



Australian Academy of  
Technology & Engineering

# Annual Review 2017-18



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## A year in review



**Professor Hugh Bradlow**  
Academy President

**The past reporting year saw the Academy implement a new Strategy Plan, one focused on Australia becoming a leading technology country.**

The nation will need an inspirational policy vision to remain a leading society and economy by the end of the next decade. As I wrote in 2017: "Where Australia can lead is by focusing on adoption of the global technology developments as well as being a developer of such technology."

We have made a strong start, holding dialogues on the aged care, transport and energy sectors, sparking lively debate in the process.

We have undertaken valuable work on other big issues: climate change, with its consequential challenges around energy and water; automation; and the question of social cohesion.

The past reporting year has also seen progress on other key strategies. I'm enormously proud that we have adopted a Diversity and Inclusion Policy that will see women constituting 50 per cent of all new Fellows elected to the Academy by 2025 – on current trends, a target we shall hit.

The Academy has shown national leadership on this question, including our commitment that we will organise events, and take part in others', only if the speaking list reflects diversity.

The STELR project continues to grow, with some 687 schools signed up. We are encouraging state governments to adopt this program, which brings STEM alive for high school students and increases enrolments in senior science, across all schools. We are also well progressed on implementing "STELR for Primary Schools" for next year.

The IMNIS mentoring scheme is now a fully fledged national program, bringing together PhD students and industry mentors in MedTech-Pharma, Energy and Minerals Resources in all mainland states, with tailored programs in Tasmania and the Territories.

Our commitment to international engagement is as strong as ever, including our stewardship of the Global Connections Fund, our membership of CAETS (now with a Board position) and the exchange programs we ran with Korea, Japan and China.

We are meeting our aim of amplifying impact, with a dedicated communications team in Melbourne that has already lifted the Academy's media and social media profile, and which will enhance our capacity to engage with the public on the big issues that have technology solutions at their core.

I would like to thank the many Fellows who have made invaluable contributions this year – whether on the Board, as a member of Assembly or Division committees, or in leading and contributing to our Forums. Thank you, too, to our CEO and her team. Together, we have strengthened the life and work of the Academy. I do believe we are an Academy for the 21st century.



**Dr Margaret Hartley**  
Academy CEO

**A major focus over the past year has been implementing our new strategy with an emphasis on getting Australia technology ready.**

We have been examining all the major challenges for the nation through that prism, with initiatives around transport and aged care among the first outcomes.

A successful Dialogue – "Shifting Gears – Preparing for the transport revolution" – was held in Melbourne. The Academy published a Position Statement on Australia's response to climate change and an Action Statement on the role of technology in active ageing.

During the reporting year, the Academy made 18 formal submissions to Government inquiries and policy development activities aligned with priority topics, drawing on the expertise of the Academy's Forum members as well as the broader Fellowship.

Fellows continued to be involved in aspects of the Academy in good numbers, with some 146 Fellows (17 per cent of the Fellowship) directly contributing to 40 policy and international projects. Women were 26 per cent of that number despite making up only 12 per cent of the Fellowship.

Overall, 524 Fellows (more than 60 per cent) were involved in at least one of the Academy's committees, working groups or Forums, and Division activities.

The Academy has made a step change in its approach to diversity and inclusion, not only adopting a comprehensive policy but turning those sentiments into outcomes.

For the first time, the Board includes a Vice-President Diversity, whose role is to lead the work on diversity and inclusion across the Academy and our focus externally.

We have organised training in mitigating unconscious bias for the Academy's entire leadership team as well as staff. The Academy has strengthened its gender targets, with the aim that 50 per cent of new Fellows by 2025 will be women.

Our international engagement and commitment to innovation continued to strengthen, with the publication of profiles of those who received Priming Grants under the Global Connections Fund. During the year, the GCF allocated 40 Priming Grants and 27 Bridging Grants.

Staff in Melbourne moved to new premises on St Kilda Road, with superior facilities and room for potential expansion.

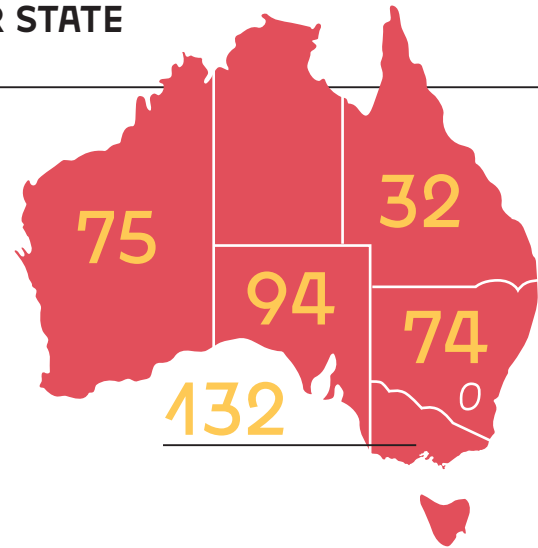
Thank you to all Fellows and staff for their enthusiastic contribution. The Academy has recorded a successful year of change and growth, providing a stable and responsive platform from which to deliver our key strategies.





### IMNIS: PARTICIPANTS PER STATE AND PROGRAM

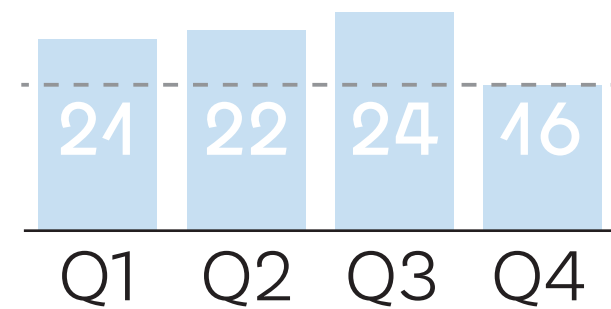
Total participants  
**417**



SA	VIC	NSW	WA	QLD
MTP Connect	MTP Connect	MTP Connect	Energy-minerals resources	MTP Connect
<b>54</b>	<b>132</b>	<b>74</b>	<b>75</b>	<b>24</b>
Energy				Mets-Minerals
<b>40</b>				<b>8</b>

### STELR: GROWTH

Target each quarter: 16



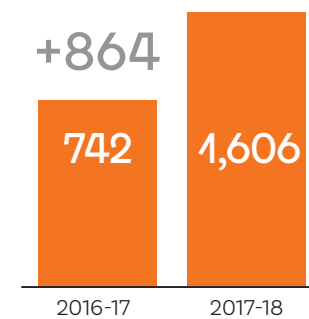
Number of STELR schools

**↑ 83**  
604 → 687

The largest annual increase since the initial roll-out.

### COMMUNICATIONS

Twitter growth



Media hits

**354**

Website visitors

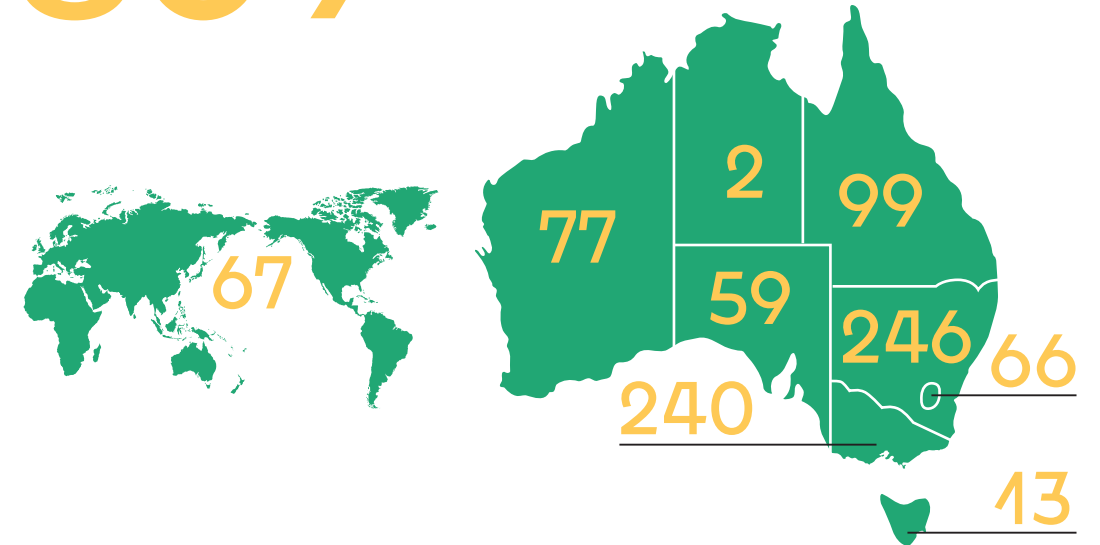


### POLICY



### FELLOWSHIP

**869** FELLOWS  
Distribution of Fellows and Honorary Fellows



### COMMITTEES AND FORUM MEMBERSHIP

Energy Forum	Agriculture Forum	Education Forum	Water Forum
<b>184</b>	<b>144</b>	<b>135</b>	<b>126</b>
Industry and Innovation Forum	Climate Change Advisory Group	Health Forum	Infrastructure Forum
<b>117</b>	<b>108</b>	<b>106</b>	<b>71</b>
Diversity and Inclusion	Audit and Risk	Membership	
<b>12</b>	<b>11</b>	<b>51</b>	

## The Industry Technology Readiness Project

**The Australian economy faces disruption at an unprecedented pace, spurred by the evolution of technology and global trends. To prepare for this new world, Australia must adopt and adapt the world's emerging technologies to keep up.**

The Academy is developing a roadmap of what Australian industries must do to maintain currency, and to integrate new and emerging technologies to boost our economic advantage.

