

# AMSI 2017 ANNUAL REPORT

# AMSI's Mission

## **THE RADICAL IMPROVEMENT OF MATHEMATICAL SCIENCES CAPACITY AND CAPABILITY IN THE AUSTRALIAN COMMUNITY THROUGH:**

The support of high quality mathematics education for all young Australians

Improving the supply of mathematically well-prepared students entering tertiary education by direct involvement with schools

The support of mathematical sciences research and its applications including cross-disciplinary areas and public and private sectors

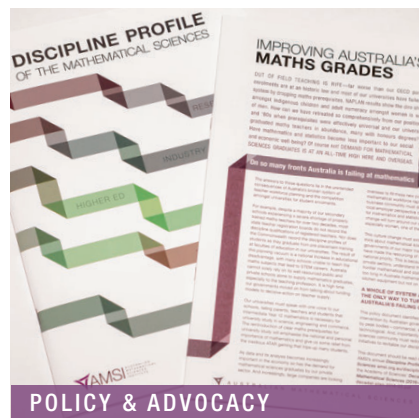
The enhancement of the undergraduate and postgraduate experience of students in the mathematical sciences and related disciplines

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POLICY & ADVOCACY



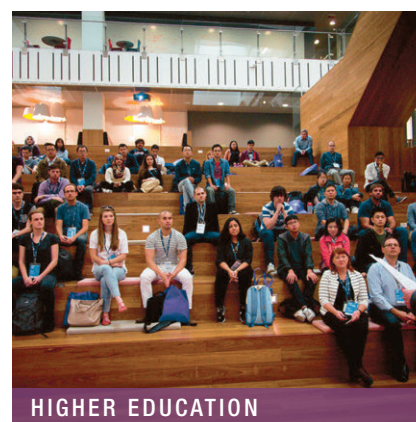
OUTREACH



SCHOOLS



SCHOOLS - CHOOSE MATHS



HIGHER EDUCATION



RESEARCH



APR.INTERN



MARKETING & MEDIA



GOVERNANCE

# From the Chair



2017 WAS ANOTHER HIGHLY SUCCESSFUL YEAR FOR AMSI. Maintaining this presents us with a challenge, especially with the impending retirement of AMSI's Director, Professor Geoff Prince.

*Geoff has been responsible for an extraordinary sequence of successes under his leadership: a significantly enhanced membership roster; the development of AMSI Intern and its evolution to APR.Intern; the Choose Maths Initiative; and the continued expansion of AMSI's Research and Higher Education Program.*

The search process for the next Director got under way in the second half of the year and is ongoing. The University of Melbourne and the AMSI Board have provided great assistance in this important process.

AMSI's role in advocacy for the mathematical sciences has changed the content and character of the national conversation. This has come about largely as a result of Geoff's tireless work at federal and state levels. AMSI's contributions, through its publications and press releases, to the debate on current issues have grown exponentially. These issues include falling participation levels especially at the higher levels, performance against international benchmarks, mathematical prerequisites for relevant university courses, out-of-field teaching and the increasing importance of the mathematical sciences in shaping Australia's future industries. The annual *Discipline Profile* published by AMSI is an invaluable resource for those who need to have the facts at their fingertips in planning mathematical and educational initiatives ([amsi.org.au/publications/discipline-profile-mathematical-sciences-2017/](https://amsi.org.au/publications/discipline-profile-mathematical-sciences-2017/)).

APR.Intern is in a growth phase following the award by the Australian Government of a significant grant of \$28.2 million early in the year. A pleasing by-product has been our ability to develop major agreements such as that signed by Dr Alex Zelinsky AO, Australia's Chief Defence Scientist, to place 100 interns in the Defence Science and Technology Group over a four-year period.

It was a privilege to attend the AMSI Choose Maths Awards this year along with most of my fellow Board members. Ultimately, many of AMSI's goals depend on the existence of a cadre of inspirational teachers able to develop the next generation of mathematically literate high school graduates. These students may use mathematics in widely dispersed fields, from biological research to optimisation of industrial processes, from nursing practice through to data management (and of course in research and teaching of mathematics). The inspirational teachers and inspired students were out in force.

The Choose Maths initiative, proudly and generously supported by the BHP Billiton Foundation, continues to deliver exciting outcomes. It was exciting to see some Melbourne trams decorated with the faces of our wonderful Ambassadors, relaying the Choose Maths message around the city during National Science Week.

AMSI's Research and Higher Education Program provides students and teachers with the opportunity to engage in a joint exploration of many topics in a variety of schools and seminars. The effective delivery of these schools is a tribute both to our members and to AMSI. The introduction of AMSI Optimise, ably led by Monash University's Andreas Ernst and AMSI staff, was a noteworthy development in this Program in 2017.

AMSI is unique in being a partnership of most of Australia's universities and mathematically intensive research institutions. AMSI exists to serve the needs of its members who are passionately committed to its nationally important mission.

A handwritten signature in dark ink, reading "Ron Sandland".

**Dr Ron Sandland AM FTSE**  
**February 2018**



# From the Director



2017 WAS ANOTHER YEAR OF GROWTH and program development at AMSI. Our staff grew by 20 per cent, the AMSI Foundation became a formal reality, we saw a successful public careers campaign hit the roads and the digital highway, and we signed our contract with the Commonwealth for the National Research Internship Program (NRIP).

AMSI's Choose Maths project, funded by the BHP Billiton Foundation, saw its third and most successful year of operation. It was a great pleasure to award three outstanding teachers with awards at the Choose Maths Awards on 31 August—Ashley Stewart, Keith Barnett, Patricia Hosking. This is a truly inspirational event with so many excited and inspired students and teachers whose achievements are so sensational.

We also launched the Choose Maths *Be More Than a Number* careers awareness campaign across public transport in three capital cities and nationally on social media and digital news services. The impact was immediate and we are now planning an expanded follow up in 2018.

The second AMSI *Gender Report* ([amsi.org.au/publications/gender-report-2017-participation-performance-attitudes-towards-mathematics/](https://amsi.org.au/publications/gender-report-2017-participation-performance-attitudes-towards-mathematics/)) was released under the auspices of Choose Maths in November. The analysis by AMSI's Ning Li and Inge Koch is wide ranging, among other things identifying self-perception of ability as a significant difference between boys and girls.

*The report recommends a national mentoring program for girls as part of their mathematical learning experience. Choose Maths "Women in Maths Network" has been piloting such a program in five states in 2017 with considerable success.*

2017 has seen a restructure of our Research and Higher Education team, now managed by Chloe Pearse along with project coordinators Angela Coughlin and Anna Muscara and administrative assistants Francesca Hoban Ryan and Liam Williamson.

This additional capacity has been key to delivering the largest ever Winter School and

the first at QUT, *Computational Foundations of Data Science*, with over 70 students. We have also successfully added *AMSI Optimise*, hosted by Monash University, to our flagship research training programs. Monash also hosted BioInfoSummer 2017 and will be delivering the 2018 Summer School; in all a major commitment and deeply appreciated by AMSI and its members.

AMSI supported 23 workshops, 83 invited international speakers and more than 1000 attendees in total during a bumper 2017 and toured the AMSI-ANZIAM Lecturer, Maria Vlasiov from Eindhoven University of Technology.

The activities of our entire research and training program are recorded impressively in our annual *Research Report* ([amsi.org.au/publications\\_category/publications/research-reports/](https://amsi.org.au/publications_category/publications/research-reports/)).

Our close engagement with government saw invitations to me to represent AMSI on two ministerial working parties: the implementation working party for the recommendations of the ACOLA *Review of Research Training* and the expert advisory panel on the National Year 1 Literacy and Numeracy Check. Both groups completed their work and made recommendations to the Commonwealth Minister for Education and Training.

Our annual *Discipline Profile of the Mathematical Sciences* and the accompanying policy document ([amsi.org.au/publications\\_category/publications/discipline-profiles/](https://amsi.org.au/publications_category/publications/discipline-profiles/) & [amsi.org.au/publications\\_category/publications/submissions/](https://amsi.org.au/publications_category/publications/submissions/)) were well received by our stakeholders and the media. In particular, they were instrumental in our engagement with Innovation and Science Australia in the development of their *Australia 2030: Prosperity through Innovation* report.

AMSI's marketing and communications capacity is the envy of mathematical sciences institutes the world over. It is the pillar which supports our engagement and our outreach to stakeholders and the public. In 2017 our achievements were remarkable: 318 media occurrences reaching a domestic and international audience of 228 million people.

AMSI's Commonwealth \$28.2m contract for the new *National Research Internship Program* (NRIP) was finalised in May 2017. Since then we have been recruiting new staff and pushing up the placement rate. Importantly, we have engaging heavily with both individual universities around the country and with university peak bodies to create placement opportunities. On the industry side we have deepened our relationship with a number of large corporates and especially in the defence sector where we have signed a memorandum of understanding with our member agency, the Defence Science and Technology Group, for 100 placements through to 2020.

I extend my sincere thanks to Ron Sandland, the AMSI Board and our members for their encouragement and support, and to our Lead Agency, the University of Melbourne, for its commitment to the Institute.

Finally, I salute the AMSI staff, our greatest asset, whose vitality and ideas contribute so much to the pursuit of our mission.

A handwritten signature in dark ink, reading 'G Prince'.

**Professor Geoff Prince FAustMS**  
**February 2018**

# AMSI Members

## Full Members



AMSI and its members acknowledge the significant contribution of the University of Melbourne as our Lead Agent and host

## Associate Members



## Government Agencies



## Societies



List of members as of December 2017

# Key Achievements

CHOOSE**MATHS** AWARDS  
ATTRACT OVER **380**  
**STUDENT ENTRIES** AND **34**  
**TEACHER NOMINATIONS**

**665** SCHOOL VISITS  
AND **117** PROFESSIONAL  
**DEVELOPMENT DAYS**  
FOR TEACHERS

MORE THAN **1800**  
**RESEARCHERS** ATTEND  
AMSI R&HE EVENTS IN 2017

AMSI R&HE EVENTS  
FEATURE ALMOST **100**  
**INTERNATIONAL SPEAKERS**

ALMOST **30%** OF  
ATTENDEES AT AMSI FLAGSHIP  
EVENTS **ARE WOMEN**

**787** RESEARCH STUDENTS,  
**ECRS** AND **RESEARCHERS**  
ATTEND AMSI'S FLAGSHIP  
TRAINING EVENTS IN 2017

NEW FLAGSHIP EVENT,  
**AMSI OPTIMISE** LAUNCHES

**318** MEDIA ARTICLES IN  
2017 — A **209% INCREASE**  
IN MEDIA COVERAGE OVER 2016

AMSI SPONSORS **23**  
**RESEARCH WORKSHOPS**

AMSI RECEIVES **\$28.2**  
**MILLION** IN FUNDING FROM  
THE AUSTRALIAN GOVERNMENT  
TO EXPAND AMSI INTERN  
INTO A NATIONAL PROGRAM,  
RENAMED **APR.INTERN**

**71** **INTERNSHIPS** COMPLETED  
THROUGH THE INTERN PROGRAM,  
MORE THAN DOUBLE THAT IN 2016

**20TH** EDITION OF  
MATHS ADDS CAREERS  
GUIDE PUBLISHED

SOCIAL MEDIA ENGAGEMENT  
**UP BY 20%** ACROSS  
ALL OF THE PROGRAMS

# Policy & Advocacy

As the central voice for Australia's mathematical sciences, AMSI plays an active role in the development of national research policy and frameworks to help shape future innovation. Our policy and advocacy agenda is intended to deliver critical reform across the mathematics pipeline from school-based and higher education, research training and funding to industry collaboration and innovation.

## Policy

### THE AUSTRALIAN MATHEMATICAL SCIENCES IN 2017

Deepening inequity across the mathematical sciences pipeline saw AMSI expand its key policy priorities in 2017 to include key recommendations tackling growing regional and indigenous disadvantage. *Improving Australia's Maths Grades* outlines key priorities for government and peak body intervention to address out-of-field teaching, falling student engagement and achievement in the classroom, careers awareness, university prerequisites and university research-industry engagement.

Key trends in the sixth edition of AMSI's *Discipline Profile of the Mathematical Sciences* show out-of-field teaching in low socioeconomic, regional and remote areas is endemic with at least 17.4 per cent of indigenous students (50 per cent in remote areas) below minimum maths standards by Year 9 compared to only 2.1 per cent of their non-indigenous peers. Gender also remains a concern with under 7 per cent of Year 12 girls enrolling in advanced maths in 2016 compared to over 13 per cent of

boys. Entrenched gender and social divides leading to low representation of female, regional and indigenous students in Australia's high maths achievers threaten future skill supply.

We continue to champion decisive action to strengthen teaching and student engagement. At least 26 per cent of Years 7–10 maths classes are taught by an out-of-field teacher, a figure that climbs to over 40 per cent in regional and low socioeconomic areas. This is more than triple the international rate of 12 per cent. In particular we continue to call for recruitment of indigenous and female mathematics teachers from Australian university mathematical sciences departments to boost classroom skill levels.

