Strategy Plan
2017-20

APPLIED

Australian Academy of
Technology & Engineering

Strategy Plan 2017-2020

The Strategy Plan identifies key areas of focus for sustained research and action required by the Academy over the next three years that will equip Australia to meet the challenges, and seize the opportunities, from global technology advances that will transform our economy, industries, social fabric and environmental sustainability over the decade to 2030.

Photo: CSIRO

Australia in 2030 — the challenges

Technology change, globalisation and demographics will create a set of major opportunities and challenges for Australian business and society. Australia will require an inspirational policy vision to remain a leading society and economy by the end of the next decade.

Australia's economic growth is expected to slow down and it will drop in economic importance due to the predicted global shift of power from the USA to China and India. However, resource-based industries (mining and agriculture) will remain a strong component of the Australian economy due to the demand created by more and more people, especially in Asia, moving out of poverty.

Nevertheless, competitive pressures will see a need for a greater innovation and value-add in both "new" industries (such as service and knowledge-based industries) and in "old" industries (such as resources and agriculture). Both types will be reliant on greater entrepreneurship, innovation and technology skills to prepare for the disruptive forces of change.

The major shifts in Australia's demography over the next decades will see a growing and ageing population. This will lead to opportunities and challenges in health including the growing level of chronic disease and burgeoning healthcare expenditure.

Owing to an expanding population, Australia's urban cities will grow substantially, putting further pressure on existing infrastructure and energy needs. Globally, food supply and demand will increase dramatically, further straining agricultural and natural resources.

Australia also must play its role in addressing important global issues

Climate change

Australia has ratified the Paris Agreement on Climate Change agreeing to reduce our greenhouse gas emissions by 26 to 28 per cent below 2005 levels by 2030. Australia's climate change mitigation and adaptation efforts will be strongly enhanced by the timely adoption and further advancement of science and technology innovations. Moreover, Australia must recognise that climate change mitigation will impact its production and export of fossil fuels. We shall need to address the mitigation of the greenhouse impact of our exports.

Automation

The workforce in all developed economies will be impacted by unprecedented levels of advanced automation. Australia is no exception and we must be prepared to adapt to this new reality.

Social cohesion

With a greater wealth of knowledge and the rise of digital technologies, consumers will grow more empowered and have a major influence on markets and industries. Digital technology will disrupt all facets of the Australian way-of-life. As a result, the stark divisions already appearing in our society will grow more serious and need mitigation.

Thus, rapid and disruptive technological change will be a constant to 2030 (and beyond) and will transform how we secure our nation and the very nature of business, work and how we go about our daily lives. More than ever, Australia will need to have a technologically advanced economy and be ready for the transitions so as to maintain a sustainable social fabric.