Funded by the Australian Research Council (ARC) Linkage Learned Academies Special Projects (LASP), the research project will run for three years and examine key industry sectors - starting with the transport sector - with a horizon out to 2030.

The project, co-chaired by Kathryn Fagg and Drew Clarke, is guided by a committee of Fellows and external experts.

"Australians have a new opportunity in the face of rapid technological change. We need new approaches to ensure Australian policy-makers, industry leaders and researchers work together to deliver the greatest benefit to Australians," Ms Fagg said.

Mr Clarke said: "The project will use the breadth of the Academy's expertise to bring together otherwise siloed aspects of industry, and this will be a contribution that existing projects don't have."

The Academy collaborated on the project with a range of stakeholders, including the Victorian Government, Infrastructure Australia, Transport of NSW and the Office of the Federal Minister for Urban Infrastructure and Cities.

### National Technology Challenges Dialogue: Transport

In May, the Academy held a dialogue on the future of transport in Melbourne, with 50 invited expert workshop participants from research, industry and government.

Discussions at the Dialogue informed the themes and questions for the next stage of the project, which will involve stakeholder consultation. This will include key recommendations to use existing and upcoming transport technologies, and will highlight future research opportunities.

### Korea's transport innovation informs Australia's transport sector

The Academy and the National Academy of Engineering of Korea participated in a joint workshop in Korea in June, on the future of transport to help inform our ARC-funded LASP project.

It brought together high-level Australian and Korean experts, the Australian delegation visiting sites highlighting Korean excellence in public transport policy and planning.



The Academy team was hosted in Seoul, Korea.

## Collaborating with ACOLA

The Australian Council of Learned Academies (ACOLA) is undertaking analyses to guide decision-makers through the decade ahead, called the Horizon Scanning Series.

Commissioned by the Commonwealth Science Council and Australia's Chief Scientist, the series brings together the four Learned Academies for an interdisciplinary approach.

In the last financial year, the Academy contributed to *The Future of Precision Medicine in Australia*, with Fellows Professor Ian Frazer, Dr Carrie Hillyard and Professor John Mattick on the expert working group.

The Academy also contributed to *The Role of Energy Storage in Australia's Future Energy Supply Mix*. Chair of the Academy's Energy Forum Bruce Godfrey chaired the Expert Working Group for the study.

"This report clearly shows the two sides of the coin - that energy storage is an enormous opportunity for Australia, but there is work to be done to build consumer confidence," he said.

The Academy contributed to both the initial scoping report and a contributing report on industry research opportunities and challenges.

## Global Connections Fund: Targeted grants breach walls of academia

The risk of antibiotics-resistant bacteria is fast emerging as a global crisis. Dr Mark Blaskovich, a medicinal chemist from the University of Queensland, is finding ways to suppress the potential pandemic.

In 2016 he was among 73 innovators to receive a Global Connections Fund Priming Grant. Forty of these awardees were profiled for a booklet showcasing the impact of Priming Grants: "Innovation Stories".

Dr Blaskovich used the grant to connect with Visterra Inc in Boston, USA.

They explored the possibility of creating a "guided missile" - an antibody drug conjugate that works by targeting and then killing drug-resistant bacteria without harming human cells.

"You can compare it to carpet bombing in World War Two, where to destroy a factory you had to bomb a whole city because the bombs weren't selective enough," Dr Blaskovich said. "Now with a guided missile you can selectively just hit that factory and avoid killing all the innocent people surrounding it."

This is one example of how a targeted grant can boost the real-world outcomes of research that might not otherwise leave the walls of academia.

In August 2017, Dr Blaskovich was awarded a Bridging Grant to continue his research in antibodies with an SME in the US. He was one of 29 to be awarded the grant of up to \$50,000.

And in June this year, 38 new Priming Grants were awarded to recipients across Australia.



The Global Connections Fund (GCF) is an initiative within the Global Innovation Strategy - a component of the Australian Government's National Innovation and Science Agenda.

GCF researchers and SMEs on a global scale - Australian researchers meet with international SMEs, and Australian SMEs meet with international researchers - to accelerate research-business relationships with more effective strategic network formation.

Collaborative relationships produce higher quality research and optimise the environment for innovation breakthroughs. Leveraging each others' strengths benefit both Australia and partner economies, assisting their development as technology leaders.

### Priming Grants

Priming Grants are grants of \$7,000 enabling Australian SMEs and Australian researchers to meet their international partners and develop their respective ideas. Designed to "prime" the commercialisation or application of a particular idea, in most cases the meetings spark ongoing collaborations.

### Bridging Grants

Bridging Grants are larger funds of up to \$50,000, intended as seed funding capital to grow viable projects in scope and to test commercialisation and proof-of-concept activities. They support international partnerships beyond the Priming Grant's initial level of engagement.

## Impact

### SUBMISSIONS

> **Digital Economy Strategy**  
*The Department of Industry, Innovation and Science*  
Priority must be given to preparing Australian industry and society leaders in applying and developing digital technologies.

> **Inquiry into funding Australia's research**  
*The House of Representatives Standing Committee on Employment, Education and Training*  
The Academy encourages efforts to increase the efficiency and effectiveness of Australia's research funding systems.

> **Research and development tax incentive**  
*Treasury's Draft R&D Tax Incentive Amendments*  
To drive greater collaboration and wider benefits for Australia, the R&D Tax Incentive should offer a premium rate for research and development undertaken with Australian publicly funded research organisations.

### WORKSHOPS

> **Energy Policy Workshop**  
The Academy held the workshop "A Sustainable Energy Future for Australia" addressing some of the country's biggest sources of emissions, cross-sectoral challenges and the intersections between energy, food, water and the environment.

> **Food Safety Workshop**  
The Academy hosted the Chinese Academy of Engineering for a Food Safety Workshop, focused on improving trade in food and agricultural products between Australia and China.



## Action statement: Higher education must be revamped for an innovation-led economy

Australia's innovation agenda needs more postgraduate science, technology, engineering and mathematics (STEM) knowledge and research training, according to an Action Statement by the Academy.

In our vision for the future of education, Australia's innovation-led economy will have more high-performing professionals with advanced STEM skills and qualifications.

These professionals will have the high levels of creativity needed to tackle complex and multidisciplinary problems, and many will take leadership roles in both private and public sectors. Their knowledge will come from higher education and work-relevant training.

The Academy advocated for the following initiatives:

- > Improving the value of postgraduate coursework degrees and research degrees for Australian students.
- > Ensuring that STEM postgraduate coursework and research degrees provide attractive and valuable career pathways.
- > Encouraging further participation of women in STEM postgraduate degrees, especially in the physical sciences, mathematics, engineering and IT.

## Education workshop leads to the way forward

The Education Forum, led by Doreen Thomas and Lachlan Blackhall as Deputy Chair, held a workshop with key stakeholders in May to establish the scope of a project looking at STEM education products and programs.

Outcomes from the workshop led the Academy to consider two focus areas:

1. Working with researchers and universities for a top-down analysis of students in STEM degrees to track their progress from schools into universities – particularly those who studied Maths Methods or Specialist.
2. Establishing an endorsement framework that would enable investors, schools and teachers to have confidence the program would deliver STEM-focused outcomes.



# Australia's innovation agenda needs more postgraduate STEM knowledge and research training.

## Career paths: Successful Australia-China exchange program continues

2017 saw the successful Australian China Young Scientists Exchange Program (YSEP) continue. Sixteen Chinese scientists visited Australia for an individually customised two-week program in the second half of July. And 16 Australian researchers travel to China in October-November.

This productive and valuable exchange program is funded by the Department of Industry, Innovation and Science (DIIS) in Australia and, for the first time in the program's history, the Australian research cohort to travel to China was opened up to researchers from industry as well as academia.

The Academy also conducted an Impact Survey for DIIS, covering the 2015 and 2016 participants in the Exchange Program.

## Highly successful symposium in Japan

Six Australian alumni of the Australia Japan Emerging Research Leaders Exchange Program (AJ ERLEP) flew to Fukuoka, Japan, in December 2017 to take part in a program review and symposium. The Academy-led one-day program review, run with the Engineering Academy of Japan and the Japan Society for the Promotion of Science, was followed by a two-day alumni-led transdisciplinary symposium.