At the other end of the pipeline an ageing population is also having a critical impact on the gender divide and the skills deficit. Currently over 30 per cent of the mathematical workforce is aged over 55 with

#### KEY AMSI POLICY RECOMMENDATIONS

##### PRIORITY A: Our Teachers

Support the unqualified teachers of secondary school mathematics; deal with the widespread maths anxiety among primary school staff and secure the future supply of properly trained maths teachers today

##### PRIORITY B: Culture Change

Restore university maths prerequisites from their historic low and turn around declining school mathematics enrolments

##### PRIORITY C: An Equitable Future

Increase the rates of graduation in the mathematical sciences, especially among women and Aboriginal and Torres Strait Islanders, to grow and refresh the quantitative professions

##### PRIORITY D: World Class

Build and support world-quality infrastructure on a national scale in the mathematical sciences and increase our international research engagement

##### PRIORITY E: Innovation

Boost the engagement of Australian business with mathematical sciences research and better equip our graduates with the coding and data skills for business careers

an unsustainably low postgraduate supply. This is compounded by low representation of women and indigenous Australians in mathematics departments nationally. Women account for only 23 per cent of the academic mathematical sciences workforce and only four AMSI member academics and 151 students out of 10,000 identify as ATSI.

There is, however, some positive news. While comparatively among the smallest of the STEM disciplines, the Australian mathematical sciences continue to maintain an impressive international presence, as well as punching above its weight in ARC discovery grant success compared to other science fields.

### OUR VISION FOR THE MATHEMATICAL SCIENCES

AMSI is calling for decisive measures to improve classroom engagement and foster Australia's future mathematical skills supply. STEM skills are essential to 75 per cent of Australia's growth employment areas. If Australia is to have an innovation future, more needs to be done to address key issues such as out-of-field teachers (more than 30 per cent of teachers are currently not fully qualified to teach mathematics) and restore university prerequisites (only 14 per cent of universities required intermediate maths to start a science degree in 2016).

It's essential to ensure Australia has the mathematical and statistical skills to remain internationally competitive and protect future national security, population health and climate stability. Future mathematical literacy requires decisive policy action and reform today.

### SUBMISSIONS

AMSI was involved in two submissions in response to national issues papers and reviews during 2017.

### Innovation and Science Australia 2030 Strategic Plan Issues Paper: Response

In March 2017, Innovation and Science Australia (ISA) released its *2030 Strategic Plan Issues Paper*, outlining six challenges seen as key to achieving their strategy for Australian innovation.

AMSI's supports the view Australia must strategically invest now in the mathematical sciences at a whole-of-system level to achieve ISA's vision for a "top tier" innovation system in 2030.



## Policy & Advocacy

In particular, AMSI identified three critical areas of need for the mathematical sciences pipeline in Australia:

- Prerequisites — AMSI recommends universal introduction of mathematics prerequisites for university studies in science, engineering and commerce
- Out-of-field mathematics teaching — AMSI's policy document includes a number of measures designed to rectify the shortage of trained mathematics teachers, and suggests this be tackled at both the Commonwealth and State level
- Industry engagement — AMSI believes industry must engage with the mathematical sciences through programs like APR.Intern

### 2017 POLICY SUBMISSIONS

Innovation and Science Australia 2030 Strategic Plan Issues Paper: Response [amsi.org.au/publications/2030-strategic-plan-issues-paper-innovation-science-australia-response/](https://amsi.org.au/publications/2030-strategic-plan-issues-paper-innovation-science-australia-response/)

Review to Achieve Educational Excellence in Australian Schools: Submission [amsi.org.au/publications/review-achieve-educational-excellence-australian-schools-submission-form/](https://amsi.org.au/publications/review-achieve-educational-excellence-australian-schools-submission-form/)

*Australia's mathematical sciences pipeline is critical to strategic planning of the national innovation system, underpinning as it does our STEM capacity. But it does far more than support science, it is a direct and crucial contributor to a world so dependent on data acquisition, data analysis, data security, and simulation.*

**AMSI's Response to the Innovation and Science Australia Strategic Issues Paper**

### Review to Achieve Educational Excellence in Australian Schools: Submission

In late 2017, AMSI made a submission to the *Review to Achieve Educational Excellence in Australian Schools*, commissioned by the Australian Government's Department of Education and Training. The review was commissioned to provide an evidence base for spending on initiatives to improve student outcomes. In its submission, AMSI makes a number of recommendations:

**Recommendation 1:** Government and education stakeholders should continue to monitor PISA, TIMSS and NAPLAN data carefully.

**Recommendation 2:** Government investigate proposals such as that outlined in the submission for the quickest turn-around of teacher numbers in mathematics teaching for secondary schools.

**Recommendation 3:** Fund a national on-the-ground professional learning system for mathematics.

**Recommendation 4:** Government facilitate the collection and dissemination of data about teacher qualifications and teaching loads.

**Recommendation 5:** Government undertake an informed national campaign enlisting the expertise of education and behaviour change experts to encourage more students to 'stick with maths'.

## Advocacy

AMSI represents the mathematical sciences adding its voice to the following advisory panels and task forces:

- ACOLA Research Training Working Group, Advisory Panel (Glen Sheldon, Geoff Prince)
- Australian Mathematics Olympiad Committee of the Australian Mathematics Trust (Janine McIntosh)
- Industrial Doctoral Training Centre Board (Geoff Prince)
- Flinders University Course Review (Geoff Prince)
- Innovation, Science and Research System 2030 Strategy consultations (Geoff Prince)

- Mathematics Association of Victoria (Michael O'Connor)
- Mathematics by Inquiry Stakeholder Reference Group (Geoff Prince)
- MATRIX Advisory Board (Geoff Prince)
- National Committee for the Mathematical Sciences (AAS) (Geoff Prince)
- Science Technology Australia (STA) Board (Geoff Prince)
- STA Policy Committee (Geoff Prince)
- Year 1 Literacy and Numeracy Expert Advisory Panel (Geoff Prince)

The Director of AMSI attended the following external events:

- 2017 Minister's Award for Achievement in Defence Science
- 2017 Pacific Maritime Expo (with DSI)
- Algorithmic Thinking project AMSI/AMT
- AustMS Annual Conference
- Australian Council of Graduate Research (ACGR) conference
- BHP CSIRO Science and Engineering Awards
- Biarri Women in Maths Prizes
- DSI & DSTG Avalon Function & Event
- DVCR Meeting, Canberra
- Jon Borwein Memorial Conference, University of Newcastle
- MERGA Conference
- Science meets Business
- Science meets Parliament
- STAR Portal Launch

### AMSI OPINION PIECES

Julia Collins (Schools): *Getting girls into maths and STEM, Inspiring Australia website* ([inspiringnsw.org.au/2017/02/07/getting-girls-into-maths-and-stem/](https://inspiringnsw.org.au/2017/02/07/getting-girls-into-maths-and-stem/)) February 2017

Laura Watson: *AMSI Choose Maths: maths adding up to a brighter future, Parents Say* (South Australian Association of School Parent Communities) August 2017

Geoff Prince: *Our maths incompetency doesn't add up*, Teacher Magazine, 12 December 2017 ([au.educationhq.com/news/45227/our-maths-incompetency-doesnt-add-up/](https://au.educationhq.com/news/45227/our-maths-incompetency-doesnt-add-up/))



## 20<sup>th</sup> EDITION

OF MATHS**ADDS** CAREERS GUIDE PUBLISHED  
THE GUIDE CONTINUES TO RESONATE  
WITH TEACHERS, PARENTS AND  
SECONDARY AND TERTIARY STUDENTS

## 30,000 VISITS

TO MATHS**ADDS** DIGITAL IN 2017  
FEATURING 100S OF JOB ADS  
ILLUSTRATING MATHEMATICAL AND  
STATISTICAL CAREER PATHWAYS

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# Outreach

AMSI's outreach initiatives strengthen awareness and understanding of the mathematical sciences while fostering collaboration and engagement at all stages of the mathematical pipeline. Further building the discipline's public profile, community engagement in 2017 included a series of public events, as well as media, flagship publications and online platforms. Focusing on AMSI's key policy priorities, outreach activities highlighted key challenges facing Australian mathematics and STEM capability for the future.

## Schools Outreach

Choose Maths remains the central driver of AMSI Schools outreach, with teacher training and professional development, school outreach such as Choose Maths Days, national awareness and engagement campaigns and the Choose Maths Awards.

In 2017 AMSI Choose Maths expanded its impact with the launch of a national careers awareness campaign with the rollout of resources and careers days in schools nationally and a national mentoring network pilot. The recognition of classroom mathematics excellence through the project's national teacher and student awards also continues to deliver flow-on benefits into the community. One of 2016's Choose Maths Awards winners, Peter Chandler, used his personal award to finance a scholarship fund to support in-school mentoring of a student teacher with a background in mathematics. Similarly, Ashley Stewart, winner of the 2017 Choose Maths Award for Mentoring Girls in Mathematics, has invested her award money in teacher training and classroom initiatives to strengthen mathematics engagement at Newton Moore Senior High School. At the end of 2016, local indigenous elders visited the school to engage with students and their projects.

AMSI Schools has also had a significant presence at maths education events including the Australian Association of Mathematics Teachers annual conference, as well as the state-based association meetings, both as active participants and as exhibitors.

## Careers

Careers awareness was a key focus for AMSI in 2017 with the rollout of two large scale classroom and community awareness campaigns and attendance at 19 careers events nationally. Increasing web traffic and demand for AMSI resources, a national transport and digital campaign targeted students, teachers and parents navigating Year 11 and 12 subject choices and university subject selection. This exposure also deepened engagement and impact of the Choose Maths careers campaign launched in 2017. Both featured the inspiring stories of the 12 ambassadors, Australian professionals who apply mathematics across a broad field base. Pre-launch, a number of Ambassadors engaged with students through a series

of Hidden Figures movie showings, with many also sharing their stories at careers days held around Australia. The Institute's popular careers guide, *Maths Adds* marked a significant milestone with the release of its 20<sup>th</sup> edition. This resource continues to resonate with teachers, parents and secondary and tertiary students, with demand only growing for the one-stop-shop guide to maths careers. The print edition features 100s of job ads and careers illustrating mathematical and statistical career pathways. The resource went digital in 2016; attracting 30,000 visits in 2017 the website includes further job examples, profiles, links and careers resources.

AMSI flagship training events also highlighted future employment in maths and stats through career afternoons at the AMSI Summer School and BioInfoSummer.

## Women in Maths

Increasing the representation of women and girls across the mathematical pipeline is a key priority for AMSI and its programs.

AMSI is tackling the gender divide in the classroom through its national Choose Maths project (page 16). Funded by the BHP Billiton Foundation, this is delivering a range of initiatives to strengthen teacher training and development, female participation in mathematics and careers awareness. Its targeted awards component is fostering a culture of mathematical excellence in the classroom acknowledging outstanding upper primary and secondary maths students and high-performing mathematical educators, in particular those who have encouraged and supported girls in maths.

The project expanded its impact with the launch of its Women in Maths Network this year, matching up mentors from industry leaders including BHP, IBM and the Australian Bureau of Statistics with Year 9 and 10 students across Australia.

Women are also encouraged to apply for Choose Maths grants to enable them to attend AMSI's flagship training programs, including the Winter and Summer Schools, BioInfoSummer and Optimise.





Amy Hawke speaking as part of the Women in Maths panel held at the AMSI Winter School 2017 at Queensland University of Technology

AMSI Schools also hosts events during the flagship programs for the recipients of the Choose Maths grants and other female participants, focusing on building networks for mentoring and support.

Released in 2017, the second Gender Report, *Participation, Performance, and Attitudes Towards Mathematics*, provides a comprehensive gender-focused analysis of NAPLAN, PISA and TIMSS data. The report's recommendations support the development of a mentoring program, as well as using growth mindset approaches and tackling teacher confidence.

Across AMSI's Research and Higher Education programs the emphasis has been on getting more women to participate in both

the research workshop program and the flagship training events. Workshop organisers are strongly encouraged to implement measures to strengthen female participation such as inclusion of Australian and international female speakers or holding informal discussions on the challenges faced by women in mathematics.

A popular function at both the Winter and Summer Schools are the Women in Maths receptions, held with the support of AMSI and the Women in Maths Special Interest Group (WIMSIG) of the Australian Mathematical Society.

With new funding, AMSI's Intern program will have a renewed focus on encouraging more women to pursue STEM careers.

## Industry

Industry engagement plays a key role in the delivery and impact of AMSI programs:

- Research, through the support of the Mathematics in Industry Study Group (MISG)
- Higher Education via the new flagship event Optimise
- Schools, through sponsorship and funding from industry powerhouses including BHP Billiton and Boeing, as well as the participation of industry professionals in the careers awareness and mentoring initiatives
- APR.Intern, AMSI's industry internship program for mathematics and STEM postgraduates

AMSI's internship program continues to expand its reach nationally, receiving \$28.2 million to deliver the Australian Government's *Supporting more women in STEM careers: Australian Mathematical Sciences Institute (AMSI) – National Research Internships Program*. With a focus on equity in STEM, this will provide 1400 internships over four years. Relaunching as APR.Intern, the expanded program will build on existing relationships and introduce the program to a wider audience.

APR.Intern's expanded delivery will be supported by AMSI Higher Education's newest flagship training event, AMSI Optimise. Launched in mid-2017, this annual one-week meeting, comprising both seminars and workshops, meets the need for a platform to foster industry, government and research community collaboration, including researchers and postgraduate students from AMSI member universities.

The Industry Advisory Committee's Industry/Mathematical Sciences Engagement (IMSE) Task Force wound up in September 2017. Comprising of senior executives from companies including the Commonwealth Bank of Australia, Woodside Energy, PayPal, Bain & Company, Google, IBM Research and BHP Billiton, as well as academic members from the Universities of Adelaide, Melbourne, Sydney, and NSW, Queensland University of Technology, Monash and RMIT Universities, made several recommendations. These included a national awareness campaign on the benefits of studying maths and the creation of a national "Work Integrated Learning" (WIL) program tailored toward undergraduate students.



