

Early work to establish a new Indigenous STEM professionals network will assist in this goal.

We need to ensure the STEM workforce supports people from culturally and linguistically diverse backgrounds, the LGBTQIA+ community, and people with disability.



Data on LGBTQIA+ participation in STEM is limited, however US research suggests members of the community still face workplace discrimination. Data on sexual harassment in the workplace appears to be worse for women who are LGBTQIA+.

Programs such as Science in Australia Gender Equity (SAGE), the Ally networks at universities across Australia, Queers in Science, and the Universities Australia Indigenous Strategy help address systemic obstacles to diversity and inclusion in the STEM sector.

Many under-represented groups in STEM have factors beyond work – including parenting responsibilities – which can impede their publication records.

Further improvements to Research Opportunity and Performance Evidence (ROPE) assessments by funding bodies and STEM employers can help to achieve equity.

By addressing gender inequity in the economy, it is estimated Australia could potentially add 11 per cent to its yearly GDP. Making further headway on challenges in other aspects of diversity is likely to have similarly positive results.

A DIVERSE AND INCLUSIVE **STEM WORKFORCE**

Target policy goals

1. Champion a diverse and inclusive STEM workforce – reflecting a diverse range of role models – and work with agencies and Government towards that goal.
2. Encourage better implementation of Research Opportunity and Performance Evidence by funding bodies and STEM employers to improve equity.
3. Seek funding for an Indigenous STEM professionals' network to help strengthen partnerships with Aboriginal and Torres Strait Islander communities on research and policy – and deepen recognition of Indigenous traditional knowledge in STEM.

Resources and data

- [How diversity makes us smarter](#)
- [Gender Segregation in the STEM professions](#)
- [Science in Australia Gender Equity](#)
- [Australia's Hidden Resource: The Economic Case for Increasing Female Participation](#)
- [Gender Equity in STEMM](#)
- [Sexual Harassment in the Workplace](#)
- [Indigenous participation in science, technology, engineering, and mathematics disciplines](#)
- [Universities unveil Indigenous participation targets](#)
- [Queer in STEM: workplace experiences reports in a national survey of LGBTQIA individuals in science, technology, engineering and mathematics careers](#)
- [LGBT Professionals' workplace experiences in STEM-related federal agencies](#)



A DIVERSE AND INCLUSIVE **STEM WORKFORCE**



Key messages

- Diversity is not only inherently important; it's crucial for excellence and innovation.
- A wide and growing body of research confirms diverse teams and organisations innovate more readily, turning a diversity of insights and questions into stronger design thinking.
- If we don't draw from the full breadth of our talent pool, we'll miss out on brilliant STEM talents whose skills are needed in our sector.
- Initiatives to advance equity, diversity, and inclusion in the STEM sector are a priority for STA as the peak body for the sector.
- We play a crucial leadership role to champion this work, and to provide policy support and practices to help speed gains across the STEM sector.
- Work to address the serious under-representation of women in STEM is crucial – including through STA's Superstars of STEM program.
- Australia has a proud tradition of sophisticated STEM knowledge systems in the Indigenous knowledges of this continent.
- This knowledge should be embraced, taught, celebrated, and advanced as part of Australia's unique knowledge systems in STEM.
- Australia needs to do more to tackle the under-representation of Aboriginal and Torres Strait Islander people in the STEM workforce – and STA has supported early work to establish an Indigenous STEM professionals network.
- Australia needs to ensure the STEM workforce supports people from culturally and linguistically diverse backgrounds, the LGBTQIA+ community, and people with disability.

RESEARCH **EXCELLENCE AND QUALITY**

“The global economy is changing. New technologies and smart companies lead. New industries and new sources of wealth are emerging. New skills are required for workers at all levels... At the core of almost every agenda is a focus on STEM: science, technology, engineering and mathematics.”

**Professor Ian Chubb AC,
Australia’s Chief Scientist
2011-2016**

Quality is key to our research heft

Australia is a research powerhouse relative to our population size.

Over the past decade, the country’s performance in research has strengthened further. This overall trend has been driven heavily by growth in both quantity and quality of our STEM research.

Both public trust, and Australia’s world-class reputation, rely on a very high quality of research.

Without a continued strong performance on quality, our national research effort would be weakened – as would the return on investment to the nation.

Australia’s STEM workforce has a deep commitment to research excellence. This is enabled through the rigour of STEM research methods, including a robust peer-review process.

This process of expert review is the cornerstone of scientific progress. It enables leading experts to assess the work of others to test its methods, conclusions and certainty.

It strengthens science – and helps to build wide confidence in findings.

This system also ensures strong rigour in evaluations of grant applications and highly competitive research fellowships, and in the scientific method itself.