The Australian alumni also received further funding to undertake visits to strengthen their research collaborations. At the highly successful symposium, Academy CEO Dr Margaret Hartley and Dr Carolyn O'Brien also met with Engineering Academy of Japan colleagues to discuss outcomes and further opportunities.

## MEDIA

- > **How to sail smoothly from industry to academia | *Nature***  
Featuring IMNIS Executive Director Dr Marguerite Evans-Galea who discusses the IMNIS program and mentoring.
- > **STEM debate has become 'misguided': former chief scientist | *Sydney Morning Herald***  
The Academy was featured in an article on the front page, and online, after Professor Hugh Bradlow said NSW Education Minister Rob Stokes' comments on STEM education were "unhelpful".
- > **Meet the Naracoorte teacher who's a tech trailblazer! | *The Naracoorte Herald***  
An article about the first high school teacher in Australia to use STELR in her classroom after first using it as a teenager was syndicated across 75 Fairfax regional media sites nationwide and gained radio coverage.
- > **Gonski report | *3AW 693 and ABC Radio***  
Professor Hugh Bradlow was interviewed on both networks to discuss the vital role of maths education. The ABC broadcast was syndicated to 80 stations around Australia.

## Impact

### SUBMISSIONS

- > **Optimising STEM industry-school partnerships: Inspiring Australia's next generation**  
*Department of Education and Training*
- > **Inquiry into school to work transition**  
*House of Representatives Standing Committee on Employment, Education and Training*



**STELR:  
BY THE NUMBERS**

**Professional Development**

**13** STELR professional development sessions to 155 teachers

**Conferences**

Attended **16** education conferences, mounting trade displays and presenting to educators

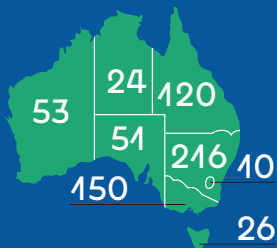
**Network**

**2800** newsletter subscribers

Twitter: **371** followers and 74.9k impressions since launching in February 2018

Facebook: **97** followers and 32.6k impressions since launching in August 2017

**Distribution**



**Another successful year for the Academy's school program STELR**

We celebrated the 600th Science and Technology Education Leveraging Relevance (STELR) school at Wadalba Community School with help from the Governor of NSW, the Honourable General and Honorary Fellow of the Academy David Hurley and Mrs Linda Hurley. Overall, we extended the reach of the STELR program in secondary schools by 83. Many schools are now purchasing class sets of multiple equipment-types.

Work began on a program, tentatively entitled "A day in the life of a seven-year-old".

This focuses on raising awareness of STEM careers, and is aimed at students in Year 2. A proof-of-concept curriculum package was developed with two primary schools in Brisbane.

We engaged secondary school students through the production of 20 video profiles of Women in STEM and Entrepreneurship. These videos show students a wide variety of interesting STEM careers and highlight the study pathways that will allow students to become change-makers in the future.

We continued to up-skill teachers both in Australia and in Asia, using STELR equipment and curriculum resources. We revamped and updated the STELR Renewable Energy curriculum package to ensure it is relevant to students today.

**STELR in more than 600 schools after a decade since launch**

**Ten years ago Dr Alan Finkel spearheaded the STELR program. In the last financial year, the program reached a milestone of 600 schools. This is an edited extract from Dr Finkel's reflection in the April issue of Focus.**

I had only just been elected a Fellow. Bright eyed and bushy tailed, I agreed to attend the education committee meeting. In front of us was a stack of papers describing the 200 or so known extracurricular science and technology activities for Australian school students.

The problem? Performance and participation rates were down; there were insufficient primary and secondary school teachers with a science degree; job security in science careers was perceived by high school students to be marginal; and the science curriculum at schools did not engage the interest of many of our brightest students.

The challenge? A contribution by the Academy, perhaps by recommending or backing one or more of the existing programs.

The key, I discovered, was relevance. Our kids were growing up in a wealthy, comfortable society. Complacency was knocking at the door.

After perusing many reports and long discussions with fellow Fellow Vaughan Beck, I proposed a co-curricular activity called Science Education Leveraging Extremely Relevant Technology (SELERT) to build on the theme of renewable energy.

The Education Committee agreed it was appropriate for the Academy to develop a program, and that it should be at a national scale. We further decided that to truly engage the students, there should be a hands-on component. We had to develop a kit of equipment for every school.

By 2008, we were running a proof-of-concept trial in four Victorian schools, half funded by the Victorian Government. The other half was funded by the philanthropic generosity of Academy Fellows.

And I had thought of a new name. STELR. All that remained was to think of words to rationalise the acronym, and the program became Science and Technology Education Leveraging Relevance.

*The STELR team celebrated the 600th STELR school, Wadalba Community School. The Governor of NSW David Hurley FTSE (pictured left) and Linda Hurley were special guests, and the Chair of the Academy's NSW Division, Dr Richard Sheldrake, presented a certificate of appreciation to the school.*



**IMNIS connects participants at a national level**

The Academy's Industry Mentoring Network in STEM (IMNIS) hosted multiple programs around Australia in the last year. IMNIS programs launched in Victoria, New South Wales, Western Australia, South Australia and Queensland. Fourteen leading universities around Australia participated.

In its first year at a national level, IMNIS connected 204 PhD students around Australia with 204 outstanding, high profile industry leaders in medical technologies, minerals resources and energy resources. Program modules included MedTech-Pharma, Energy and Minerals. Nationally, 93 per cent of IMNIS participants surveyed at the close of the 2017-18 programs rated this initiative as "positive and successful".

This success has allowed the Academy to secure another two years of funding from the Industry Growth Centre MTPConnect, as well as increased support from METS Ignited, both industry growth centre partners for this initiative. IMNIS also welcomes a new sponsor with BHP committing funds to support the Energy and Minerals programs.

IMNIS partnered with the Centre for Commercialisation of Regenerative Medicine (CCRM) Australia to kick-start a pilot of an International Mentoring Program in Regenerative Medicine. This pilot involves industry leaders from the United States and the United Kingdom, and includes an International Travel Award for mentees to attend an international conference. CCRM Australia selected five outstanding PhD students from QLD, VIC and SA to participate, and the pilot will complete in December 2018.

IMNIS has only been possible due to the tremendous support and funding from our collaborative network of partners, sponsors and supporters.

**IMNIS goes national**

IMNIS officially launched across Australia in May, with the program offered in all states and territories. Karen Andrews MP, the then Assistant Minister for Vocational Education and Skills – and currently the Minister for Industry, Science and Technology – gave a speech via video.



*IMNIS Executive Director Dr Marguerite Evans-Galea and IMNIS Director Professor Paul Wood.*



*Minister Karen Andrews addresses the audience.*



*From left: Martin Elhay (mentor) and Niveditha Vathsangam (mentee); Alex Atkins (mentor) and Nazanin Nourifard (mentee).*

**IMNIS:  
BY THE NUMBERS**

**Growth programs**

An expansion of the discipline areas – medical technology and pharmaceutical, and energy-minerals – running in WA, SA, VIC, NSW and QLD

**14** leading universities participating in at least one program

**Hours mentoring**

More than **2000** hours of mentoring generously donated by industry professionals

**Events**

**4** events  
**1500** attendees

**Network**

More than **1000** registrants tracking events, blogs and participant profiles

More than **3100** followers across social media platforms, Facebook, LinkedIn, Twitter



## Action on mining

### Fracking science for WA inquiry

In December 2017, the Academy delivered a commissioned report reviewing relevant scientific and governmental reviews on hydraulic fracturing and shale gas development to support the Independent Scientific Panel Inquiry investigations into Hydraulic Fracture Stimulation in Western Australia.

The Academy summarised findings and highlighted areas of both consensus and ongoing debate relating to the effects of shale gas development on water, air, land, biodiversity, health and society.

### Australia's mining sector must step up

The Academy released an Action Statement calling on Australian governments and mining industries to make our minerals sector a world leader in managing its environmental and socio-economic impacts.

The Academy outlined the way forward for the government and mining industries to follow. They focus on three key areas:

- > Proactively address Australia's legacy mine challenge and ensure that current and future mine operators are held accountable for mine site remediation and closure
- > Improve environmental risk assessment and management for mining operations
- > Earn the public's trust through transparency in management

### Increasing mineral discovery success

Investment in low-impact, cost-effective technologies will help address the urgent need to increase the success rate of discovering internationally competitive Australian mineral deposits in increasingly challenging conditions.

The Academy made seven key recommendations for the Government, industry and other stakeholders to support the UNCOVER initiative – a report published by AMIRA International.