## Outreach

A successful pilot WIL program took place at Perth-based resources company Woodside in early 2017 and a second round commenced over the 2017–2018 summer.

The IAC is now moving into a new role as the primary forum for ongoing engagement between AMSI and industry. AMSI thanks IAC and the IMSE chair Mark Lawrence for his work on the committee and taskforce.

As a member of Science & Technology Australia (STA), AMSI took part in the annual Science Meets Business and Science Meets Parliament events:

- Science meets Parliament 2017 was held from 21–22 March. Professor Geoff Prince attended, along with Professor Jacqui Ramagge (The University of Sydney) and Associate Professor Natalie Thamwattana (University of Wollongong), as AMSI's representatives at the event
- Science meets Business 2017 was held on 9 November, and attended by Rachel Geddes, Mark Ovens and Glen Sheldon from the Intern team, as well as Chloe Pearse, from RHE. During a speed-pitching session, Rachel Geddes won the opportunity to pitch the APR.Intern Program to the conference delegation

Both events offer the opportunity to build relationships and raise awareness of AMSI's mission with government and industry.

## Public Events and Sponsorship

Bringing a real-life context to mathematics for a broader audience, AMSI regularly incorporates public lectures and panel discussions into its flagship training and research event programs. In addition, events such as the popular Women in Maths evenings and the careers events associated with AMSI's Summer and Winter Schools create networking and mentoring opportunities for students, academics and industry.

In 2017, AMSI's public program covered topics ranging from statistical methods used to make sense of big data generated by

biomedical researchers, the mathematical challenges underlying networks and queueing, and the mathematics of weather forecasting. Running during flagship training and research programs including AMSI Summer School, AMSI BioInfoSummer, and AMSI Winter School, as well as through the AMSI-ANZIAM lecture tour, these lectures illustrate the cross-disciplinary impact of the mathematical sciences.

AMSI and Choose Maths were major sponsors for the inaugural WIMSIG conference, held in Adelaide in September. Choose Maths Executive Director, Inge Koch, also presented data from the Gender Report at this conference.



**2017 AMSI-ANZIAM Lecturer Professor Maria Vlasίου delivering her Public Lecture on queues on Interacting Networks**

### KEY PUBLIC EVENTS 2017

#### PUBLIC LECTURES:

##### *Networks for Big Data*

Associate Professor Ginevera Allen, Rice University, presented by AMSI Summer School

##### *Queues on Interacting Networks*

Associate Professor Maria Vlasίου, Eindhoven University, AMSI-ANZIAM Lecturer, public lecture series

##### *Models, Maths and the Revolution in Weather Forecasting*

Dr Peter May, Bureau of Meteorology, presented by AMSI Winter School

##### *Genomics, Big Data and the Future of Medical Research and Healthcare*

Professor John Mattick, Garvan Institute of Medical Research, presented by AMSI BioInfoSummer

#### PUBLIC OUTREACH EVENTS:

World Science Festival, Brisbane

Melbourne Knowledge Week

Sydney Science Festival at the Australian Museum

AMSI also sponsored the Jonathan Borwein Commemorative Conference, held in September to celebrate the life of long-time AMSI supporter and SAC chair Jon Borwein, who passed away unexpectedly in 2016.



DELIVERING THE CHOOSE**MATHS** PROJECT, AMSI SCHOOLS HAS:

MADE **665** SCHOOL VISITS TO **120**  
SCHOOLS ACROSS AUSTRALIA

CONDUCTED **117** PROFESSIONAL  
DEVELOPMENT SESSIONS ATTENDED  
BY **1784** TEACHERS

AWARDED **40**  
CHOOSE**MATHS** GRANTS

RECEIVED **34** TEACHER NOMINATIONS  
AND **381** STUDENT TEAM VIDEOS  
FOR THE CHOOSE**MATHS** AWARDS



# Schools

Expertise, experience and evaluation are the hallmarks of the AMSI Schools program and its impact on Australian communities. Across primary and secondary schools, universities and workplaces, the Program enhances perception of the beauty and usefulness of mathematics.

AMSI Schools initiatives focus on providing knowledge and resources to teachers, students and parents. Funded by BHP Billiton Foundation, our flagship project Choose Maths (see page 16) builds on years of experience in developing outreach programs for schools.

## Careers

*Maths Adds* turned 20 in 2017! This milestone was marked with the release of our biggest ever issue, featuring 40 jobs across 11 sectors as well as real-life career profiles. A must-have for those considering maths careers, this powerful resource supports engagement with students, parents and teachers about subject and course choices for Years 11 and 12 and university.

Digital tie-in [mathsadds.amsi.org.au](http://mathsadds.amsi.org.au) has become a popular destination for students looking to explore maths futures online. Regularly updated with new example jobs and career profiles, this searchable resource puts maths career information at your fingertips. In 2017, *Maths Adds* received more than 30,000 site visits, with 20,000 hard copies distributed to Australian schools nationally and through careers expos and events.

## Calculate

Growing popularity and demand has positioned the AMSI Schools material bank as a standalone website. *Calculate.org.au* houses a comprehensive library of material to support mathematics learning in primary and secondary schools nationally. The open-access website is a one-stop shop for teachers seeking resources such as planning documents, lesson suggestions, units of work, videos, explanations of mathematics used in industry and professional development slide sets.

## ICE-EM Mathematics

The third edition of ICE-EM Mathematics was published in 2017. Now in single volumes, the books are designed to develop a strong foundation in mathematics for every student in Years 5 to 10/10A. Regularly updated, revised and consolidated, these textbooks provide comprehensive coverage of the Australian Curriculum and its state variants for each year level.

*A five-year national collaboration between AMSI and the BHP Billiton Foundation, CHOOSE MATHS is empowering Australian students to pursue mathematics. Working across the pipeline from the classroom to university and industry, this initiative aims to strengthen mathematics capability, improve public perception and increase engagement of women and girls.*

---

**Associate Professor Inge Koch**  
Executive Director, CHOOSE MATHS

**Janine McIntosh**  
AMSI Schools Program Manager, CHOOSE MATHS  
Project Director

**SCHOOLS.AMSI.ORG.AU**

# Choose Maths

Funded by the BHP Billiton Foundation and delivered by AMSI Schools, Choose Maths continues to drive national initiatives to strengthen Australia's mathematics capability and the engagement of women and girls. Engagement was a key focus in 2017 with the launch of the careers awareness campaign and the delivery of a national mentoring pilot through the Women in Maths Network.

Now at the mid-way mark, the Choose Maths project is:

- Fostering engagement, enthusiasm and confidence in mathematics demonstrated by girls
- Delivering professional development to increase teacher knowledge and confidence in mathematics, as well as commitment to the implementation of strategies known to engage and inspire girls in Choose Maths schools
- Enhancing community understanding of the importance and value of mathematics as a career pathway
- Challenging the tightly held public perception of the gender stereotype in mathematics

## Teacher Professional Development

In 2017 Choose Maths Outreach Officers conducted:

- 665 (1192 across the project to date) school visit days across 120 schools
- 117 (233 since project launch) professional development sessions
- Engagement with 1784 (3457 across the project) teachers

Working with primary and secondary teachers, our team is delivering showcase lessons and professional development to deepen content knowledge and understanding of current teaching practices. Many teachers also draw on our topic-specific resources such as content modules and support materials. We also work closely with schools to strengthen learning and engagement through outreach activities such as Choose Maths Family Nights and Choose Maths Days.

## Careers Awareness Campaign

Launched in 2017, the careers awareness campaign went live in classrooms with the national rollout of powerful classroom resources including poster and brochure packs. Highlighting the broad application of mathematics, the campaign centres on the inspiring stories of Australians working in or applying mathematics. Relatable and engaging, students have had a strong response to the initial 12 careers ambassadors with the campaign set to expand in 2018.

The campaign hit digital platforms across popular Australian media sites and public transport in August. Public engagement with Choose Maths-branded buses in Sydney and Perth and buses and trams in Melbourne translated to a spike in online traffic. In particular, we saw an increased interest in maths careers information as students navigated subject and course selection season.



*“Conversations are a major part of the work of AMSI Schools and are a focus of Choose Maths. Conversations about what works in teaching, about career choices and about some of the nitty gritty elements of mathematics content are part of the life of the team.”*

Janine McIntosh, AMSI Schools Program Manager





*“It helped me understand that areas of study that seem out of reach such as engineering, computer coding and biotechnology are possible. After listening to these influential and successful women, I have become excited to explore all kinds of study options and career pathways.”*

**Year 9 Student**

### STUDENT EVENTS

To coincide with the Australian opening of the Hollywood blockbuster movie *Hidden Figures* in March 2017, Choose Maths ran a series of movie events in Melbourne, Sydney, Brisbane and Adelaide targeted at Year 10–12 girls. Featuring presentations from a number of the careers ambassadors, as well as a screening of the movie, the events inspired the more than 1700 students who attended the sessions.

In September, over 200 girls from six schools on the north-west coast of Tasmania joined careers ambassadors at an event at Hellyer College in Burnie.

### CAREERS EXPOS

AMSI and the Choose Maths project had a presence at nine careers expos across the country in 2017 and spoke to thousands of students about subject selection in Year 11 and 12 as well as the career growth areas in maths and STEM more generally in Australia.

## Women in Mathematics Initiatives

Choose Maths continues to pursue opportunities to challenge gender stereotypes in mathematics and increase participation of girls and women in mathematics. In 2017, we commenced a new program of initiatives targeting secondary school and university students. Outreach activities include:

- University and school-based Choose Maths Days
- A national Choose Maths Mentoring project pilot to strengthen engagement of female secondary students
- Women in Maths Exchange Events (see Section: Choose Maths Grants)

Aimed at increasing the participation of senior secondary students in mathematics, the Girls Enjoy Maths, (GEM) Days (renamed Choose Maths Days) provided Year 9 and 10 students with information about careers requiring mathematics and the many choices better knowledge of mathematics can offer them.

Three GEM Days held at universities brought together female students, university students and staff, and another GEM Day took place at a Choose Maths school in SA. After very positive feedback from students and teachers, this initiative will be extended to more universities and many Choose Maths secondary schools.

The pilot Choose Maths Mentoring project launched in Term 3, introducing more than 100 Year 9 and 10 girls to 70 mentors working with or studying mathematics. The program extended over a number of sessions, again with the aim of engaging more students into selecting more and higher levels of mathematics in Years 11 and 12.

## Choose Maths Grants

The number of Choose Maths grants awarded increased to 40 in 2017, extending to four of AMSI's flagship events: Summer School, Winter School, Optimise and BioInfoSummer. *Women in Maths Exchange* networking events were held at each of these events in 2016 to encourage networking of the female participants, while simultaneously providing a source for new mentors.

# Choose Maths Awards

A Choose Maths calendar highlight, the second Choose Maths Awards were presented in Melbourne on 31 August. Awarded to teachers and students nationally, the awards celebrate mathematics achievement, creativity and excellence in Australian schools. More than 200 guests attended this year’s ceremony, with winners in all categories attracting considerable media attention. The quality of nominated teachers and student videos was very high, with ten outstanding teachers and ten student teams from three different age groups taking honours. A further 20 student teams received honourable mentions for their videos at in-school presentations. For details of the winners see opposite.

The Choose Maths teacher and student awards are a powerful acknowledgement of mathematics education excellence in and beyond classrooms nationally. With a focus on girls, the teacher awards recognise outstanding and innovative mentors who drive learning and engagement in and well beyond their classrooms—education leaders who are helping shape futures and foster confidence and capability in their colleagues. The student awards encourage tomorrow’s thought leaders to explore powerful mathematical themes on film and reassess their perception and understanding of the subject and its role in the world.

## CHOOSE MATHS AWARDS

In total, 20 metropolitan and regional teachers and 40 student teams from around Australia have been honoured since the Choose Maths Awards began in 2016. This includes 20 student teams who received Honourable Mentions in 2017.

More than \$160,000 has been awarded to both schools and teachers since the awards program began.

Over 1600 registrations in 2016 and 2017 has resulted in more than 700 student videos submitted



# Research

2017 research focused on the teacher surveys and the student intervention classes, both conducted in Choose Maths schools. We analysed the 2016 teacher survey data, focusing on teacher confidence and competence and reported the results in *Teacher Confidence, Education and Experience: Choose Maths Teacher Survey 2016 (AMSI Choose Maths Research No. 1-2017)*. These baseline data informed the 2017 teacher survey, designed in collaboration with the Australian Centre for Educational Research (ACER). ACER also administered the surveys, collected responses and will provide an evaluation of the 2017 data.

Encouraged by successful pilot student intervention classes to about 600 students in Choose Maths schools at the end of 2016,

we conducted intervention classes consisting of a pre-survey, a presentation of growth mindset ideas, collaborative mathematical activities and a post-survey in Year 5, 6, 8 and 9 classes in all Choose Maths schools.

We reported the results of the pilot study of Year 5 and Year 8 students, together with our analysis on mathematics participation data of Year 12 students in Australia and a gender-focused analysis of NAPLAN, PISA and TIMSS data, in the *Gender Report 2017: Participation, Performance, and Attitudes Towards Mathematics (AMSI Choose Maths Research No. 2-2017)*.

# Choose Maths Awards

## Student Awards: MATHS IS OUR FUTURE

In 2017, 381 student teams (out of more than 1000 teams that registered) submitted entries to the video competition in the three school year groups: Junior (Years 5–7), Intermediate (Years 8–9) and Senior (Years 10–12).