There is a symbiotic relationship between research excellence and the openness and accessibility of research.

Open access data and publishing enable research findings to be assessed by wider audiences. This, in turn, enables further insights to be developed and drawn.

Building on the work of other teams, researchers can speed their own advances. It is a virtuous circle.

Greater open access to research publications and primary sources can also help to build stronger public understanding of science – and further trust and confidence in it.

RESEARCH **EXCELLENCE AND QUALITY**

Target policy goals

1. A clearer national strategy to move towards open access data and publications where confidentiality and intellectual property regulations allow.
2. Benchmark our performance against advanced economies to identify areas to maintain our leadership and those to target for growth.
3. Strengthen public understanding of the STEM workforce's quality control methods including the role of expert peer review.

Resources and data

- [Why Plan - S](#)
- [STA - Submission to the Rural and Regional Affairs and Transport References Committee](#)
- [Institutions can retool to make research more rigorous](#)
- [The academic, economic and societal impacts of open access: an evidence-based review](#)
- [NHMRC's Research Quality Strategy](#)
- [Australian Code for the Responsible Conduct of Research](#)
- [Australia cannot afford to compromise the principles underpinning scientific research](#)



RESEARCH **EXCELLENCE AND QUALITY**

Key messages

- Over the past decade, Australia's performance and research quality have strengthened further – coming off a high base.
- Quality assurance systems such as peer-review, the Australian Research Council and National Health & Medical Research Council codes of conduct, and stringent ethics requirements have been effective to ensure quality of Australia's research.
- This trend has been driven heavily by growth in both quantity and quality of our STEM research.
- Public trust, and Australia's world-class reputation, rely on a very high quality of research.
- Without a continued strong performance on quality, our national research effort would be weakened – as would the return on investment to the nation.
- Australia's STEM workforce has a deep commitment to research excellence. This is enabled through the rigour of STEM research methods, including a robust peer-review process.
- The process of expert review is the cornerstone of scientific progress. It enables leading experts to assess the work of their competitors to test its methods, conclusions and certainty. It strengthens science – and helps to build wide confidence in findings.
- Open access data and publishing enable research findings to be assessed by wider audiences.
- This, in turn, enables further insights to be developed and drawn.
- Building on the work of other teams, researchers can speed their own advances. It is a virtuous circle.
- Greater open access to research publications and primary sources can also help to build stronger public understanding of science – and further trust and confidence.



STRONG PUBLIC **CONFIDENCE IN SCIENCE**

“Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less.”

Marie Curie



Why confidence matters to science

Strong public confidence in science enables societies to reap the full benefits and advances of scientific discovery.

Without public backing, scientific breakthroughs may not be taken up, and the returns on investments in science will not be as strong.

Governments, researchers, research institutions and scientists share a responsibility to help nurture public confidence and wide understanding of the rigour of science.

Australia has generally strong levels of public support for science and strong trust in scientific experts. In particular, Australians highly trust scientists to ensure facts and evidence are part of public debates.

Despite the strong overall levels of trust in science, the level of general science literacy in the community is not as high as it could – or should – be.

This challenge, coupled with a decline in specialist science journalism and the elevation of non-expert opinion on science issues in public discussion, can make it harder for public audiences to verify which information is reliable.

This has been particularly acute in discussion of the science on climate change, genetically-modified crops and organisms, and immunisation.

With both valid and invalid information available at the click of a button, it is important for decision-makers and the broader Australian public to know how science achieves confidence and clarity in its findings through rigorous peer review processes.

Successive Australian Governments have articulated a clear commitment to build this stronger community understanding of science – and to engage in science.

STRONG PUBLIC **CONFIDENCE IN SCIENCE**

Flagship programs such as STA's Science Meets Parliament, our STA STEM Ambassadors program, the Government's Inspiring Australia program and other initiatives assist towards that goal.

As the Department of Industry, Science, Innovation and Resources notes: "to fully realise the social, economic and environmental benefits of our significant investment in science and research, we must communicate and engage the wider community in science."

"Australia aspires to be an innovative society with a technologically-skilled workforce, a scientifically-literate community and well-informed decision-makers."

Success in building strong public confidence in science can be strengthened further by the STEM sector working closely with humanities and social-sciences experts.

Large-scale initiatives catalysed by Governments to address significant challenges are a clever way to accelerate Australian innovation, drive collaboration, and build on Australia's strengths.

The pursuit of bold aspirations can also inspire Australians about the transformative power of science and technology – securing an even stronger future for STEM in Australia.

Nurturing public confidence and trust in science is crucial to create the conditions in which science can flourish – and maximise its benefits to Australia.