These include:

- > Non-invasive geoscientific data collection should be carried out over the whole continent to further scientific knowledge

- > International standards for geoscience data should be developed and implemented to ensure data is findable, accessible, interoperable, and reusable
- A number of test facilities for technologies should be established nationally, so researchers can test new or international technologies in well-defined real-world Australian conditions

## The role of technology in active ageing

Australia needs to embrace digital health technologies and focus on data integration and standardisation.

But unless these technologies are subsidised by the Government, only a small proportion of the population will be able to afford these treatments.

The Academy recommends three key steps to achieve better use of health technology:

- > Standardisation and integration of data collection and sharing
- > Consumer empowerment
- > Greater investment in preventative technologies to improve quality of life and reduce healthcare costs

## Australia's response to climate change

Australia's mitigation and adaptation efforts will be strongly enhanced by the timely adoption and further advancement of science and technology innovations, supported by government policy settings that encourage investment in technologies already available.

The innovation required for effective climate change mitigation and adaptation efforts offers immense opportunities for the creation of social, economic and environmental benefit.

Australia requires a cross-sectoral roadmap to achieve net zero carbon emissions by 2050. The Academy stands ready to play its part in the required technological revolution.

## Impact

- > Professor Doreen Thomas, Chair of the Education Forum, gave evidence at the House of Representatives Standing Committee on Employment, Education and Training Inquiry into Funding Australia's Research.
- > **Action statement launch: Addressing the Environmental Impacts of Australian Mining's Past and Future**  
The Academy launched the Statement at a panellist discussion at the University of Technology Sydney, chaired by Denise Goldsworthy and included representatives from government, industry and academia.
- > **When gold loses its glitter | Australasian Science Magazine**  
Denise Goldsworthy penned an article addressing unrehabilitated legacy mines and the way forward to minimise environmental impacts, based on an Academy Action Statement.

- > **National Technology Challenges Dialogue: The Crisis in Ageing**  
Dialogue discussions identified major challenges Australia must overcome for a better healthcare system, including community lack of trust in the system and lack of data integration.
- > **How will we know if fracking in WA will be safe? | ABC Radio Perth**  
On the program *Focus with Nadia Mitsopoulos*, Executive Director of Policy Dr Matt Wenham discussed fracking concerns and opportunities in a debate for about 45 minutes.
- > **High hopes for economic boost from Australian Space Agency | news.com.au**  
Dr Rosalind Dubs commented on what the new space agency will mean for Australian technologists, researchers and start-ups. The article appeared in 32 publications around Australia.



## Submissions from the Academy

One of the Academy's important functions is to help develop effective public policy in areas involving science, technology and engineering, with submissions, calling on the expertise of our Fellows, to Government and Parliamentary inquiries and legislative initiatives.

### National Energy Guarantee (NEG) Draft Design consultation paper The Energy Security Board

The NEG has the Academy's qualified support. While it is not the preferred policy to reduce emissions, in the current environment it may be Australia's best chance to clear the muddled policies hampering energy sector investment.

### Clean Energy Finance Corporation (CEFC) Review Department of the Environment and Energy

The Academy recommends expanding the Clean Energy Innovation Fund and a technology-neutral investment mandate for the CEFC, a specialist clean energy financier.

### Hydraulic Fracture Stimulation in Western Australia Independent Scientific Panel Inquiry into Hydraulic Fracture Stimulation in WA

To responsibly and sustainably develop shale gas resources, governments and industry must commit to evidence-based, site-specific risk assessment and mitigation, transparent and open communication with communities, impact monitoring and robust independent research addressing knowledge gaps.

### Food derived using new breeding techniques

#### The Food Standards Australia New Zealand (FSANZ) Consultation

In a joint submission with the Australian Academy of Science, this submission addresses the new technologies and techniques arising from better understanding of breeding and genetics.

The specific techniques being considered include: genome editing, GM rootstock grafting, cisgenesis and transgenesis, and techniques involving null segregants.

### The management and use of Commonwealth environmental water House of Representatives Standing Committee on the Environment and Energy Inquiry

Australia needs stable and adequate investment in strategic research supporting improved environmental water management to solve its many unique challenges and develop and maintain expertise.

### Gene technology regulation

- > Updating gene technology regulation in Australia
- > Review of the Gene Technology Scheme

The Academy made two joint submissions with the Academy of Science regarding gene technologies and their regulation, participating in the review of the National Gene Technology Scheme.

We stated that the review process should focus on improving the existing process-based legislative framework by reducing the level of regulatory oversight of proven modifications with a history of safe use.

### Draft NSW Advanced Manufacturing Industry Development Strategy Consultation NSW Department of Industry

The Academy commended the NSW Government for commissioning the Strategy and supported many of its key findings. The Academy made key recommendations in the submission regarding clarity, investigating industry support initiatives and sharpening proposed KPIs.

### Inquiry into the social issues relating to land-based driverless vehicles in Australia

#### House of Representatives Standing Committee on Industry, Innovation, Science and Resources

The Academy argues that there are compelling benefits to full automation of Australia's road system. These include benefits to the nation's health, infrastructure, economy and improving equity and access.

### Safety assurance system for automated vehicles

#### National Transport Commission

The Academy favours regulatory options that promote innovation and rapid time to market of new technologies, while still ensuring safety. Continuing the current regulatory approach is not the best option because it does not account for the new opportunities created by autonomous vehicles.

### On-road trials of automated vehicles

#### National Transport Commission

The Academy strongly endorses regulatory reform to enable the advancement of autonomous vehicle technology and implementation in Australia.

### Australia's space industry capability

#### Australian Government Review

The Academy urged the Review to consider a number of key points, such as: Australia has a critical need for secure, long-term satellite capability; and a national space agency should be established to ensure Australia's position as a respected contributor to the global space industry.

### Inquiry into the Australian Government's role in the development of cities

#### House of Representatives Standing Committee on Infrastructure, Transport and Cities

The Academy made eight recommendations in this submission including: a collaborative systems thinking approach to urban development; the use of citizen juries or other means to engage the community; and maximising the use of rooftop solar power.



## STELR: Video profiles of women in STEM and entrepreneurship

STELR produced 20 videos profiling inspiring women in STEM fields, as part of the government's Women in STEM and Entrepreneurship (WISE) grants.

These videos were used to showcase the range of career options girls with an interest in STEM can navigate – while noting that some may not yet exist.

One career profile was of water design engineer Ella Gross, who shared her video on LinkedIn and received almost 5000 views. Views of the rest of the videos continue to gain traction as they're shown across conferences, such as the National Science Teachers conference.

The videos are available to watch on the STELR website, on Australia's Science Channel and on the Digital Technologies Hub website.



### VIDEO PROFILES OF WOMEN IN STEM CAREERS AND ENTREPRENEURSHIP

View them all at [www.stelr.org.au/WomenInSTEM](http://www.stelr.org.au/WomenInSTEM)

#WomenInSTEM #BeAChangeMaker #DoSTEMakeChange

This project received grant funding from the Australian Government.



## More direct action – our Diversity and Inclusion Policy

Introduced in May 2018, the Academy's Diversity and Inclusion Policy commits to more direct diversity and inclusion action and outcomes.

- > Our first priority will be to address the imbalance in gender in STEM. The Academy's future diversity priorities include age, Indigenous Australians and ethnicity in STEM.
- > Women should constitute 50 per cent of all new Fellows elected to the Academy by 2025.
- > The Academy's awards, meetings and events will reflect gender diversity and promote inclusion.
- > The Academy will support programs that promote diversity and inclusion across schools, university and industry.
- > The Academy will promote the achievements of women in STEM.
- > The Academy's recruitment and selection processes will be structured so that a diverse range of candidates is actively considered.
- > The Academy will be accountable by publicly and regularly reporting its performance statistics.

The Academy's Diversity and Inclusion Committee, chaired by Dr Bruce Godfrey, created the Diversity and Inclusion Policy.

### What is diversity and inclusion?

Diversity at work means employing and working with a diverse range of people. Diversity covers age, cultural background, gender, religion, and ability and disability, as well as many other aspects of people's lives. Inclusion occurs when a diversity of people feel valued and respected, have access to opportunities and resources, and can contribute their perspectives and talents to improve their organisations.

## SAGE Symposium reviews progress

The 2017 Science in Australian Gender Equity (SAGE) Symposium discussed ways of enhancing the roles of women's role in Australian society, particularly in the research environment.

Held in Brisbane in September over two days, the first day covered topics including Changing Culture from Within, Value in Equality, Empowerment for All and Collective Action.

During Day 2, participants reviewed the program in a session titled Pressure Testing the Peer Review Process. This was followed by three workshops focused on Action planning, Building inclusive environments in STEM workplaces and Capacity building/professional development.

A partnership between the Academy and the Australian Academy of Science, SAGE is a program of activities designed to improve gender equity and diversity in science, technology, engineering, mathematics and medicine (STEMM) through a focus on these disciplines at Australian higher education and research institutions, using the successful Athena SWAN Charter from the UK.