### BEST JUNIOR VIDEO:

**Montagu Bay Primary School (TAS)** – *Triangles Are Our World*

### BEST INTERMEDIATE VIDEO:

**Ferny Grove State School (QLD)** – *To the Maths Haters*

### BEST SENIOR VIDEO:

**St Monica's College (QLD)** – *Maths is our future*

### AWARDS FOR EXCELLENCE

**The Grange Public School (NSW)** – *The Importance of Maths/ Maths Is Everything*

**North Rockhampton State High School (QLD)** – *We Rely on Math*

**Burwood Girls High School (NSW)** – *Maths: The Future*

**Blackheath and Thornburgh College (QLD)** – *Maths and Technology*

**Carmel Adventist College (WA)** – *CAC*

**Galen Catholic College (VIC)** – *A Slice of the Future*

**Westminster School (SA)** – *Maths is PAWsome!*

## Teacher Awards:

In 2017 we received 34 nominations and applications for consideration by the judging panel.

### MENTORING GIRLS IN MATHEMATICS AWARDS:

**Ashley Stewart – Newton Moore Senior High School (WA)**

As Head of Mathematics, Ashley has provided sustained support and mentorship to students and colleagues at Newton Moore Senior High School. Traditional teaching approaches fail to engage the school's large population of Indigenous students. Ashley realised these students, many of whom are Noongar boys and girls, learn best through interactive activities. Reflective of these insights and the diverse abilities across the school, she implemented a Year 8 engineering course. The success of this initiative has seen similar courses rolled out across all year groups. In 2017 Ashley encouraged the entry of Newton Moore's first all-girls team to the Mathematical Modelling Challenge. With three teams in 2017, the school was among only seven schools in Australia to have this many teams compete. As well as driving innovative STEM programs, Ashley has led the integration of new technologies and teacher mentoring to enhance learning and student engagement.

### OUTSTANDING PRIMARY TEACHER

**Keith Barnett – Epping North Public School (NSW)**

Keith's journey began in the classroom where the passion and enthusiasm of a great teacher led to a love of learning. Over two decades he has been teaching mathematics in an engaging and accessible way that excites his students: They engage in a wide range of mathematical concepts through a combination of inquiry-based learning, digital platforms and outreach. As well as initiatives such as a Financial Literacy program, Keith's achievements include leadership of the school's participation in the Elevate project and establishment of a Tournament of Minds team. Beyond the classroom, he is drawing on his deep understanding of Australian and international education to inspire a new generation of educators through lectures and personal development sessions.

### OUTSTANDING SECONDARY TEACHER

**Patricia Hosking – St Aidan's Anglican Girls' School (QLD)**

Patricia knows mathematics is her students' golden ticket to future employability. This underscores her unwavering commitment to fostering a love of mathematics in girls at St Aidan's. As Head of Mathematics, she has led high-level mathematics and overall classroom results. Her innovative and adaptive teaching approaches include adapting content delivery to students to ensure relevance and incorporation of technology to facilitate student engagement and understanding. She draws on problem solving, modelling and real-world context and engages students by providing access to external outreach and enrichment activities through university and industry collaboration. Her enrichment and outreach programs draw on 'Old Girls' networks as avenues to incorporate powerful female mentorship into classroom learning.

### TEACHING EXCELLENCE AWARDS

**Vanessa Fay – Australian Science and Mathematics School (SA)**

**Sam Hardwicke – Turner School (ACT)**

**Anthony Martin – Chatham High School (NSW)**

**Amanda Cassidy – St Patrick's Primary School Wangaratta (VIC)**

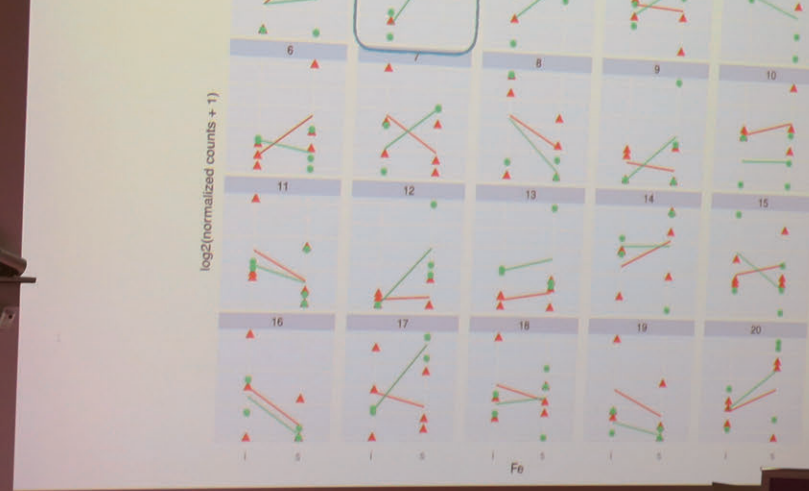
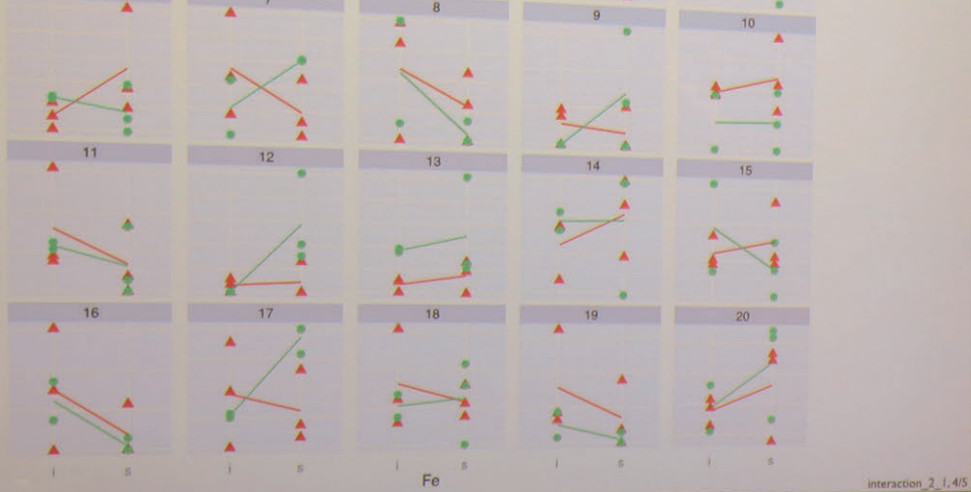
**Con Tsitos – Blaxland High School (NSW)**

**Sally Tweddle – Presbyterian Ladies' College (VIC)**

**Elizabeth Loneragan – Beth Rivkah Ladies College (VIC)**







**567**

TOTAL 2017 HIGHER  
EDUCATION FLAGSHIP  
EVENT ATTENDEES

**28%**

OF FLAGSHIP EVENT  
PARTICIPANTS  
WERE FEMALE

**86**

RECEIVED AMSI  
STUDENT TRAVEL  
GRANTS

**40**

WOMEN RECEIVED  
CHOOSE**MATHS**  
GRANTS



# Higher Education

AMSI's Higher Education program enhances the undergraduate and postgraduate experience for students studying mathematical sciences and related disciplines. Our flagship events bring Australian students together to develop their talents. Featuring training schools, graduate courses and scholarships, they set the standard for research training infrastructure.

.....  
**Chloe Pearce**

*National Program Manager (from June 2017)*

**Paul Ulrick**

*National Program Manager (until April 2017)*

**Professor Geoff Prince**

*Acting National Program Manager (April – June 2017)*

**HIGHERED.AMSI.ORG.AU**

Exposure to cutting-edge methodologies and field areas not routinely covered in academic courses prepares graduates for the challenges of cross-disciplinary research and industry innovation.

Supported by the Department of Education and Training's *Securing Australia's Mathematical Workforce 2016–2020* project, AMSI's flagship events aim to strengthen postgraduate research training to build Australia's mathematical innovation capability. In 2017, this funding allowed AMSI to expand the program through a new initiative—AMSI Optimise—bridging the gap between research and industry.

## Providing a Platform for World-Class Talent

With record attendance at 2017 events, including AMSI Winter School and the launch of AMSI Optimise, AMSI's Higher Education program has strengthened its impact on the mathematical sciences community. A total of 567 students and early career researchers attended events in 2017, a significant increase on the 2016 total of 428. More than 50 national and international experts participated in a teaching capacity at these events, giving their time, passion and research expertise with emerging researchers.

## AMSI Optimise

Launched in June 2017, this mini-conference put optimisation in the spotlight with 108 students, researchers and industry representatives participating. Running over five days, the event fostered research–industry engagement while providing a platform for APR.Intern to develop new relationships. Building on this success, AMSI Optimise will again run in Melbourne in 2018.

## Supporting Inclusivity and Participation

Currently women account for fewer than 30 per cent of undergraduate and postgraduate enrolments in the mathematical sciences. The Choose Maths grants address financial and social barriers to participation of women at AMSI flagship events, by providing travel, accommodation and carer support. In 2017, 40 women received funding support through the program with notable growth in the participation of women within bioinformatics. Funded by BHP Billiton Foundation through the AMSI Choose Maths project, the Choose Maths Grant Committee selects recipients on a competitive basis.

From late 2017, events held by AMSI include a session spotlight on underrepresented groups, including the ATSI and LGBTQI communities, and barriers to participation for those with a disability.

### 2017 CHOOSE MATHS GRANTS BY EVENT

.....  
AMSI Summer School – **20** awards

AMSI Winter School – **6** awards

AMSI Optimise – **2** awards

AMSI BioInfoSummer – **12** awards

### Beyond the Classroom

AMSI Higher Education's embedded outreach program continues to foster community engagement with the mathematical sciences. Accessible cutting-edge research is shared across a range of outreach initiatives such as public lectures, panel discussions, media campaigns, blog posts and speaker and student profiles.

Each of our 2017 flagship training events featured a significant number of program extras and outreach activities, including the following:

- Opening Address by a keynote speaker
- Women/Diversity in STEM event
- Choose Maths grant winners networking event
- Careers session or panel
- Public lecture
- Event dinner
- Other events including lunchtime lectures, poster sessions and student social events

These extras have generally been very well supported by flagship event attendees, host university staff and the public. Further value is gained through the filming of our public lectures and sharing through digital platforms after the event.

### Higher Education Events

#### AMSI FLAGSHIP PROGRAMS

##### AMSI SUMMER SCHOOL 2017

9 JAN – 3 FEB, The University of Sydney  
[ss.amsi.org.au](http://ss.amsi.org.au)

An intensive four-week program, the 15<sup>th</sup> annual AMSI Summer School was attended by 168 honours and postgraduate students. Hosted by the University of Sydney, students tackled one or two of eight intensive honours level mathematics and statistics subjects on offer, with many students taking one subject for credit.

Under the supervision of Australian research leaders, academic work was complemented by enrichment lectures, as well as social events, a public lecture and a careers afternoon. The Public Lecture was very successful, with over 300 members of the general public attending Rice University's Associate Professor Ginevera Allen's talk.

##### AMSI VACATION RESEARCH SCHOLARSHIPS 2016–2017

DEC 2016 – FEB 2017  
[vrs.amsi.org.au](http://vrs.amsi.org.au)

AMSI's Vacation Research Scholarships provide students with a taste of life as a researcher. In 2016/17 43 recipients completed real-world mathematical research projects under the supervision of academics from their home university. This model is effective in inspiring students to continue with further research in the future.

In what was described as the perfect end to six weeks of research, recipients joined their peers and supervisors at the University of Melbourne to present their findings at the AMSI Connect conference.

Students also attended a range of information sessions and workshops led by field leaders.

##### AMSI OPTIMISE 2017

26–30 JUN, Monash University  
[optimise.amsi.org.au](http://optimise.amsi.org.au)

Featuring a three-day conference and two-day workshop, AMSI Optimise made considerable impact in its first year, with 108 participants and considerable media coverage. Featuring industry challenges and presentations on topics including utilities, logistics and current optimisation practices, the first three days stimulated vigorous discussion. This was followed by a two-day workshop exploring routing, radiotherapy, scheduling, continuous optimisation, healthcare, optimisation of data analysis, stochastic MIP and other applications.

##### AMSI WINTER SCHOOL 2017 ON COMPUTATIONAL FOUNDATIONS OF DATA SCIENCE

26 JUN – 7 JUL, Queensland University of Technology  
[ws.amsi.org.au](http://ws.amsi.org.au)

Hosted by the Queensland University of Technology, this year's Winter School attracted 70 graduate students and postdoctoral fellows. Women accounted for 30 per cent of attendees with one participant identifying as ATSI. This year's attendees explored the theme of Computational Foundations of Data Science, attracting a variety of participants from a broad range of scientific disciplines.

This year's public lecture by the Bureau of Meteorology's Dr Peter May was extremely well received with the popular topic garnering strong

media coverage. Revealing the quiet revolution in weather forecasting that has been bubbling over the past few decades, he explored the impact of big computers, big data and lots of maths on weather science and forecasting.

##### AMSI BIOINFOSUMMER 2017

4–8 DEC, Monash University  
[bis.amsi.org.au](http://bis.amsi.org.au)

More than 170 students and public and private sector researchers gathered at Monash University for a showcase of cutting-edge developments in bioinformatics. Sessions ranged from hands-on introductory levels through to specialist lectures by local and international experts.

Renowned Australian bioinformatician and director of the Garvan Institute of Medical Research, Professor John Mattick, delivered a popular public lecture on the incorporation of personal genomic information into patient medical records to support delivery of precision healthcare.