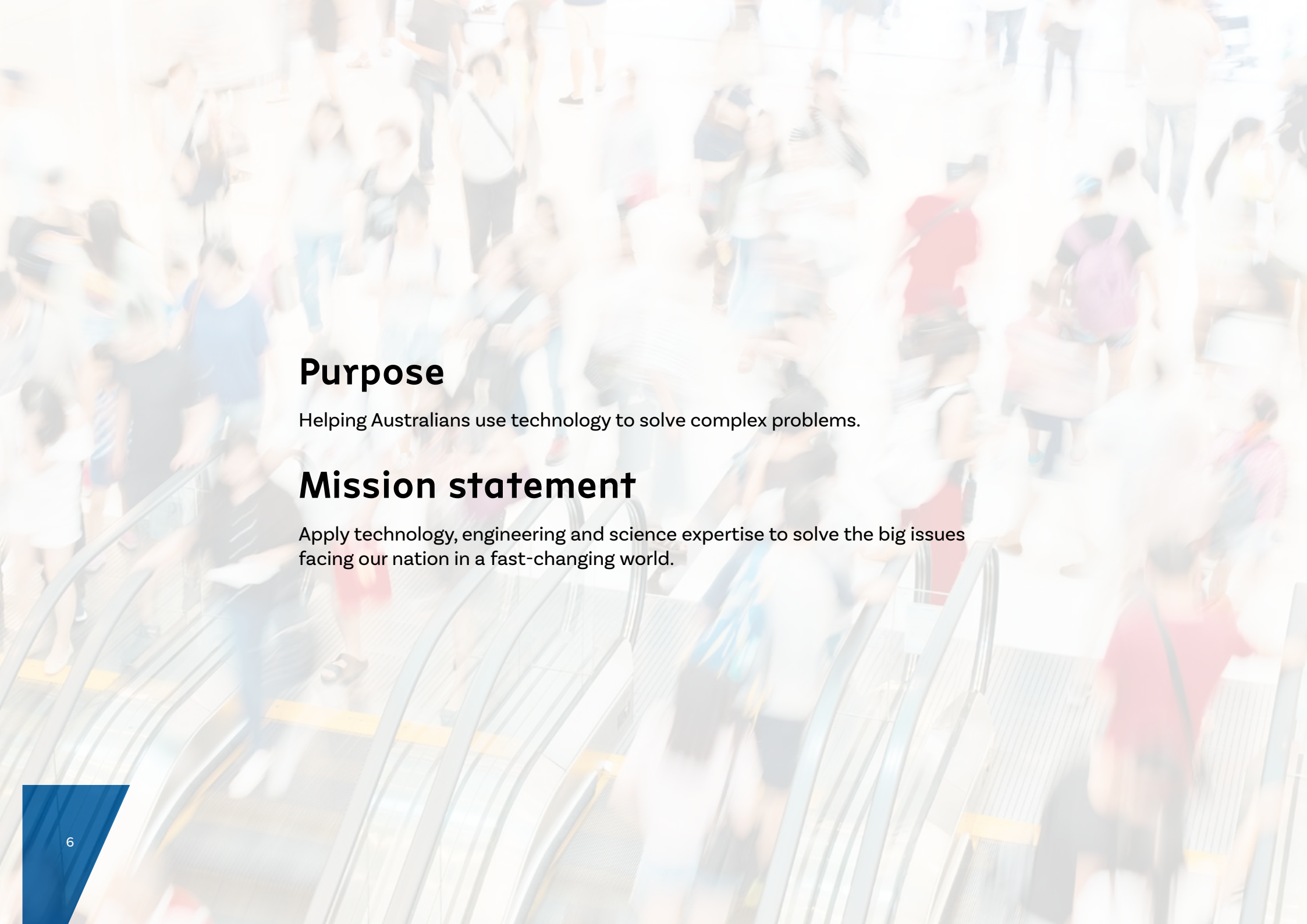
About the Academy

The Australian Academy of Technology and Engineering is an independent thinktank that helps Australians understand and use technology to solve complex problems.

We bring together Australia's leading experts in technology, engineering and science to provide impartial, practical and evidence-based advice on how to achieve sustainable solutions and advance prosperity.

The Academy champions excellence and contributes robust and practical thinking to Australia's big debates.

Like you, we're curious about the world and want to create a better future.



Purpose

Helping Australians use technology to solve complex problems.

Mission statement

Apply technology, engineering and science expertise to solve the big issues facing our nation in a fast-changing world.

Key strategies

Australia will need to harness technology innovation in all its forms, as part of its successful transition to a national technology and knowledge based economy. The key strategy areas we will work on are:

1. Ensure industry technology readiness
2. Enhance technology and engineering career paths
3. Improve STEM education
4. Achieve greater gender equity and diversity
5. Connect globally for the benefit of Australia
6. Celebrate technology, engineering and innovation excellence
7. Amplify impact
8. Strengthen engagement

1. Ensure industry technology readiness

The Australian economy faces unprecedented disruption due to emerging technologies and global trends. This disruption will impact jobs at every level in the economy and will occur at "exponential" pace. Failure to be prepared will risk a decline in many aspects of our Australian way of life and society. With 0.3 per cent of the global population, Australia cannot expect to produce more than 3 to 5 per cent of the world's technology. However, we need to adopt and adapt all of the world's emerging technologies relevant to Australia's needs.

We need to identify and advocate best-practice technology adoption/utilisation and technology invention.

Strategies

Using the Academy's National Technology Challenge priority areas as a base:

1.1 Develop a technology readiness index for Australian industry (across a range of key sectors), which identifies suitable measures for technology awareness, adoption and impact. This will allow measurement of the progress of Australian businesses and governments against the index criteria, which will result in identification of "jobs of the future" and key research areas to address gaps.