### Bronze, silver and gold awards

Athena SWAN is an evaluation and accreditation program that has been running for than a decade in the UK, enhancing gender equity in STEM. Through bronze, silver and gold awards, it recognises excellence in employment practices that advance and promote the careers of women and gender minorities in STEMM subjects.

The SAGE Pilot of Athena SWAN involves 40 members, including 30 universities, six medical research institutes and four government science organisations.

The SAGE Pilot has adapted the UK processes for the Australian context, running training workshops on gender equity and providing gender equity accreditation for participating universities, medical research centres and Government research organisations.

## SAGE: Workshop in India produces equality plans

A workshop in India convened by the Australian, Indian and UK governments has generated cross-national recommendations for achieving gender equality in science, technology, engineering, mathematics and medicine (STEMM).

The workshop was supported by Science in Australia Gender Equity (SAGE), a partnership between the Academy and the Academy of Science promoting gender equity in academic and research organisations in Australia.

The top five recommendations included:

1. Develop a proposal to the Indian Science Academies' inter-academy panel to introduce an Athena SWAN framework to India.
2. Develop a strategy to leverage corporate social responsibility to support female internships across all three countries.
3. Develop a common set of messages for a digital campaign to promote women in STEMM across Australia, India and the UK.
4. Consider developing a proposal to expand trilateral cooperation on promotion of Women in STEMM to the Commonwealth.
5. Strengthen coordination and development of and support for bespoke professional leadership programs for Women in STEMM.

## Impact

### Solving the gender equation | Australasian Science Magazine

The Academy coordinated an article discussing the gender diversity in STEM and the Academy's joint program SAGE (Science in Australia Gender Equity). The article was written by the Chair of the Academy's Diversity and Inclusion Committee, Dr Bruce Godfrey.



## Academy goes to APEC in Hanoi

The Academy participated in the APEC Policy Partnership in Science, Technology and Innovation meetings in Hanoi, Vietnam, in 2017, represented by Executive Director of Policy Dr Matt Wenham. APEC is a forum for 21 Pacific Rim member economies that promotes free trade throughout the Asia-Pacific region.

The Academy's presence at APEC had the potential to extend the Academy's bilateral and multilateral engagement on technology readiness and innovation and entrepreneurship. Academy Director Dr Rosalind Dubs attended and chaired a session at the APEC Women in STEM Workshop the same week. As a member of the Performance and Audit Review Committee of Science in Australia Gender Equity (SAGE), of which the Academy is a partner, she was able to represent the SAGE program at the APEC meeting.

## East Asia Roundtable

In September, the Academy was invited to the East Asia Roundtable annual Symposium and Roundtable meeting in Busan, South Korea, and was represented by Vice-President Professor Kaye Basford. The Roundtable is convened by the engineering academies of China, Japan and South Korea. The event gave the Academy an opportunity to liaise more closely with its North Asian sister academies, as well as being able to provide input into the "closed" Roundtable meeting. The Symposium on Smart Cities was attended by Senior International Relations Associate Dr Carolyn O'Brien.

## More success for the China-Australia Annual Symposium

Jointly managed by the Australian Academy of Science, the Academy and the Chinese Academy of Science, the 13th China-Australia Annual Symposium took place in October 2017 in Brisbane.

The Symposium focused on synthetic biology with four sub-themes: macromolecular design, pathways, genome-scale and ethics. The cohort of eminent speakers discussed a range of synthetic biology challenges and ideas, from synthetic DNA templates to photosynthetic metabolism.

The successful event was also attended by a group of early-to-middle-career researchers from both countries.

Two Academy Fellows – the University of Queensland's Professor Peter Gray and ANU's Professor Simon Foote – were part of the Steering Committee. The annual event is funded through the Australia-China Science and Research Fund, administered by the Australian Government Department of Industry, Innovation and Science, and the Chinese Academy of Sciences.



Part of the East Asia Round Table Meeting.

## Academy President presents at STS Forum in Japan

In October 2017, Academy President Professor Hugh Bradlow presented at the Annual Meeting of the Science and Technology in Society (STS) Forum in Kyoto, Japan. The STS Forum is a major event bringing together more than 1000 world leaders from various fields, including Nobel Laureates, Science Ministers, senior university representatives and multinational executives. Professor Bradlow spoke during the Internet of Things session at the Forum.

## Innovation for Cool Earth Forum

Academy President Professor Hugh Bradlow attended the Innovation for Cool Earth Forum (ICEF) in Tokyo in October 2017. Established by Japanese Prime Minister Shinzo Abe, the Forum provides a global platform to promote discussions and cooperation among researchers, business leaders and policymakers worldwide on ways to address climate change through innovative energy and environmental technologies. Participation in this high-level event is by invitation only.

## Celebrating 40 years – the National Research Foundation of Korea

To mark its 40th anniversary, the National Research Foundation of Korea held an International Forum in Seoul in October 2017. Academy President Professor Hugh Bradlow attended this prestigious event and spoke on the theme of Research Excellence for Future Society.

## CAETS Convocation – understanding the bioeconomy

Held in Madrid, Spain, in November 2017, the International Council of Academies of Engineering and Technological Sciences (CAETS) Convocation helped tackle some of the major global issues that innovative engineering can solve. With the theme of "Challenges of the Bioeconomy", the Convocation included sessions on food security, genetic engineering, the blue bioeconomy and energy presented by experts from around the world.

"The bioeconomy" refers to the use of renewable biological resources and the ability to convert them into products, such as food and feed. It includes the production, processing, storage, consumption, recycling and disposal of natural resource demands innovative techniques.

Essentially, the bioeconomy brings together the various sectors of the economy that are related to biological resources – agriculture, forestry, fisheries, food, bio-based chemicals and material and bioenergy.

Academy President Professor Hugh Bradlow and Executive Director of Policy Dr Matt Wenham attended and contributed to the wider discussion, as well as holding side discussions with sister academies from China, Japan, Korea, India, the US and the UK.

## INTRAW – International Raw Materials Observatory

The Academy's Executive Director of Policy Dr Matt Wenham participated in the final consortium meeting for the EU Horizon 2020-funded project INTRAW – International cooperation on raw materials – in November 2017 in Brussels, Belgium.

## Australia China Next Step Initiative

Eight Australian researchers were awarded a Next Step Initiative grant to further their collaboration with Chinese partners.



## A trusted source of advice

The Academy develops trusted, informed and visionary views to persuade decision-makers on the development and implementation of technology for the good of Australia and its people.

The Academy advocates in an impartial and non-political manner for proposals that will benefit the economy, society and the environment.

During the year, Academy Fellows and staff attended some 100 meetings, workshops and conferences to build the Academy's profile and the influence of its proposals. They included meetings with:

- > The Head of Science and Commercialisation Policy and the Head of Science Policy in the Department of Industry, Innovation and Science
- > The Head of Resources Division, Department of Industry, Innovation and Science
- > The Manager Transport Innovation, Investment and Business, Victorian Department of Economic Development, Jobs, Transport and Resources
- > Transport technology readiness stakeholders including in the Office of the Minister for Urban Infrastructure; Standards Australia; Infrastructure Australia; and Transport for NSW
- > The Department of Infrastructure, Regional Development and Cities, Transport Technology Futures Taskforce
- > Participants at the Victorian Lead Scientist workshop on STEM participation
- > The General Manager, Commercialisation Policy, Department of Industry, Innovation and Science
- > The Chief Scientist

## AI embraced by Victorian Parliament

Robots visited the Parliament of Victoria last month for the launch of the Victorian All-Party Parliamentary Group on Artificial Intelligence.

The group, made up of parliamentarians from across the political spectrum, aims to learn more about the transformative nature of AI and how it will affect the future of Victoria.

The Academy's Victorian Division and the Committee for Melbourne co-hosted the seminar for MPs and their staff, which was addressed by 3A Institute Director Professor Genevieve Bell.

The event was launched by Innovation Minister Philip Dalidakis and Shadow Innovation Minister David Southwick, who are the group's co-convenors.

"We should be learning to embrace that change, adopt that change and then work out how we as a community and society can make sure people are not left behind," Mr Dalidakis said. "Parliament will be at the forefront of being able to explain and take advantage of this technology."

During the launch, robots from RMIT University handed the co-convenors a primer outlining basic information on some of the key issues in AI and machine learning.



Minister for Innovation Philip Dalidakis is handed a primer on AI and machine learning at the launch. Photo: Glenn Jeffrey

## South Australia election voter compass

The Academy's South Australian division put together a voter compass in the run-up to the state election in March, encouraging parties and voters to make technology policy a priority in political debates.

The Academy submitted a document to the offices of SA Best, Liberal, Labor and the SA Greens urging a number of policies that, if implemented, would help South Australia thrive.

Policies and priorities included:

- > Urgently ensuring power reliability, reducing the need to import power from the NEM at peak power prices
- > Being the first mover for 5G infrastructure
- > Evidence-based analysis of the role of genetic technology in the food of the future

Responses were received from Labor and the Greens.