*AMSI thanks the following people for their leadership in 2017: Summer School Director Professor Anthony Henderson (The University of Sydney), BioInfoSummer Director Professor David Powell (Monash University), Optimise Director Professor Andreas Ernst (Monash University) and Winter School Director Professor Ian Turner (Queensland University of Technology). We also acknowledge the contributions of the speakers and lecturers, Vacation Research Scholar supervisors and support staff, and their generosity in giving their time to ensure the success of these events.*

## Higher Education

### SPONSORS

AUSTRALIAN BIOINFORMATICS AND  
COMPUTATIONAL BIOLOGY SOCIETY

APR.INTERN (FORMERLY AMSI INTERN)

AUSTRALIAN GOVERNMENT –  
DEPARTMENT OF EDUCATION  
AND TRAINING

BHP BILLITON FOUNDATION

MAXIMA

MONASH UNIVERSITY

OPTYM

QUEENSLAND CYBER INFRASTRUCTURE  
FOUNDATION LTD

QUEENSLAND UNIVERSITY  
OF TECHNOLOGY

SILICON GRAPHICS  
INTERNATIONAL CORP

TECHNOLOGY ONE

THE ARC CENTRE OF EXCELLENCE  
FOR MATHEMATICAL AND  
STATISTICAL FRONTIERS

THE AUSTRALIAN SIGNALS  
DIRECTORATE

THE SIMULATION GROUP



## Other Events/Programs

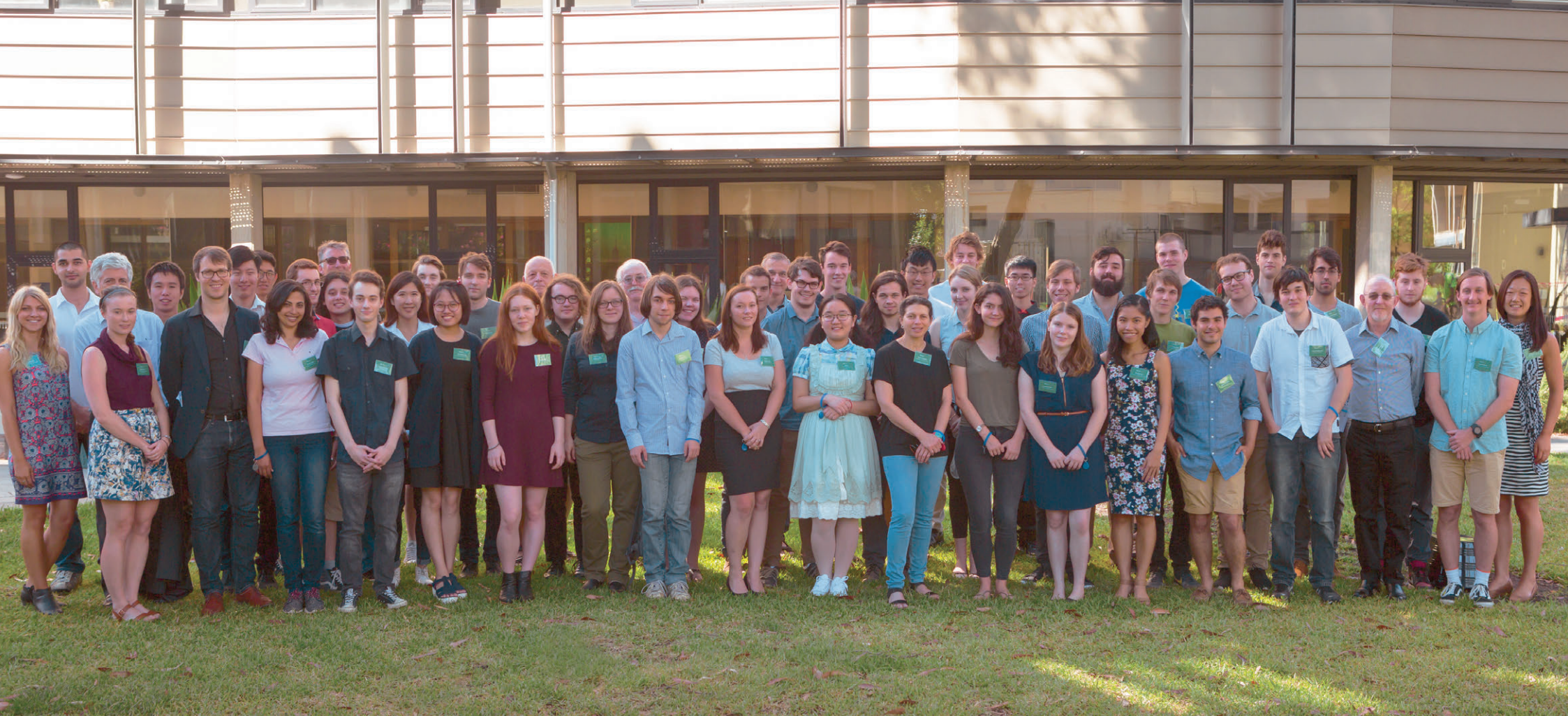
### ADVANCED COLLABORATIVE ENVIRONMENT NETWORK HONOURS AND MASTER'S COURSES

[highered.amsi.org.au/ace-hons-courses](https://highered.amsi.org.au/ace-hons-courses)

The Advanced Collaborative Environment (ACE) Network facilitates greater collaboration between the mathematical sciences community within Australia and internationally, broadening the student research experience beyond existing academic programs and supporting our smaller member universities to offer full honours programs.

Through the ACE Network, nine honours courses were delivered in Semesters One and Two, enabling simultaneous student participation in honours subjects across a number of universities.





**23**

SPONSORED  
WORKSHOPS

ALMOST  
**1000**  
PARTICIPANTS

**83**

SPONSORED  
INTERNATIONAL  
SPEAKERS

**37**

TRAVEL GRANTS  
AWARDED VIA  
AMSI MEMBER  
TRAVEL FUNDS

# Research

AMSI Research's internationally recognised scientific workshop program nurtures collaboration and knowledge sharing critical to mathematical discovery. In 2017, the Institute sponsored 23 workshops and conferences nationally, with the interdisciplinary impact of the mathematical sciences attracting participants from academia, industry and government.

---

**Chloe Pearce**

*National Program Manager (from June 2017)*

**Paul Ulrick**

*National Program Manager (until April 2017)*

**Professor Geoff Prince**

*Acting National Program Manager (April – June 2017)*

**RESEARCH.AMSI.ORG.AU**

## Workshop Program

Reporting to the AMSI Board, the Scientific Advisory Committee (SAC) provides scientific advice to support AMSI's research-facing activities and reviews, as well as evaluating AMSI Scientific Workshop program applications. Following strong application rounds in 2016 and mid-2017, the committee approved 23 AMSI sponsored workshops for funding in 2017. From topology and geometry to astronomy, these events highlighted the breadth of research and application within the mathematical sciences. International research engagement also provides a platform to strengthen Australia's collaborations and knowledge base. In 2017, new collaborations were formed including relationships with Japan, South Korea and China. In total, AMSI supported 83 international mathematical experts to visit Australia.

In conjunction with direct sponsorship of the 2017 workshop series, AMSI also funded 37 workshop travel grants via AMSI Member Travel Funds to support staff and students from our member institutions. These grants cover accommodation and travel expenses to AMSI-sponsored events including supervisor travel to the Vacation Research Scholarship program AMSI Connect. With at eight workshops already committed and more applications to come, we anticipate another strong year in 2018.

### MORE INFORMATION

.....  
2018 workshops list:

[research.amsi.org.au/events/category/scientific-workshop](https://research.amsi.org.au/events/category/scientific-workshop)

AMSI workshop funding: [research.amsi.org.au/workshop-funding](https://research.amsi.org.au/workshop-funding)

Travel funding: [research.amsi.org.au/travel-funding](https://research.amsi.org.au/travel-funding)

## MATHS IN INDUSTRY STUDY GROUP

AMSI's support of the Mathematics in Industry Study Group (MISG) helps provide valuable collaboration experience to academic researchers and PhD students. More than 60 delegates attended MISG2017 at the University of South Australia's City West campus

in February. Working in groups, participants solved real-world industrial problems from the DST Group, TTG Transportation Technology, Royal Automobile Association SA and SA Power.

## 2017 AMSI-ANZIAM Lecture Tour

Co-sponsored by AMSI and ANZIAM, Associate Professor Maria Vlasίου toured universities in Adelaide, Perth, Melbourne and Sydney to deliver a series of public lectures (*Queues on Interacting Networks*) and specialist talks (*Heavy-Traffic Limits for Layered Queueing Networks*). With research interests spanning stochastic processes and operations research, she focused on practical industry problems while exploring the analysis of non-traditional stochastic models, such as healthcare logistics, warehouse systems and traffic control.

The well-attended events attracted more than 60 attendees in Adelaide and more than 80 in Melbourne. Outreach was supported by media engagement, including print coverage in *The Australian*.

An annual calendar fixture, the AMSI-ANZIAM Lecture Tour brings eminent international researchers to Australia to encourage the research and general communities to engage with new ideas at the cutting edge of global mathematics.

## AMSI Research Report

AMSI's *Research Report 2016–17* is a comprehensive record of the Institute's research activities for the year ending in June 2017.

Please refer to the Research Report for detailed information on the individual workshops funded by AMSI. All recent reports are available online at [amsi.org.au/publications\\_category/publications/research-reports/](https://amsi.org.au/publications_category/publications/research-reports/) or by contacting us at [funding@amsi.org.au](mailto:funding@amsi.org.au)

*AMSI thanks the Chairs of the Research and Higher Education Committee and Scientific Advisory Committee respectively together with all the committee members for their support and advice throughout 2017.*



### Research Events

#### ADVANCED COLLABORATIVE ENVIRONMENT (ACE) NETWORK RESEARCH SEMINARS

In addition to running the ACE honours program (see page 23), AMSI advertised access to 27 research seminars broadcast by universities around Australia using their ACE facilities. The AustMS/AMSI Teaching Seminar Series commenced in March 2017, with a focus on academic teaching of mathematics and statistics at universities.

#### AMSI SPONSORED SCIENTIFIC WORKSHOP PROGRAM 2017

AMSI's Scientific Workshop program facilitates Australian mathematical research collaboration by:

- Sponsoring local and international workshops and conferences
- Providing travel support for Australian students and researchers attending AMSI-sponsored events
- Bringing leading international researchers to Australia for scientific collaboration and public outreach

For full workshop and speaker details and event outcomes, please refer to AMSI's Research Reports. Visit [amsi.org.au/publications/research\\_reports](http://amsi.org.au/publications/research_reports)

##### Hypergeometric Motives and Calabi-Yau Differential Equations

8–28 JAN 2017, The University of Melbourne, held at MATRIX

**Attendees: 24**

##### International Conference in PDE, Geometric Analysis, and Functional Inequalities

7–10 MAR 2017, The University of Sydney

**Attendees: 39**

##### Applied Probability at the Rock

17–21 APR 2017, The University of Adelaide, held at Ayers Rock Resort

**Attendees: 69**

##### China–Australia Joint Conference on PDE and Related topics

1–6 MAY 2017, The Australian National University, held at Mission Beach Resort

**Attendees: 43**

##### Topology in Australia and South Korea 2017

1–5 MAY 2017, The University of Melbourne

**Attendees: 37**

##### Tensor Categories and Field Theory

5–9 JUN 2017, The University of Melbourne

**Attendees: 24**

##### Computational Inverse Problems

11–23 JUN 2017, Monash University, held at MATRIX

**Attendees: 47**

##### Integrability in Low-Dimensional Quantum Systems

26 JUN – 21 JUL 2017, The University of Melbourne, held at MATRIX

**Attendees: 59**

#### HEIDELBERG LAUREATE FORUM 2017

Held annually in Germany, the Heidelberg Laureate Forum (HLF) is a once in a life-time opportunity for highly-skilled young scientists to engage with annual recipients of the world's most prestigious Mathematics and Computer Science awards. AMSI and AustMS co-fund a grant to support Australia's presence at this prestigious event, awarding the 2017 HLF travel grant to Saul Freedmen.

##### CATS 2017 Computational & Algorithmic Topology, Sydney

27 JUN – 1 JUL 2017, The University of Sydney

**Attendees: 46**

##### Harmonic Analysis and PDE

17–21 JUL 2017, Macquarie University

**Attendees: 50**

##### Interactions Between Semigroups and Operator Algebras

24–27 JUL 2017, The University of Newcastle

**Attendees: 23**

##### String Geometries and Dualities

11–15 SEP 2017, The University of Adelaide

**Attendees: 34**

##### Workshop on Free Boundaries, Phase Transitions and Interfaces

18–19 SEP 2017, The University of Melbourne

**Attendees: 8**

##### Australian-Japanese Workshop on Real and Complex Singularities

25–29 SEP 2017, The University of Sydney

**Attendees: 31**

##### Workshop on Applications in Natural Resource Mathematics (WANRM)

3–5 OCT 2017, The University of Queensland

**Attendees: 56**

##### Elliptic PDEs of 2nd Order: Celebrating 40 Years of Gilbarg and Trudinger's Book

16–28 OCT 2017, The University of Melbourne, held at MATRIX

**Attendees: 16**

##### Combinatorics, Statistical Mechanics and Conformal Field Theory

30 OCT – 17 NOV 2017, The University of Melbourne, held at MATRIX

**Attendees: 23**

##### Workshop on Mathematical Modelling of Risk and Contiguous Topics

27 NOV – 1 DEC 2017, The University of Melbourne, held at MATRIX

**Attendees: 36**

##### Gauge Theory and Higher Geometry

27 NOV – 1 DEC 2017, The University of Adelaide

**Attendees: 40**

##### Future Directions in Representation Theory

4–8 DEC 2017, The University of Sydney

**Attendees: 88**

##### Statistical Challenges in Astronomy

4–5 DEC 2017, The University of New South Wales

**Attendees: 75**

##### The South Pacific Optimisation Meeting in Western Australia 2017

8–10 DEC 2017, Curtin University of Technology

**Attendees: 47**

##### Australia–China Conference in Noncommutative Geometry and Related Areas

18–22 DEC 2017, The University of Adelaide

**Attendees: 41**



# Research Collaboration: Parks Victoria

Parks Victoria is responsible for managing a diverse estate that covers more than 4 million hectares (about 17 per cent of Victoria) and includes national parks, urban parks, wilderness areas and 70 per cent of Victoria's coastline. In 2010, AMSI entered into a three-year agreement with Parks Victoria to provide statistical support for their environmental monitoring, evaluation and reporting activities.