STRONG PUBLIC **CONFIDENCE IN SCIENCE**

Target policy goals

1. Deepen opportunities for engagement between STEM experts and the broader Australian public through funding for public engagement programs including flagship outreach initiatives run by STA.
2. Strengthen communication skills across Australia's STEM community through specialist training and support from peak bodies such as STA.
3. Include a component in public research funding to communicate the findings – ensuring research grants expressly include resources to relay key findings to the public.

Resources and data

- [Inspiring Australia's Scientific Culture](#)
- [Thinking critically on critical thinking: why scientists' skills need to spread](#)
- [US attitudes to and trust in science](#)
- [Strong public trust in scientists](#)
- [Inspiring Australia](#)
- [Australia 2030: Prosperity through Innovation](#)

Key messages

- Strong public confidence in science enables societies to reap the full benefits and advances of scientific discovery;
- Without it, scientific breakthroughs may not be taken up, and the returns on investments in science will not be as strong;
- Governments, researchers, research institutions and scientists share a responsibility to help nurture public confidence and wide understanding of the rigour of science;
- Australia has generally strong levels of public support for science and strong trust in scientific experts;
- Australians trust scientists to ensure facts and evidence are part of public debates;
- Nurturing public confidence and trust in science is crucial to create the conditions in which science can flourish – and maximise its benefits to Australia.



GLOBAL LINKS & RESEARCH COLLABORATION

“Strengthening Australia’s innovation and research links globally, and connecting with international investors, will lift Australia’s domestic innovation performance and help Australia maximise opportunities in the new global economy.”

Former Australian Foreign Minister Julie Bishop

Background

The world-class strength of Australian STEM hinges on its openness to the world, and its global collaborations in research.

Through partnerships with other world-leading research teams across the globe, Australian STEM continues to make cutting-edge breakthroughs and seize advantages for our country.

Strong global engagement gives us our competitive edge. As a small population nation that is geographically distant from other major innovation hubs, this outreach is crucial.

It ensures Australia’s strengths in research despite the country’s comparative underproduction of STEM graduates and its smaller investment in research relative to the size of our economy.

Due to global collaboration, the quality of Australia’s research has kept pace with the best in the world, as Excellence in Research for Australia assessments continue to confirm.

International engagement helps us to secure a share of intellectual property rights and future income from advances made by global teams.

And it gives us access to the work and talent pool of other research nations to strengthen our own research system.

Even stronger global collaboration in research and engagement should also be pursued by Australia as a powerful economic, diplomatic, and soft power asset.

It can open doors to new opportunities for Australia – and ensure we do not fall behind.

Our location in the Indo-Pacific gives us a competitive advantage in the region compared to Europe and the US.

But to make the most of this edge, Australian researchers must be supported and resourced to deepen their global and regional engagement.

This is particularly important as our economic competitors ramp up their strategic investments in science and R&D. With a significantly smaller economy, Australia’s best strategy to remain competitive in research is through global collaboration.

The benefits to Australia’s broader diplomatic relations of maintaining a collaborative approach to research are immense.

Scientific and technological research can enhance Australia’s international standing and foster deeper bilateral and multilateral ties.

This, in turn, strengthens the benefits and returns to Australia from research – and keeps us competitive with the world.

GLOBAL LINKS & RESEARCH COLLABORATION

Target policy goals

1. Policies that strengthen global collaboration by Australia's STEM community and enable global movement by scientists to keep Australia at the forefront of STEM breakthroughs.
2. Expand the recognition and role of science diplomacy in Australia's foreign relations as a powerful economic, diplomatic, and soft power asset.
3. Remove regulatory barriers to internationally collaborative research.

Resources and data

- [Strong global engagement](#)
- [Six Aussie universities in global top 100](#)
- [ERA National Report](#)
- [Excellence in Research for Australia](#)
- [The challenge of China's rise as a science and technology powerhouse](#)
- [Australian Research Collaboration in Australia](#)



GLOBAL LINKS & RESEARCH COLLABORATION



Key messages

- The world-class strength of Australia's STEM sector hinges on its openness to the world, and the country's strong global collaboration in research;
- Through partnerships with other world-leading research teams across the globe, Australian STEM continues to make cutting-edge breakthroughs and seize advantages for our country;
- Strong global engagement gives Australia a competitive edge;
- As a small population nation that is geographically distant from other major innovation hubs, such outreach is crucial;
- Other nations encourage strategic international engagement through grants and partnerships which is something Australia should consider;
- It ensures Australia's strengths in research despite our comparative underproduction of STEM graduates and our smaller investment in research relative to the size of our economy;
- Global research collaboration is also a powerful economic, diplomatic, and soft power asset;
- We need to continue to enhance policies to strengthen global collaborations by Australia's STEM community and ease global movement by scientists to keep Australia at the forefront of global research.