And later, meetings were held between SA committee members and three Ministers in the incoming state government, the Chief of Staff of the Opposition Leader, leaders of the Greens and Advance SA parties.

Some local back-benchers and the science adviser of a SA representative of the Federally-based Centre Alliance were also met with.

## Connecting with the region

The Indonesian Ministry of Education and Culture invited the Academy's STELR project to deliver a keynote at an international seminar on implementing STEM education.

Peter Pentland, Executive Manager of the Academy's Schools Program, spoke alongside presenters from South Korea, Japan and Thailand.

The event was supported by the Southeast Asian Ministers of Education Organization (SEAMEO).

## Advocating for STEM education

The Academy responded promptly when the NSW Education Minister, Rob Stokes, made a speech calling STEM education a "fad".

President Professor Hugh Bradlow was quoted in *The Sydney Morning Herald* expressing concern at the Minister's remarks and emphasising the importance to the economy of STEM subjects, particularly mathematics.

Following the media response, Professor Bradlow and Academy staff met the Minister, the Secretary of the NSW Department of Education, the Secretary of the NSW Department of Industry and the Director of Policy Office of the NSW Premier.

The meetings were an opportunity to promote the importance of STEM in schools and the role that the Academy's STELR project could play in engaging students.

# Celebrating excellence



Doreen Thomas.  
Photo: Eamon Gallagher



## Innovation Dinner

Another successful Innovation Dinner was held in June 2018, celebrating Australia's leading technologists and engineers.

Australian of the Year Professor Michelle Simmons captivated the audience with her passionate keynote on the future of quantum computing. And this year was the first time the Batterham Medal and the ICM Agrifood Awards were presented alongside the Clunies Ross Awards.

The 2017 Batterham Medal and ICM Agrifood Awards were presented in November at the Oration Dinner.

## Clunies Ross Awards



### Knowledge Commercialisation: Professor David Huang

Professor David Huang and collaborators Associate Professor Peter Czabotar, Associate Professor Guillaume Lessene and Professor Andrew Roberts are recognised for their role in the development of a novel, potent anti-cancer drug called Venetoclax.

### Entrepreneur of the Year: Dr Erol Harvey

Scientist, educator and entrepreneur Dr Erol Harvey has made outstanding contributions to Australia through the world-leading microfluidic engineering company MiniFAB, his distinguished academic career and his unwavering support for research commercialisation and entrepreneurship.

### Innovation: Dr Jim Aylward

Dr James Aylward is the inventor of Picato, a novel anti-skin cancer drug developed from a folklore remedy that has been used to treat more than one million patients. Picato is a prescription drug with worldwide sales and major competitive advantages, and has become part of the arsenal for dermatology clinics.

## Batterham Medal

The Batterham Medal recognises the contributions of outstanding young engineers.



### Nick Birbilis

The 2017 winner was Monash University engineer Professor Nick Birbilis for his work on corrosion. His signature contribution in the last five years was his breakthrough in developing light-weight "stainless" magnesium and aluminium alloys.



### Madhu Bhaskaran

RMIT electrical engineer Associate Professor Madhu Bhaskaran is the 2018 winner and the first woman to be awarded the Batterham Medal. She is pioneering research into oxide-based flexible electronics - unbreakable transparent electronic devices.

## ICM Agrifood Awards

One male and one female early-career agrifood innovator win an ICM Agrifood Award.



ICM Agrifood winners 2017.

### Rebecca Darbyshire

NSW Department of Primary Industries' Dr Rebecca Darbyshire is leading Australia on climate change readiness and one of her major contributions to Australia's agriculture sector has been to introduce innovative ways to make complex scientific results more accessible for on-the-ground application.

### James Hunt

La Trobe University's Dr James Hunt has dedicated his research to supporting grain growers across the Australian wheat belt to improve the productivity and profit of grain-based farms.



ICM Agrifood winners 2018.

### Angela Van de Wouw

Dr Angela Van de Wouw from the University of Melbourne is a global authority on blackleg - the most severe canola disease in Australia. Dr Van de Wouw discovered new ways to control the disease, effectively arming farmers with management options to protect their crops and has prevented crop losses worth millions of dollars each year.

### Shu Kee Lam

Dr Shu Kee Lam, also from the University of Melbourne, is committed to understanding how more carbon dioxide will affect the important plant-soil processes that control the nitrogen supply used by crops. His research paper in Global Change Biology informed 20,000 policy makers on developing nitrogen-use policy in agriculture.



## Oration Dinner

The annual Oration Dinner was held in Sydney to welcome the 2017 Fellows. The orator was Alan Joyce, CEO of Qantas, who has been a Fellow since 2012.



## 2017 Fellows



**Dr Julie Beeby**  
Chair, Powerlink Queensland



**Dr Lachlan Blackhall**  
Chief Technology Officer, Reposit Power



**Professor Peter Corke**  
Director, Australian Centre for Robotic Vision



**Professor Graham Currie**  
Professor of Public Transport, Monash University



**Professor Rocky De Nys**  
Professor of Aquaculture, James Cook University



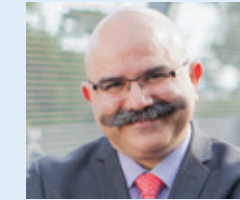
**Professor Bronwyn Fox**  
Director, Manufacturing Futures Research Institute, Swinburne University of Technology



**Dr Steven Frisken**  
CEO, Cylite Pty Ltd



**Professor Ewa Goldys**  
Deputy Director, ARC Centre of Excellence for Nanoscale BioPhotonics, Macquarie University



**Dr Kourosh Kayvani**  
Global Managing Director - Design, Innovation and Eminence at Aurecon



**Professor Mark Kendall**  
Professor, Australian Institute for Bioengineering and Nanotechnology, University of Queensland



**Professor Linda Kristjanson AO**  
Vice-Chancellor and President, Swinburne University of Technology



**Elizabeth Lewis-Gray**  
Chairman and Managing Director, Gekko Systems



**Dr Tony Lindsay**  
Director STELaRLab, Lockheed Martin



**Dr Xiaoling Liu**  
Director, Newcrest Mining Limited



**Professor Ravendra Naidu**  
Chief Executive Officer and Managing Director, CRC for Contamination Assessment and Remediation of the Environment



**Dr Anthony Radford AO**  
Director, IMNIS



**Dr Sarah Ryan**  
Director, Woodside Petroleum Ltd



**Professor John Mattick AO FAHMS**  
Executive Director, Garvan Institute of Medical Research



**Dr Tony Peacock**  
CEO, Co-operative Research Centres Association



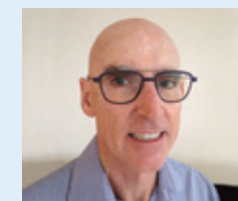
**Dr Brett Phillips**  
Director, Cardno NSW/ACT Pty Ltd



**Professor Laura Pool-Warren**  
Pro Vice-Chancellor (Research Training), University of NSW



**Professor Andrew Potts**  
Co-Founder, Chief Executive Officer and Executive Director, AMOG Group of Companies



**Michael Quigley**  
Adjunct Professor, University of Technology, Sydney



**Skipp Williamson**  
Managing Director, Partners in Performance



**Peter Yates AM**  
Deputy Chair, Myer Family Investments

## 2017 FOREIGN FELLOW



**Dr Ya-Qin Zhang**  
President, Baidu Inc



## Achievements of our Fellows



Veena Sahajwalla.  
Photo: Courtesy of  
UNSW

### Fellows elected to the Royal Society

Professor Michelle Simmons, Professor Graeme Jameson and Foreign Fellow Professor Robin Grimes were elected to the Royal Society, joining 1600 of the world's most eminent scientists.

### Martin Green

Professor Martin Green has become the first Australian to win a prestigious Global Energy Prize for revolutionising the efficiency and cost of solar photovoltaics, and making it the lowest-cost option for bulk electricity supply.

### Peter Corke and Alex Zelinsky

The two Academy Fellows brought the International Conference on Robotics and Automation (ICRA) to the southern hemisphere for the first time since the global event launched in 1984.

### Megan Clark

The former CSIRO chief executive will lead the Australian Space Agency for its first year after completing a government review of the space sector.

### Veena Sahajwalla

Professor Sahajwalla launched the world's first e-waste microfactory at the University of NSW that will offer a solution to burning and burying waste that contains valuable reusable materials. Professor Sahajwalla is pictured above.

### John Mattick

Genomics England – a flagship organisation set up to deliver the 100,000 Genomes Project to sequence whole genomes from NHS patients – appointed Professor Mattick as its first CEO.

### Paul Zimmet

Professor Zimmet was named the 2018 Victorian Senior Australian of the Year for the profound impact of his pioneering work in diabetes.

### Dimity Dornan

Dr Dornan was named the 2018 Queensland Senior Australian of the Year for her life-changing work of more than 50 years of speech pathology through her organisation Hear and Say.