1.2 Identify, and contribute to the debate of the big issues of technology where government intervention can have a significant impact on adoption (eg. regulations for self-driving cars, energy policy, new healthcare models, precision agriculture, clean energy technologies, smart cities, AI and robotics, new employment models, cybersecurity). Propose solutions that will take Australia to the next level in terms of productivity, prosperity and global competitiveness.

1.3 Promote incentives for Australian industry to collaborate with the research sector (complementary to the the Academy Research Excellence in Australia model). In doing this, the Academy will draw from recent research from the four Learned Academies in Australia and collaborate with, and engage, priority industry sectors on the importance of technology readiness and technology invention, adoption and impact.

2. Enhance technology and engineering career paths

Technology adoption in the economy will require a workforce with a deep understanding of engineering synthesis, scientific experimentation and data analysis as well as understanding of social and economic impacts. Industry will require more employees with these skills; skills that are honed through research degrees in technology, engineering and science.

There is an imperative for tertiary sector educators/research leaders to be able to convey an understanding of industry career paths to their students and provide the networks to help facilitate connections to industrial opportunities. However, postgraduate students in these disciplines often are taught by academics who have followed a research career entirely within the research and higher education sector.

Strategies

2.1 Identify and promote the optimal skill set for STEM undergraduate education. There is an increasing expectation that STEM graduates, besides deep technical skills, also have capabilities in entrepreneurship, creativity, design, analysis of economic and social impacts of technology, as well as gain management and leadership skills. We need to articulate a realistic path for university courses to achieve these demanding outcomes.

2.2 Develop options to enable academics to form stronger links to industry and hence better equip them to provide guidance to their students on research-industry collaboration (eg. extend the REA metrics to recognise academics who direct students towards industrial careers and/or take industry based sabbaticals and/or engage industry technologists and engineers for lectures).

2.3 Extend the the Academy Industry Mentoring Network in STEM (IMNIS) so that it is available to all STEM based PhD students working within the Academy 's National Technology Challenge priority sectors.

3. Improve STEM education

STEM education creates critical thinkers, ensures general science literacy, and enables the next generation of innovators. It is clear that most jobs of the future will require significant mathematics and science preparation. It is imperative, if we are to build and maintain a flexible dynamic workforce, that we make STEM education and life-long learning key priorities so as to skill workers for current and future STEM-based industries.

The strategies below must be applied across all educational sectors: primary, secondary, tertiary, and vocational.

Strategies

3.1 Evaluate strategies for engaging students in STEM education in schools.

3.2 Strengthen STEM teaching in schools by advocating for:

i. **deep discipline knowledge for all initial STEM teacher education and training** (such as a bachelor degree with an appropriate major, along with either undergraduate or postgraduate qualifications in teaching);

ii. **all out-of-field teaching in STEM disciplines to be eliminated** through a phased system of professional development and/or equivalency based on teaching experience and knowledge; and

iii. **a feasibility study on an independent national recognition scheme for STEM teachers** to be developed that links remuneration to the level of qualification and experience.

3.3 Expand the deployment of the the Academy STELR School Program. This includes extending the reach of the current year seven to 10 program in secondary schools, as well as considering its adaptation to years one to six.

4. Achieve greater gender equity and diversity

Achieving gender equity and diversity is important for workplaces not only because it is "fair" and "the right thing to do", but because it is also linked to a country's overall economic performance. Workplace gender equity and diversity is associated with improved national productivity and economic growth; increased organisational performance; enhanced ability of companies to attract talent and retain employees; and enhanced organisational reputation.

Only one in four IT graduates and one in 10 engineering graduates are women.

Further, women occupy fewer than one in five senior researcher positions in Australian universities and research institutes and around one quarter of the STEM workforce overall. STEM-oriented women managers are also under-represented in Australian businesses.

A concerted national effort is required to overcome the cultural, institutional and organisational factors that discourage girls and women from studying STEM and that limit their opportunities to pursue careers in STEM-underpinned organisations.

We also need to ensure that the Academy's structures reflect the diversity (eg. cultural) of groups represented in the Australian STEM workforce.