Through this agreement, AMSI statistician Kally Yuen became a research partner in Parks Victoria and has been actively involved in research activities including evaluation of data capture options for remote camera wildlife monitoring projects and assessing the effectiveness of invasive plant control programs. Due to its continuing success, the partnership was extended at the end of the original agreement in 2014. The current partnership will continue until 2020.

## SALLOW WATTLE CONTROL MONITORING PROGRAM IN THE GRAMPIANS NATIONAL PARK

An experimental monitoring program was set up in November 2015 to investigate the effectiveness of five techniques to control the spread of sallow wattle in the Grampians National Park. Sallow Wattle (*Acacia longifolia* subsp. *longifolia*) is not native to the area. Invasion by this species will result in a change of species composition in the Grampians if it is not managed.

The techniques included two mechanical treatments (brushcutting and mulching), two herbicide treatments and one manual treatment (removal of weeds by hand pulling and hoeing). All five treatments were also examined for their possible damage to neighbouring species (off-target effects) and costs. Kally worked in conjunction with Dr Marie Keatley, Parks Victoria Environmental Scientist—Flora, and park managers to design the program and set up a project-specific database for data storage.

Analyses of the 2017 data suggested that all treatments were effective to some degree after one year. However, no conclusion could be made about their off-target effects as longer-term follow up of the experimental plots is required. The results also indicated that the costs incurred by the treatments varied considerably. Kally presented these results to the study team in a meeting in October



**Brushcutting, one of the techniques investigated in the sallow wattle control monitoring program in the Grampians National Park**

and received very positive feedback. Based on these results it was decided to seek funding to maintain the program and Kally will continue to provide statistical support to the team.

## INVESTIGATION OF SUITABLE SOFTWARE FOR REMOTE CAMERA DATA MANAGEMENT

At Parks Victoria, remote cameras are frequently used to monitor animal species in the parks. A typical remote camera survey can easily

produce thousands of camera images. Traditionally, the process of sorting the images after each survey and the entry of data for statistical analysis have been extremely tedious and time consuming. In recent years, several software programs have been made available to the public for remote camera data management. Kally identified the essential requirements for the management of remote camera data at Parks Victoria and conducted a review of each software program. The goal was to identify the most suitable program for data management across all remote camera projects in Parks Victoria. Following the review, Kally put forward recommendations which are currently being considered by the Science and Management Effectiveness team. Once a suitable software program has been adopted, Kally will streamline the entire process so that it can be easily implemented by managers in the parks.

## SCIENCE AND MANAGEMENT EFFECTIVENESS TEAM WORKSHOP

As a team member of the Science and Management Effectiveness branch at Parks Victoria, Kally attended a special branch workshop held in Inverloch on 27–29 November 2017. The workshop included updates from all team members on their current key projects, trials of special software designed for specific case studies, and meeting with park managers in the region to gain insight into their current monitoring and conservation activities. Kally contributed to the discussions of different projects and there is scope in the future to utilise her specialised skills in the design and analysis of some of the projects that were discussed.

*AMSI acknowledges Parks Victoria for their continuing support of this important research collaboration.*





**71**

INTERNS PLACED  
FROM **12**  
DISCIPLINES

**36** INDUSTRY

PARTNERS ACROSS  
**10**  
INDUSTRY SECTORS

**\$1.38**

MILLION FUNDING  
GENERATED FOR  
UNIVERSITIES

**97%**

OF PARTICIPANTS  
SATISFIED WITH  
THE PROGRAM



# APR.Intern

APR.Intern (formerly AMSI Intern) works across all disciplines and sectors to create opportunities for PhD students to work with industry on complex real-world research challenges. As we build Australia's STEM and innovation capability, we hope to see short-term industry engagements become a routine part of the Australian postgraduate experience.

.....  
**Cate Ballard**

National Program Manager

**Glen Sheldon**

Deputy Program Manager/Acting National Program Manager

**APRINTERN.ORG.AU**

In another defining year for the program, 2017 highlights included new partnerships with the Australian Government Department of Education and Training (DET) and the Defence Science and Technology (DST) Group.

We continue to expand the program to facilitate delivery of the \$28.2 million *Supporting more women in STEM careers: Australian Mathematical Sciences Institute (AMSI) – National Research Internships Program (NRIP)*. With a primary focus on engaging women, this national-scale expansion will enable the program to generate 1400 industry-based PhD internships by 2020. With direct support for participating industry partners, these placements will create essential innovation linkages between Australian business and universities across metropolitan and regional areas nationally. The new program has been given a head start after DST Group signed a four-year partnership with AMSI to place 100 postgraduate interns.

The new APR.Intern brand was soft-launched in late 2017 with a print and digital advertising campaign. Also known as the Australian Postgraduate Research Intern program, this evolution of AMSI Intern reflects our increased STEM research scope, while retaining links to the original program. With an embedded open door, the new logo is a reminder of our core mission to open new industry opportunities to PhD students nationally.

## Internal and External Growth

Essential to support future growth and delivery, the team has undergone a significant expansion. As well as additional administrative and marketing functions, newly appointed Deputy Program Manager Glen Sheldon (Acting National Program Manager from October 2016 to October 2017) will lead relationship management and strategic planning. As we expand our reach, the recruitment of four new Business Development Officers (BDOs) will deepen engagement in Victoria and New South Wales, as well as opening new avenues in South Australia. A pilot initiative to embed a part-time BDO at James Cook University is also under way. A second round of BDO recruitment will take place late in 2018, with a focus on Queensland and Western Australia.

Following the conclusion of AMSI's three-year co-investment agreement with eight member universities in Victoria and New South Wales, we have commenced engagement to continue these collaborations through NRIP. We will expand engagement with eligible Australian universities and institutions as we continue to build awareness of the program and funding throughout 2018.



Chief Defence Scientist, Dr Alex Zelinsky and Professor Geoff Prince at the Pacific 2017 International Maritime Exposition in Sydney

*“APR.Intern’s national internship program is a great opportunity to harness the potential of graduates with STEM qualifications. We at DST are very excited by this initiative and have stepped up to take advantage of this opportunity.”*

**Dr Alex Zelinsky, Chief Defence Scientist, DST**



APR ] NTERN

### Performance Summary

In 2017, 71 interns were placed, more than double 2016's 34 placements. International students accounted for just under half the interns placed, with Australian citizens and permanent residents making up 24 and 27 per cent respectively. The number of female interns in 2017 dropped slightly to 27 per cent (19 students total) from 32 per cent in 2016.

While 19 universities across six states were represented in 2017 placements, a majority were in Victoria and New South Wales (77 per cent), a reflection of their higher level of business development activity due to the nature of the co-investment partnerships brokered in 2015. An increasing number of interns were also placed outside these two states, in the Australian Capital Territory, South Australia, Tasmania and Western Australia.

In 2017, 28 per cent of interns were placed with SMEs, up from 24 per cent in 2016, with large enterprises accounting for 44 per cent and government agencies 24 per cent of placements. With the introduction of the NRIP funding scheme, more than 90 per cent of internships received rebates in 2017, a significant increase on 2016's 30 per cent.

Concluding in December 2017, the co-investment partnership resulted in 87 internships placed over the three years from 2015–2017, including 49 in 2017. This success has been a key driver in the national expansion of the Intern program.

#### CUSTOMER SATISFACTION SURVEY RESULTS (2008–2016)

Overall satisfaction with intern program **97%**

Student satisfaction **96%**

Academic Mentor satisfaction **99%**

Industry Partner satisfaction **95%**

**57%** of interns reported internship was first industry experience

More than **50%** of academic mentors and industry partners intend to continue working together

### Strategic Partnerships

AMSI continued to develop strategic partnerships with a number of high-level Australian organisations in 2017. Highlights include:

- AMSI Director, Professor Geoff Prince and Chief Defence Scientist, Dr Alex Zelinsky co-signed a MOU that will see **DST Group** accept 100 interns through to the end of the NRIP funding period in 2020
- The **Defence Science Institute** partnership continued into its third year, with three internships secured in 2017
- The highest annual intern intake by a single company, ten internships commenced with consulting engineering company **Aurecon** in 2017 with a further three in the pipeline for Q1 2018
- Seven of the 11 placements over three years negotiated with the **Australian Bureau of Statistics** commenced in 2017. This agreement is likely to be varied to accommodate more internships
- **ANZ** partnership continued with six interns placed across 2017. Three of these interns, all women, were offered full-time positions at completion of their internship projects
- Two new internships have commenced from Victoria University with **Cycling Victoria** and the **Western Bulldogs Community Foundation**. Both internships are sociological and have appointed female PhD students
- Our **Telstra** partnership delivered another seven internships in 2017
- **Woodside** will successfully complete three internships by year end laying the groundwork for more in 2018 and, along with BHP, lay the groundwork for deployment of a business development officer in WA in 2018

In the last quarter of the year AMSI was working with 36 industry partners with some exciting new relationships being developed. The program continues to attract and engage with start-ups and SMEs such as **Geli**, a Victorian Government sponsored start-up working on renewable energy, and **Tec.Fit**, who have placed three interns researching 3D modelling.



## Marketing & Media

As Australia's national voice for the mathematical sciences, AMSI engages with broad stakeholder audiences across the mathematics pipeline through our Schools, Research and Higher Education and APR.Intern programs. A significant growing media presence supports the Institute's policy engagement, advocacy and research training activities.

**318** NEWS  
ARTICLES QUOTE

AMSI IN 2017, A  
**209%**  
INCREASE OVER 2016

MEDIA AUDIENCE REACH  
OF **228** MILLION FROM

**17**  
MEDIA RELEASES

SOCIAL MEDIA  
ENGAGEMENT

INCREASED BY  
**20%** ACROSS  
ALL PROGRAMS

AMSI EMAIL OPEN RATE  
AVERAGES **43%**

NOTABLY HIGHER THAN  
THE NON-PROFIT SECTOR'S  
**25%** OPEN RATE



## Marketing & Media

### Strategy

Strong design concepts and messaging across major campaigns and publications continue to play a fundamental role in supporting AMSI and its mission. The Institute's overall brand exposure increased in 2017 through existing print and digital communications channels and exploration of emerging platforms.

The Choose Maths careers awareness campaign launched nationally in mid-2017 with careers packs landing in 10,000 schools, including 15 classroom posters and a booklet. This was supported by a major national transport advertising campaign aligned with Year 11 and 12 subject selection and university open days around the country during August and September. Centred on Choose Maths and the Institute's *Maths Adds* careers guide, the campaign ran across public transport in Sydney, Melbourne and Perth for two months, including 350 advertisements with an overall reach of 9.9 million from people of 14 years and over.

Public transport exposure was supported by a national digital advertising campaign launched over four weeks on national news streams, social media platforms and through high-reach individual influencers. This achieved 1.2 million impressions and resulted in increased website visits. Social media growth was achieved Institute-wide with the programs increasing their overall social media engagement by 20 per cent on existing platforms.

Audience engagement with planned e-communications was very high in 2017 with an average 43 per cent open rate and 7.4 per cent click through rate achieved on email campaigns, significantly higher than the 25 per cent and 3 per cent respective averages for the non-profit sector (Comparison data source Mail Chimp [mailchimp.com/resources/research/email-marketing-benchmarks/](http://mailchimp.com/resources/research/email-marketing-benchmarks/)).

Underpinning engagement capability and reach, enhanced functionality of our customer relationship management, media and marketing systems has allowed targeted messaging to core markets, increasing overall lead generation.

**Mari Ericksen**

Marketing and Communications Manager

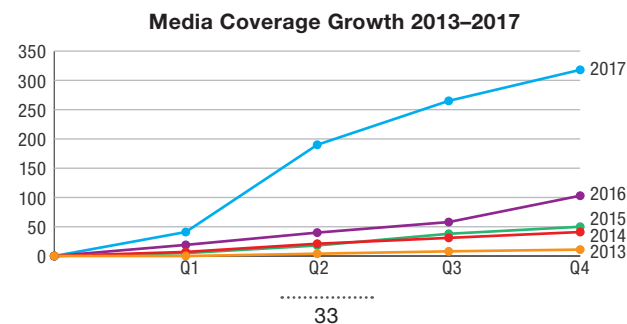
### Branding

Soft launched in December 2017, AMSI Intern rebranded as APR. Intern better reflecting the broad and inclusive scope of the program: all sectors, all states, all disciplines. The rebrand coincided with the Australian Government's \$28.2 million funding to expand the program to place 1400 PhD students into industry over four years.

The APR.Intern brand appeals to a broad audience: academia, government and industry (all sectors). The look and feel of the new brand projects a trusting, sophisticated and high-end image. The use of the door in the logo represents the APR.Intern brand journey of opening doors for postgraduate industry career pathways, industry innovation and increased collaborations between academia and industry into the future. Taking an integrated multi-channel approach, phase two of the initial campaign will include print media and the development of APR.Intern's digital presence.