### Michelle Simmons

Professor Simmons was named 2018 Australian of the Year in recognition of her pioneering research and inspiring leadership in quantum computing.

### Eric Reynolds

Oral health expert Professor Reynolds won the 2017 Prime Minister's Prize for Innovation for his discovery of a protein that repairs and strengthens teeth. Today the protein, sold as Recaldent, is used by millions of people every day.

### Marlene Kanga

Dr Marlene Kanga began her role as the new President of the World Federation of Engineering Organisations – the second woman and second Australian to do so in its 49-year history. In this role, she represents some 100 engineering institutions and 30 million engineers.

### Graeme Young

Professor Young was awarded the 2017 Eureka Prize for Innovation in Medical Research in recognition of his work with CSIRO and Clinical Genomics colleagues on a novel circulating tumour DNA blood test for colorectal cancer patients.

### Kathy Hirschfeld

Kathy Hirschfeld was elected President of UN Women National Committee Australia. Ms Hirschfeld is a chemical engineer and has been on the UN Women National Committee Australia board since 2013.

### Liang-Shih Fan

Foreign Fellow Dr Liang-Shih Fan has been included in Marquis Who's Who – a biographical data system that selects individuals profiles based on their current reference value, since 1899.

### Mary O'Kane

NSW Chief Scientist and Engineer Professor Mary O'Kane was awarded the Peter Nicol Russell Medal Career Achievement Memorial Medal by Engineers Australia. Awarded annually, Professor O'Kane is the second woman to win the PNR Memorial Medal since its inception in 1923.

### Stephen Powles

Professor Stephen Powles has become a Web of Science Highly Cited Scientist (HiSci), belonging to the top 1 per cent most cited scientists globally across 21 category disciplines. There are only six HiSci's in agricultural science and, of these, Professor Powles is the only crop and weed scientist.

### Hugh Durrant-Whyte

Professor Hugh Durrant-Whyte was appointed NSW Chief Scientist and Engineer, replacing Professor Mary O'Kane. Professor Durrant-Whyte is known for his pioneering work in autonomous robotics.

## Vale to our Fellows 2017-18

Professor Joe Baker died on 16 January 2018, aged 85.

Professor Brian Cherry died on 27 April 2018, aged 83.

Professor Graeme Bird AO died on 26 May, aged 88.

Professor Tony Linnane died in November 2017, aged 87.

Dr Phillip Playford AM died in Perth on 12 July 2017, aged 85.

Professor Peter Poole, died in Perth on 17 August, aged 85.

Emeritus Professor Rolf Prince AO died in Sydney on 4 July 2017, aged 88.

Mr Walter Stamm AM died on 26 March 2018, aged 91.

Dr Geoffrey Taylor died in Canberra on 7 October 2017, aged 93.

Dr Geoffrey Vaughan died in Melbourne on 4 January 2018, aged 84.

Professor Stuart Wenham died on 23 December 2017, aged 60.



## DIVISION ACTIVITY

### NSW DIVISION

#### Energy Symposium: The NEM after the Finkel Review

The future of Australia's electricity market was the subject of lively debate at the CBA Colonial Theatre in Sydney. Attended by 150 industry experts, the Symposium included presentations from Dr Alan Finkel and international guests.

They discussed energy policy, investment opportunities, and political, economic and technological challenges associated with the Finkel Review recommendations implemented by the Energy Security Board for the NEM.

The Division also held events on:

- > Knowledge Clusters and Innovation: How Australia's hearing Health Ecosystem became World Class (Annual Meeting and Malcolm Chaikin Oration)
- > The Data Game: Players, Potential and Privacy
- > Disruptive Innovation: The Industry Challenge
- > New discoveries, challenges and opportunities with the SKA
- > Annual Meeting of the Four Societies
- > Risk in Transforming Society
- > How Innovation in Autonomous System Drives the Future
- > A Special Event: The Future of Technology
- > Robotic Measurement of the Heat in the Ocean

### VIC DIVISION

#### After Hazelwood: Victoria's Electricity Future

The symposium brought together leading speakers from the government, regulation, industry and research communities to explore opportunities to maintain reliable and affordable electricity supply while substantially reducing greenhouse gas emissions.

It also explored the state's electricity future from the perspective of suppliers and users, with Chloe Munro, Paul Grahall and Professor Pierluigi Mancarella among the speakers.

The Division also held events on:

- > 3D Bioprinting: Printing Parts for Bodies
- > Digital Manufacturing: Revolution or Evolution
- > Agribusiness in East Africa: The potential and the perils (Annual Meeting and Presentation)
- > Where geologists fear to tread: Minefields in Lake Mungo archaeology (Joint Academies Dinner)
- > Scale up of Technologies: Separation and Energy Storage
- > Defence Manufacturing in Australia
- > 2018 Victorian Commencement Dinner
- > The Australian Synchrotron: how world class infrastructure delivers real-life benefits
- > New AI in Agricultural Technologies

### QLD DIVISION

#### Technology readiness briefing to Queensland Government Directors

The purpose of this event was to raise the profile of the contributions individual Fellows and the Academy collectively can make as a trusted advisor on technological issues to government. The meeting addressed four topic areas: transport and energy; agriculture and water; infrastructure; and science and education.

The Division also held events on:

- > UQ ChangeMakers with Andrew Liveris
- > UQ Energy: It's all about energy
- > Broadband Communications: Much more than the NBN (Annual Meeting and Presentation)
- > A Robot Apocalypse
- > Recent Innovations in Biomedical imaging Technology at UQ and Potential Pathways into Industry/Clinical Practice
- > Challenges of a rapid transition to a low-carbon energy economy

### WA DIVISION

#### Bitcoin and blockchain

University of Western Australia economics expert Professor Dirk Bauer was featured at the Division's end-of-year evening talk and dinner. He provided an introduction to bitcoin and blockchain, discussing how the technology works and the role of transparency, decentralisation and efficiency and the recent applications of blockchain technology in the energy sectors.

### ACT DIVISION

#### Residential power plants and electricity network management

ANU research fellow from the School of Computer Science Dr Paul Scott gave a talk on power systems and smart grids. He discussed how batteries and electric vehicles will soon become the next un-ignorable investment – unless networks regulate their uptake first.

He explored these challenges and opportunities, presenting recent results from the Bruny Island Battery Trial that uses the Network-Aware Coordination technology developed at the ANU.

The Division also held a lecture on cyber security, and breath biomarkers and biosecurity.



Chloe Munro

### TAS DIVISION

#### Mining in Tasmania: Dinosaur or Deliverer?

Is the mining industry a "dinosaur" facing extinction, or a "deliverer" providing a sustainable source of economic prosperity for Tasmania? This public forum intended to raise community awareness and understanding of issues around the future of mining in Tasmania.

Guest speakers had expertise in the economics of mining, sustainability, environmental and community impacts, and government policy, moderated by Louise Saunders from ABC Radio Hobart.

### SA DIVISION

#### Transforming Industry through Technology

The division hosted a technology showcase as part of the Global Maintenance Upper Spencer Gulf Industry Conference and Trade Expo in Whyalla. It featured top technologies developed by South Australia's universities – each offering collaboration to help SMEs engage in multi-disciplinary research programs and partnerships with a strong commercial focus.

University of Adelaide, Flinders University and the University of SA presented some of their most exciting projects.

## IMPACT

The Academy's strategic focus on amplifying impact began to result in much-improved media reach in the latter part of the year.

There was coverage through outlets that included ABC radio (national, Melbourne and Gold Coast), Sky TV Business, 3AW, news.com.au, *Nature*, *The Australian*, *The Advertiser* (Adelaide) and the Fairfax regional network.

The Academy launched its podcast channel, with four podcasts uploaded in late June. On Twitter, engagement in March to June rose 247 per cent on the previous quarter, impressions increased 215 per cent and the number of followers rose 59 per cent.

#### Innovation Dinner media coverage

The Innovation Dinner is a highlight on the Academy's calendar and the high quality of the awardees was reflected in the media coverage the Academy gained.

Fellow and Clunies Ross awardee Dr Erol Harvey was interviewed live on national television on the night on Sky Business with Ticky Fullerton, and again on ABC breakfast radio the next morning.

Dr Jim Aylward, another Clunies Ross awardee, was interviewed twice on ABC radio – on *Mornings with Jon Faine* and *Drive with Matt Webber*.

The evening generated substantial Twitter traffic. Our hashtag #atselInnovationDinner trended strongly in Melbourne, reaching fifth most popular hashtag of the night.