Strategies

4.1 Enhanced leadership at Board level to champion gender equity and diversity in the Academy through its Gender Equity and Diversity Policy and programs, including our current target for women to comprise a minimum of one-third of all New Fellows elected to the Academy each year.

4.2 Champion SAGE (Science in Australia Gender Equity) program, the Academy/Academy of Science co-owned gender equity program within the Higher Education Sector.

4.3 Advocate for gender equity and diversity in STEM-based industries.

5. Connect globally for the benefit of Australia

Australia contributes some three per cent of global research and its success as a technology pace-setter depends on leveraging off, and participating in, international efforts. For international collaboration to better reflect Australia's need for research translation and commercialisation, international collaborations must also reflect such relationships. This has seen the Academy focus on accelerating researcher-SME engagement and early stage innovation collaboration to address "market gaps" in Australia.

the Academy has well-developed international collaborative linkages with its 28 international sister academies which it can leverage to boost science diplomacy as well as gain best practice from around the world. However, resource limitations dictate that global engagement needs to be prioritised and aligned to Government priorities, programs and funding opportunities.

Strategies

5.1 Review The Academy's international strategy plan to emphasise engagement with:

- **(i)** economies whose technologists and engineers are going to provide the Academy with world best practice examples and opportunities; as well as
- **(ii)** economies who would benefit from Australian technology and expertise.

5.2 Prioritise our engagement – global, regional and bilateral – to aligned better with Government priorities, The Academy's National Technology Challenges and Australia's broad innovation needs.

6. Celebrate technological sciences, engineering and innovation excellence

The Academy's resource is its Fellows' deep knowledge, expertise and experience in technology, engineering and science drawn across academia, research, industry and government. Ensuring we elect the best minds to the Academy is vital for our sustained expertise, quality of advice, effectiveness and ultimate impact.

Australia also needs to celebrate its innovation success stories. The Clunies Ross Awards have a proud tradition of recognising contributions by dedicated individuals who have shared their vision and knowledge with others to apply technology for the benefit of Australia.

We also must encourage the next generation of entrepreneurs and innovators.

Strategies

6.1 Ensure the Academy is the leading Learned Academy for the 21st Century through our meticulous merit-based process for Fellowship selection of the nation's leaders in technology and engineering, with balance across industry, academia, research and government.

6.2 Champion excellence in the application of technology and innovation through our Clunies Ross Awards and prizes that celebrate young entrepreneurs and innovators, namely the Batterham Medal and the ICM Agrifood Award.

7. Amplify impact

In general, the community has relatively low science literacy, and public trust in science is waning. Further, policy makers generally have limited in-depth expertise regarding technology and engineering. To achieve greater impact, the Academy needs to be recognised widely as a trusted source of advice.

The Academy will enhance its communication and engagement strategies, both internally and externally, to ensure it fully harnesses the expertise of its Fellows, as well as strengthening existing, and forging new, stakeholder relationships.

Strategies

7.1 Promote the Academy's brand as a trusted source of technology policy as widely as possible.

7.2 Increase investment in communication capability and capacity to ensure effective messaging across a wider audience (ie. the public as well as politicians, public servants, other national and international academies, and other key interest groups).

8. Strengthen engagement of Fellowship

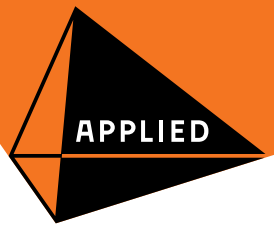
The Academy has an enviable body of expertise in its Fellowship. We need to enhance engagement of the Fellows to maximise their input.

Strategies

8.1 Enhance our Fellows' membership of the Academy through the activities of the Divisions and Forums.

8.2 Strengthen stakeholder engagement through sustained engagement with other academies (eg. Australian Council of Learned Academies (ACOLA), Council of Academies of Engineering and Technological Science (CAETS)), and enhancing existing and establishing new partnerships with key bodies within Australia's research, science and technology and innovation system (eg. Industry Growth Centres, Innovation and Science Australia, Federal and State Government Departments).

8.3 Engage with younger technologists and engineers and the community in developing the Academy policy positions. The most effective mechanism of achieving this will be determined as part of the operational implementation of the strategic plan.



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