### Media Exposure

Key media campaigns in 2017 secured strong exposure for the mathematical sciences with 318 unique media stories, a 209 per cent increase on the previous year, reaching an audience of 228 million. Our focus on increasing national reach, in line with the Institute's membership and program audiences, was achieved through both national and local outlets, over multiple channels including print, digital, TV and radio. Media stories aligned to the Institute's key priorities highlighted in AMSI's 2016 policy document *Securing Australia's Mathematical Workforce*, and coverage included project initiatives such as the Choose Maths Awards (page 21), public lectures, launch events such as AMSI Optimise as well as the APR.Intern and DST Group intern partnerships (page 31).



### Social Media

AMSI generated significant social media growth in 2017, with a 20 per cent increase across all platforms. Targeted Facebook and Twitter campaigns were implemented across AMSI's main channels: @DiscoverAMSI (Facebook/Twitter), @amsischools (Facebook/Twitter) and @amsichoosemaths (Facebook only).

Driven by the promotion of key events, AMSI Schools' Choose Maths Facebook profile saw the biggest increase, of more than 260 per cent over the previous year to reach almost 450 followers, with larger increases linked to events including the *Hidden Figures* movie sessions and the Choose Maths Awards. AMSI Schools Facebook page saw more modest growth but still increased by more than 50 per cent over the previous year. AMSI's main Facebook profile @DiscoverAMSI grew by almost 700 followers to 4065, about a 20 per cent increase.

AMSI's @DiscoverAMSI and @AMSIschools Twitter accounts also saw good growth. Discover AMSI had more than 1570 followers at the end of 2017, with more than 303,000 tweet impressions, almost 1000 likes and more than 740 retweets. The AMSI Schools Twitter account gained almost 380 followers over the year, with more than 660,000 tweet impressions, more than 400 retweets and over 700 likes, for total engagement of more than 1150.

### Publications

The Institute's growing suite of publications, resources and reports to support delivery of our core programs increased in 2017 with the release of the *Choose Maths Gender Report 2017*. This report provides a comprehensive analysis of Australian primary and secondary mathematics education trends in relation to gender difference and impacts on Year 12 participation, students' performance and attitudes over the last ten years. The report received promising media coverage in mainstream media such as Triple J radio.

A full list of AMSI 2017 publications can be found on page 42.

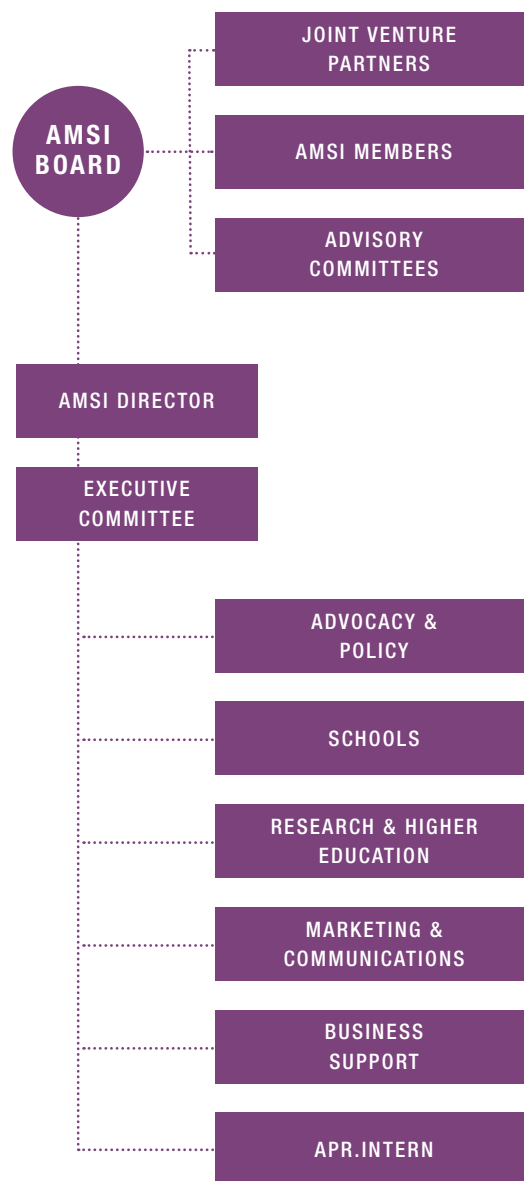
# Governance



AMSI is an unincorporated collaborative joint venture of Australia's universities and other bodies related to the mathematical sciences. Six universities signed a Joint Venture Agreement (JVA) in 2002 to become the first full members of AMSI. The University of Melbourne is AMSI's lead agent and since 2002 a further six universities have become full members, including all Group of Eight universities. Our membership is made up of an additional 17 universities, five government agencies and six mathematical and statistical learned societies.



## Governance



## Organisational Structure

AMSI continues to make a significant contribution to the mathematical sciences in Australia. Our initiatives and programs are important parts of an overall strategy to enhance the standing and health of mathematics and statistics across the community.

AMSI is critically dependent upon the support of its member institutions. Without this support—both financial and via active participation in AMSI's enterprise—the Institute would not be able to provide the many services that are of direct benefit to the mathematical sciences.

AMSI's members meet face to face twice a year and the full members meet at least four times annually. In this way AMSI keeps its programs fresh and responsive to its membership.

## Management of AMSI

The JVA makes the AMSI Board responsible for the overall direction of the Institute, formulation of policies and management of activities in AMSI's three portfolio areas:

- School education
- Research and higher education
- Industry engagement

External advice is provided by four high-profile advisory committees.

Activities are detailed in the annual Business Plan and Budget document, authorised annually by the full members and the board. Management of the Institute and its activities is the responsibility of the Executive Committee (listed on page 40).

## AMSI Board Composition

The board comprises:

- An independent chair appointed by the full members
- The Institute Director
- The Institute Deputy Director appointed by the full members
- One person representing the lead agent — the University of Melbourne

- Two people representing the full members appointed by mutual agreement of the full members
- Two people representing the associate members appointed by mutual agreement of the associate members
- Up to five independent members representing business and industry appointed by mutual agreement of the full members

Remuneration of board members is noted in the financial statements on page 43.

The independent members of the board are appointed for terms of one year but are eligible to serve for one or more further terms if reappointed in accordance with clause 19.3 of the JVA. Board representatives for the full members and associate members serve two-year terms.

## Board Meetings

In 2017 board meetings were held on the following dates:

- 23 February 2017
- 4 May 2017
- 19 July 2017
- 21 November 2017
- 15 December 2017 (board out of round meeting)

### ATTENDANCE:

**Dr Ron Sandland** (5 of 5)

**Dr Adelle Howse** (5 of 5)

**Prof. Lynn Batten** (3 of 3, until July 2017)

**Prof. Karen Day** (5 of 5, Professor Aleks Owczarek attended as proxy in February and May, Professor Laura Parry attended as proxy in July and November)

**Prof. Jim Denier** (5 of 5)

**Dr Eileen Doyle** (2 of 5)

**Prof. Andrew Eberhard** (5 of 5)

**Prof. Joseph Grotowski** (5 of 5)

**Prof. Markus Hegland** (4 of 5)

**Prof. Graeme Hocking** (3 of 3, from July 2017)

**Dr Mark Lawrence** (5 of 5)

**Prof. Geoff Prince** (4 of 5, sat out December meeting due to topic under discussion)





# Committees & Stakeholders

## BOARD MEMBERS

**Dr Ron Sandland AM** AMSI—*Chair*  
**Dr Adelle Howse** AMSI—*Deputy Chair*  
**Prof. Lynn Batten** Deakin University (*until July 2017*)  
**Prof. Karen Day** The University of Melbourne—Lead Agent Representative  
**Prof. Jim Denier** Macquarie University  
**Dr Eileen Doyle FAICD** Company Director  
**Prof. Andrew Eberhard** RMIT University  
**Prof. Joseph Grotowski** The University of Queensland  
**Prof. Markus Hegland** Deputy Director, AMSI  
**Prof. Graeme Hocking** Murdoch University (*from July 2017*)  
**Dr Mark Lawrence** Mark Lawrence Group  
**Prof. Aleks Owczarek** The University of Melbourne—Proxy for Karen Day  
**Prof. Laura Parry** The University of Melbourne—Proxy for Karen Day  
**Prof. Geoff Prince** Director, AMSI

## BOARD OBSERVERS

The Chairs of the Advisory Committees, the President of the Australian Mathematical Society and Director of MASCOS are also invited onto the Board as observers.

**Dr Bob Anderssen** *Chair*, AMSI Education Advisory Committee  
**Prof. Kate Smith-Miles** President, Australian Mathematical Society  
**Prof. Tony Guttman** Director, MASCOS (*until December 2017*)  
**Prof. Terry Speed** Chair, AMSI Scientific Advisory Committee  
**Prof. Peter Forrester** National Committee for the Mathematical Sciences (NCMS) Representative  
**Prof. Scott Sisson** President, Statistical Society of Australia (*from July 2017*)

## AMSI RESEARCH & HIGHER EDUCATION COMMITTEE

**Prof. Markus Hegland** The Australian National University—*Chair*  
**Dr Nicola Armstrong** Murdoch University  
**Prof. Nigel Bean** The University of Adelaide (*from July 2017*)  
**Michael Cromer** The Australian National University (*until February 2017*)  
**Thomas Dyer** University of Wollongong (*from June 2017*)  
**Prof. Anthony Henderson** The University of Sydney

**Dr Phillip Isaac** Queensland University of Technology  
**Assoc. Prof. Inge Koch** Executive Director, Choose Maths, AMSI  
**Chloe Pearce** Program Manager, Research and Higher Education, AMSI (*from June 2017*)  
**Prof. Geoff Prince** Director, AMSI  
**Prof. Aidan Sims** University of Wollongong  
**Assoc. Prof. Scott Sisson** SSA  
**Prof. Kate Smith-Miles** President, AustMS  
**Prof. Terry Speed** Chair, AMSI Scientific Advisory Committee  
**Paul Ulrick** Program Manager, Research and Higher Education, AMSI (*until April 2017*)  
**Maaikie Wienk** ACE Network Coordinator, AMSI

## AMSI SCIENTIFIC ADVISORY COMMITTEE

**Prof. Terry Speed** Walter and Eliza Hall Institute of Medical Research—*Chair*  
**Prof. Ben Andrews** The Australian National University  
**Prof. Andrew Barbour** The University of Melbourne (*from November 2017*)  
**Prof. Philip Broadbridge** La Trobe University  
**Prof. Darren Crowdy** Imperial College London  
**Prof. Ezra Getzler** Northwestern University  
**Assoc. Prof. Frances Kuo** The University of New South Wales (*until May 2017*)  
**Prof. Elizabeth Mansfield** University of Kent  
**Prof. Mary Myerscough** The University of Sydney (*from November 2017*)  
**Prof. Geoff Prince** Director, AMSI  
**Prof. Terry Tao** UCLA; Clay Mathematics Institute  
**Prof. Lesley Ward** University of South Australia (*from November 2017*)  
**Prof. Ole Warnaar** The University of Queensland

## AMSI INDUSTRY ADVISORY COMMITTEE

**Dr Mark Lawrence** Mark Lawrence Group—*Chair*  
**Prof. Nigel Bean** University of Adelaide  
**Dr Eileen Doyle FACID** Company Director  
**Joe Forbes** Biarri  
**Dr Adelle Howse** Independent  
**Prof. Geoff Prince** Director, AMSI  
**Bryan Quinn** BHP Billiton (*until July 2017*)  
**Glen Sheldon** Acting National Program Manager, APR.Intern

## AMSI EDUCATION ADVISORY COMMITTEE

**Dr Bob Anderssen** CSIRO—*Chair*  
**Dr Amie Albrecht** University of South Australia  
**Dr Abdulmoeed Arayne** Brunswick Secondary College (*until December 2017*)  
**Dr Frank Barrington** The University of Melbourne  
**Peter Brown** The University of New South Wales  
**Dr Mary Coupland** University of Technology Sydney  
**Dr Michael Evans** Senior Consultant, AMSI  
**Janine McIntosh** Program Manager, AMSI Schools; Choose Maths Program Director, AMSI  
**Prof. Geoff Prince** Director, AMSI  
**Prof. Jacqui Ramagge** University of Wollongong  
**Philip Swedosh** King David School  
**Prof. Tom Lowrie** The University of Canberra

## CHOOSE MATHS ADVISORY COMMITTEE

**Prof. Kate Smith-Miles** Monash University—*Chair*  
**Jessica Simpson** BHP Billiton Manager Community and Social Investment, Sustainability and Public Policy (*until June 2017*)  
**Dr Michael Forbes** Biarri Commercial Mathematics  
**Assoc. Prof. Inge Koch** Executive Director, Choose Maths, AMSI  
**Adjunct Prof. Gilah Leder** Monash University  
**Prof. Jennifer Graves AO** Distinguished Prof., La Trobe University  
**Nagla Jebeile** NSW Department of Education  
**Janine McIntosh** Program Manager, AMSI Schools; Choose Maths Program Director, AMSI  
**Michael O'Connor** Schools Outreach Project Manager, AMSI  
**Prof. Geoff Prince** Director, AMSI  
**Dr Roslyn Prinsley** National Adviser, Science and Mathematics Education and Industry, Office of the Chief Scientist  
**Rebecca Samulski** BHP Specialist Social Investment Australia, Community and Indigenous Affairs (*From June 2017*)  
**Prof. Terry Speed** Walter and Eliza Hall Institute of Medical Research



## AMSI Staff



### PROFESSOR GEOFF PRINCE

DIRECTOR OF AMSI  
ACTING PROGRAM MANAGER, RHE (from  
April – June 2017)  
[director@amsi.org.au](mailto:director@amsi.org.au)

Geoff Prince has been the Director of the Australian Mathematical Sciences Institute (AMSI) since 2009. Geoff has a long academic career as a teacher and researcher at RMIT University, the University of New England and La Trobe University where he was Head of Department. He works in differential geometry, differential equations and their application. Geoff holds a BSc (Hons) and a DipEd from Monash University and PhD from La Trobe University.