## SUCCESS IN COMMUNICATION

Total media mentions: **354**

<b>38</b> News Corp Au	<b>149</b> ABC
<b>79</b> Fairfax	<b>88</b> Other

#### Website

Compared to the previous financial year:

**35%** more views from organic search  
**18%** increase in desktop audience  
**20%** increase in tablet audience  
**45%** more average time on website  
**26%** more people aged 18–24 are visiting the website

#### Social media

**1606** Twitter followers, 30 June 2018  
**834** LinkedIn followers, 30 June 2018

#### Focus magazine

**325** Digital subscribers  
**1450** Print subscribers

#### Multimedia

**4** podcasts with **113** listeners  
**15** YouTube videos with more than **1600** plays.



## DIVISIONAL CHAIRS

ACT:	Professor John Richards
NSW:	Dr Richard Sheldrake
QLD:	Professor Mike Hood
SA:	Michael Heard
TAS:	Professor Ross Large
VIC:	Dr Alexander Gosling
WA:	Professor Bogdan Dlugogorski

## FORUM CHAIRS

AGRICULTURE:	Professor Timothy Reeves
EDUCATION:	Professor Doreen Thomas
ENERGY:	Dr Bruce Godfrey
DIGITAL FUTURES:	Professor Glenn Wightwick and Professor Michael Miller
HEALTH:	Professor Karen Reynolds
INDUSTRY AND INNOVATION:	Kathryn Fagg
INFRASTRUCTURE:	Professor Graham Currie
MINERAL RESOURCES:	Denise Goldsworthy
WATER:	Dr Robert Vertessy

## ACADEMY STAFF

Dr Margaret Hartley	Chief Executive Officer
Dr Matt Wenham	Executive Director, Policy
Sue Wickham	Executive Director, Operations and Events
Peter Pentland	Executive Manager, Academy Schools Program
Dr Marguerite Galea-Evans	IMNIS Executive Director
Dr Mark Bradley	International Innovation Programs Manager
Dr David Glanz	Senior Communications Manager
Pennie Stoyles	STELR Program Manager
Lynn Pagoda	Governance Secretary
Dr Carolyn O'Brien	Senior International Relations Associate
Dominic Banfield	Policy Analyst
Dr Emily Finch	Policy Analyst
Robyn Lawford	Policy Support Officer
Deborah Sippitts	Communications Manager (SAGE)
Andrew Griffiths	Digital Coordinator
Anthea Batsakis	Communications Officer
Nivedita Seewoosunkur	Data Integrity Officer
Maria Pridham	Finance Officer
Elvira Copur	Senior Coordinator, Membership and Awards
Charlee Woodham	Operations Administrator
Amelia Ingrisiano	Events Coordinator and Division Support Officer
Sarah Hayward	International Mentoring Officer

## The Board

The Academy is led by the Board, which is responsible for strategy and governance. The Board establishes two primary sets of committees to ensure engagement of the Fellows, seeks to enhance the experience of Fellowship and maximise Fellows' input to Academy activities.

**Divisions:** Geographic-based groups of Fellows that provide a social network and a continuing education experience of Fellowship and liaise with state and territory governments

**Forums and Working Groups:** Expertise-based groups of Fellows determined by common knowledge areas, professional interest and the Academy's areas of focus.



**Professor Hugh Bradlow**  
President



**Professor Kaye Basford**  
Vice-President Financial Sustainability and International



**Dr David Cook AO**  
Vice-President Membership



**Dr Bruce Godfrey**  
Vice-President Diversity



**Dr Margaret Hartley**  
Chief Executive Officer



**Dr Rosalind Dubs**  
Director



**Dr Carrie Hillyard**  
Director



**Professor Karen Reynolds**  
Chair, Health and Technology Forum



**Dr Richard Sheldrake AM**  
Chair, NSW Division



**Professor Doreen Thomas**  
Chair, Education Forum

Full biographies are available at [applied.org.au](http://applied.org.au)



## Financial Summary for the year ended 30 June 2018

### Principal Objectives

The long-term objective of the Academy is to promote the application of scientific and engineering knowledge to practical purposes in Australia. The activities of the Academy during the financial year were directed towards our key strategy of promoting technology readiness for Australia 2030. In particular, the Academy:

- > Provided evidence-based advice on a range of technology and innovation policy issues to governments, industry and the community
- > Provided a forum for debate and policy formulation on important national issues
- > Undertook projects on matters of major technology and engineering national significance
- > Fostered and recognised excellence in technology and engineering
- > Used its international linkages to provide access to expertise from around the world
- > Conducted a program in over 660 Australian secondary schools to promote the relevance of science, technology, engineering and mathematics (STEM) and a more scientifically literate society; and ran a national program of industry mentoring for PhD students in STEM

### Operating Result

The operating result for the Academy showed a total revenue of \$6,743,777.

The major source of income was government grants and contracts accounting for 58 per cent of revenue (similar to 2016-17); investment income 10.8 per cent (up from 7.4 percent in 2016-17) and sponsorship at 6.6 per cent was down from 12.9 per cent in the previous year.

There was an operational deficit for the year of -\$135,937 (compared to a deficit position of -\$225,273 in the previous year). The realized net fair value gain on available-for-sale financial assets was \$87,148 (compared with \$326,711 in 2016-17). The total comprehensive income for the year was a deficit of -\$48,787 (compared with \$101,438 for the previous year).

The financial position remained strong with total current assets of \$6,180,339 and total liabilities of \$4,100,919. The asset to current liability ratio was 1.5 (a healthy financial position is reflected in a ratio greater than 1.0).

### STATEMENT OF PROFIT OR LOSS AND OTHER COMPREHENSIVE INCOME FOR THE YEAR ENDED 30 JUNE 2018

	2018 \$	2017 \$
<b>Revenue</b>	<b>6,743,777</b>	<b>5,580,440</b>
<b>Expenses</b>		
Learned Fund	(2,167,654)	(1,879,268)
Endowment Fund	(749,882)	(564,861)
Technical Projects	(521,206)	(593,745)
International Science and Technology	(2,254,755)	(1,835,649)
STELR	(1,100,384)	(882,362)
Awards	(85,833)	(49,828)
<b>Total Expenses</b>	<b>(6,879,714)</b>	<b>(5,805,713)</b>
<b>Deficit for the year</b>	<b>(135,937)</b>	<b>(225,273)</b>
<b>Other comprehensive income</b>		
Items that may be reclassified subsequently to profit or loss in future years:		
Fair value gain on available-for-sale financial assets	87,148	326,711
<b>Other comprehensive income for the year</b>	<b>87,148</b>	<b>326,711</b>
<b>Total comprehensive (loss)/income for the year</b>	<b>(48,787)</b>	<b>101,438</b>

### STATEMENT OF FINANCIAL POSITION AS AT 30 JUNE 2018

	2018 \$	2017 \$
<b>ASSETS</b>		
<b>Current Assets</b>		
Cash and cash equivalents	4,405,538	4,619,497
Trade and other receivables	297,972	286,226
Financial assets	1,354,027	1,657,814
Other assets	122,802	75,198
<b>Total Current Assets</b>	<b>6,180,339</b>	<b>6,638,735</b>
<b>Non-Current Assets</b>		
Financial assets	5,622,662	5,567,588
Plant and equipment	447,245	88,530
Intangible assets	61,651	66,362
<b>Total Non-Current Assets</b>	<b>6,131,558</b>	<b>5,722,480</b>
<b>TOTAL ASSETS</b>	<b>12,311,897</b>	<b>12,361,215</b>
<b>LIABILITIES</b>		
<b>Current Liabilities</b>		
Trade and other payables	241,586	167,578
Income in advance	3,612,650	3,637,335
Provisions	236,460	283,592
<b>Total Current Liabilities</b>	<b>4,090,696</b>	<b>4,088,505</b>
<b>Non-Current Liabilities</b>		
Provisions	10,223	12,944
<b>Total Non-Current Liabilities</b>	<b>10,223</b>	<b>12,944</b>
<b>TOTAL LIABILITIES</b>	<b>4,100,919</b>	<b>4,101,449</b>
<b>NET ASSETS</b>	<b>8,210,978</b>	<b>8,259,766</b>
<b>EQUITY</b>		
Reserves	384,301	297,153
Retained surplus	7,826,677	7,962,613
<b>TOTAL EQUITY</b>	<b>8,210,978</b>	<b>8,259,766</b>

### 2017-18 Donations

- > CRC for Polymers
- > Professor David Henry Solomon AM  
FAA FRS FTSE FICHEM
- > Valerie Dawn Solomon
- > Dr Denis Wade AM FTSE
- > Dr Jennifer Whythes FTSE
- > Dr Alan Donald AM FTSE
- > Cochlear Foundation Limited
- > Dr Doreen Veronica Clark AM FTSE
- > John Theodore Ralph AC FAA FTSE
- > Peter Yates AM FTSE
- > ASCA - AEF Donation
- > Dr Geoffrey Knights AM FTSE
- > Morrish Besley AC FTSE
- > Dr Robert La Nauze FTSE

### 2017-18 Acknowledgements

- STELR
- > Orica Limited - Major Sponsor
- > Australian Power Institute - Sponsor
- Innovation Dinner
- > Monash University - Principal Sponsor



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