### PROFESSOR MARKUS HEGLAND

DEPUTY DIRECTOR (from July 2016)  
[markus.hegland@anu.edu.au](mailto:markus.hegland@anu.edu.au)

Markus Hegland is a Professor in the Mathematical Sciences Institute of the Australian National University. He is a numerical analyst and has worked in the area of high dimensional approximation, regularisation theory for ill-posed problems and on parallel algorithms and high-performance computing. He has been CI and AI on several ARC Discovery and Linkage grants and ARC funded research centres. In 2010 he received a Hans Fischer Senior Fellowship of the

Technical University of Munich (TUM) and has been honoured with a TUM ambassadorship in 2016. Originally from Switzerland, Markus has been at the Australian National University since 1992. Markus chairs AMSI's Research and Higher Education Committee and is a member of the AMSI board and executive.



### ASSOCIATE PROFESSOR INGE KOCH

EXECUTIVE DIRECTOR, CHOOSE MATHS  
[inge@amsi.org.au](mailto:inge@amsi.org.au)

As Executive Director for AMSI and the Choose Maths program, Inge is building on her experience in and passion for engaging girls and young women in her love for mathematics. Prior to joining AMSI in 2015, Inge worked in industry and the CSIRO, and had academic positions at the University of Newcastle, UNSW and Adelaide University. Her statistics research interests focus on analysis of high-dimensional data with applications in proteomics and cancer research.



### JANINE MCINTOSH

PROGRAM MANAGER, AMSI SCHOOLS,  
CHOOSE MATHS PROGRAM DIRECTOR  
[janine@amsi.org.au](mailto:janine@amsi.org.au)

Janine McIntosh manages AMSI Schools. Janine leads a professional development and schools visit program for teachers across the country.

Through clusters of schools supported by industry and government partners, Janine's aim is to encourage more Australians to enjoy and study mathematics.

Janine is one of the authors of ICE-EM Mathematics and has developed a suite of online and careers materials in her time at AMSI. Janine was one of the writers for the Australian Curriculum: Mathematics F–10. She is an experienced primary teacher, who has worked as a lecturer in mathematics education at the University of Melbourne and serves on the Maths Challenge and AMOC Committees of the Australian Mathematics Trust.



### CHLOE PEARSE

PROGRAM MANAGER, RESEARCH & HIGHER  
EDUCATION (from June 2017)  
[chloe.pearse@amsi.org.au](mailto:chloe.pearse@amsi.org.au)

Chloe is responsible for the AMSI Research and Higher Education portfolios. Prior to joining AMSI, Chloe worked on international and domestic marketing and recruitment strategies to attract undergraduate and postgraduate students to the University of Melbourne. Chloe also has experience in policy and advocacy relating to equity in higher education and public health reform in the state of Victoria.



### PAUL ULRICK

PROGRAM MANAGER, RESEARCH & HIGHER  
EDUCATION (until April 2017)

Paul was responsible for the AMSI Research and Higher Education program until April 2017. Prior to joining AMSI Paul enjoyed a broad and diverse career including management, analytical and consulting roles in service, industrial and consumer markets with Shell, Billiton, Wesfarmers and Spotless. Paul holds a Bachelor of Science (Mathematics and Statistics) from Melbourne University and completed a Graduate Diploma in Applied Statistics in 2016.



### CATE BALLARD

NATIONAL PROGRAM MANAGER, APR.INTERN  
(on maternity leave until October 2017)  
[cate@amsi.org.au](mailto:cate@amsi.org.au)

Cate has been the National Program Manager for APR. Intern since September 2011. Her role is to develop and grow the postgraduate internship program. Before coming to AMSI, Cate worked at the International College of Management, Sydney in a dual role as an Industry Training/ Business Development Manager. She has also held strategic sales and marketing roles with two leading hotel chains in Australia.



## AMSI Staff



### GLEN SHELDON

ACTING NATIONAL PROGRAM MANAGER,  
APR.INTERN (until October 2017)  
DEPUTY NATIONAL PROGRAM MANAGER,  
APR.INTERN  
[glen.sheldon@amsi.org.au](mailto:glen.sheldon@amsi.org.au)

Glen is the Deputy National Program Manager for APR. Intern. Glen is responsible for the strategic direction and operational management of the APR. Intern program. His role provides high-level leadership, strategic development and implementation for the expansion of the APR. Intern program, while driving the number of placements across our member universities.

Prior to his position at AMSI, Glen held a range of senior marketing and publishing roles working with government, industry and the higher education sector.



### MARI ERICKSEN

MARKETING & COMMUNICATIONS MANAGER  
[mari@amsi.org.au](mailto:mari@amsi.org.au)

Mari is passionate about driving AMSI's brand and mission. She heads the Institutes marketing, media and design functions and is responsible for delivery of the overall marketing strategy.

Mari joined AMSI in 2012, previously she was Head of Marketing Events at Financial Times in the UK.



### ROD BIRCH

BUSINESS MANAGER  
[r.birch@amsi.org.au](mailto:r.birch@amsi.org.au)

Rod joined AMSI as Business Manager in October 2011. Formerly with the Faculty of Medicine, Dentistry and Health Sciences at the University of Melbourne, his career has spanned work in government, two major accounting firms and a major bank and has included consulting to the tertiary education sector.

## HONORARY STAFF

**Dr Michael Evans** Senior Consultant  
**Jan Thomas OAM** Research Fellow

## NON-EXECUTIVE STAFF

**Kirsten Doert** Executive Assistant to the Director  
**Maaïke Wienk** ACE Coordinator/Finance Officer

## MARKETING & COMMUNICATIONS

**Danny Doan** Web development (from November 2017)  
**Paul Murphy** Art Director (from October 2017),  
Graphic Designer  
**Michael Shaw** Art Director (from October 2017),  
Multimedia Manager  
**Melissa Trudinger** Publications Officer

**Simon Villani** Web development (until October 2017)  
**Laura Watson** Media & Communications Officer

## APR.INTERN

**Margo Brown** Executive Assistant to the National  
Program Manager and Program Administrator  
**Fiona Druitt** Business Development Officer (Victoria)  
**Rachel Geddes** Business Development Officer (Victoria)  
**Sophie Kennedy** Administrative Assistant (from  
September 2017)  
**Rachel Misitano** Marketing & Communications  
Coordinator (from October 2017)  
**Anne Nuguid** Project Consultant  
**Mark Ovens** Business Development Officer (NSW)  
**Joanna Steinle** Administrative Assistant (from August 2017)

## PARKS VIC

**Dr Kally Yuen** Statistician

## RESEARCH & HIGHER EDUCATION

**Angela Coughlin** Project Coordinator (from August 2017)  
**Francesca Hoban Ryan** Administrative Assistant (from  
May 2017)

**Anna Muscara** Project Coordinator (from September 2017)  
**Cate Parsons** Project Officer (until June 2017)  
**Liam Williamson** Administration Support

## AMSI SCHOOLS

**Nadia Abdelal** Outreach Officer (from January 2017)  
**Jacinta Blencowe** Outreach Officer  
**Sarah Blood** Choose Maths Web and Social Media  
Officer  
**Anna Bock** Outreach Officer (from May 2017)  
**Helen Booth** Outreach Officer  
**Greg Carroll** Outreach Officer (until December 2017)  
**Julia Collins** Women in Maths Project Officer  
**Daryn Corish** Outreach Officer (until January 2017)

**Claire Embregts** Executive Assistant to AMSI Schools  
Program Manager and Choose Maths Executive Director  
**Marcus Garrett** Outreach Officer (from October 2017)  
**Dr Susan James** Outreach Officer  
**Dr Ning Li** Gender Researcher  
**Cassandra Lowry** Outreach Officer (from July 2017)  
**Kristin Marriner** Choose Maths, Marketing &  
Communications Coordinator  
**Leanne McMahon** Outreach Officer  
**Michael O'Connor** Schools Outreach Project Manager  
**Darla Trejo** Choose Maths, Finance & Admin Officer

# Financials

AMSI's financial records are managed and administered by AMSI staff by utilising the accounting and financial systems of the University of Melbourne. All financial statements are reconciled to the University of Melbourne's integrated financial system to ensure compliance with relevant policy and to confirm the amount of cash reserves held by the University of Melbourne on behalf of AMSI. Our operating performance for the year was largely within expectation, having regard to operating conditions we experienced.

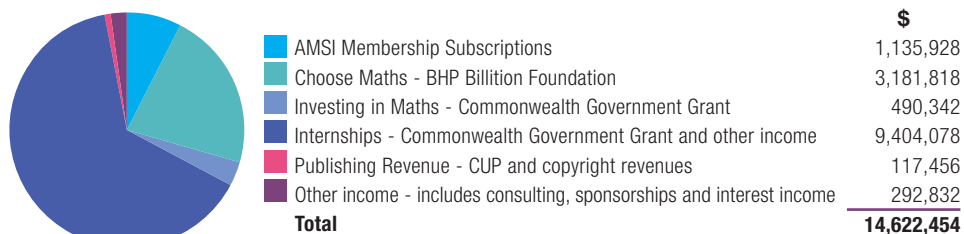
Our total income for the year was \$14,622,454 and comprised:

- member subscriptions (\$1,135,928),
- our Higher Education Grant with the Commonwealth (\$490,342),
- funding for our Choose Maths Program provided by the BHP Billiton Foundation (\$3,181,818),
- internship revenues of (\$9,404,078), including grant revenue from the Commonwealth of (\$8,900,000),
- publishing revenue (\$117,456), and
- other income, including sponsorships and interest (\$292,832).

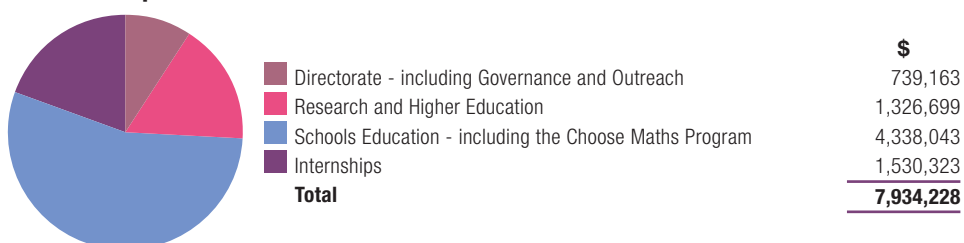
Our total expenses for the year were \$7,934,228, incurred across our key operating areas:

- Directorate activities which includes Governance and Outreach (\$739,163),
- Research and Higher Education Programs (\$1,326,699),
- Schools Program incorporating Choose Maths (\$4,338,043), and
- Internship Program (\$1,530,323).

## Institute Income



## Institute Expenditure



Major commitments to ChooseMaths, the Intern Program and to the Research and Higher Education Program are a feature of our increased expenditure this year.

The Institute derived a net operating surplus of \$6,688,226 for the reporting period (\$14,622,454 income less \$7,934,228 expenses).

Our opening cash balance of \$4,969,242 together with the operating surplus of \$6,688,226, contributed to our total closing cash balance of \$11,657,468 as at 31 December 2017, the majority of which represents future commitments on our major grants.

The total carried forward of \$11,657,468 comprises:

• committed to the Choose Maths Grant from BHP Billiton Foundation	\$3,398,005
• committed to Investing in Mathematics Grant from the Commonwealth	\$40,164
• committed to our Intern Program Grant from the Commonwealth	\$7,403,478
• and committed and uncommitted funds within AMSI Core	\$815,821
	<b><u>\$11,657,468</u></b>

## Certification

The University of Melbourne undertakes to provide audited financial statements for all contractually funded activities when required by the relevant funding body, but not generally for AMSI as a whole. In the absence of an overall annual audit statement, the following certification is provided.

We hereby certify that funds received by AMSI during the year ended 31 December 2017 and the expenditure incurred during that period were in accordance with all relevant funding agreements, with the AMSI Joint Venture Agreement, and with the approved Business Plan.

The balance of cash reserves as at 31 December 2017 of \$11,657,468, as detailed in the following financial statements, is consistent with the balance of AMSI funds as represented in the accounting records of the University of Melbourne as at 31 December 2017.

Geoff Prince  
Director

Rod Birch  
Institute Finance Manager

## Financials

### Statement of Financial Performance

	Year ended 13/12/2017	Year ended 13/12/2016
	\$	\$
<b>INCOME</b>		
<b>Membership Income</b> - AMSI Membership Subscriptions	1,135,928	970,755
<b>Major Grants</b>		
Investing in Maths - Commonwealth Grant for Higher Education	490,342	241,217
Choose Maths - BHP Billiton Foundation	3,181,818	4,481,131
<b>Internships</b> - includes Commonwealth Grant, collaboration and placement fees	9,404,078	1,137,500
<b>Publishing Revenue</b> - CUP and copyright revenues	117,456	121,543
<b>Other income</b> - includes consulting, sponsorships and interest income	292,832	207,613
<b>Total Income</b>	<b>14,622,454</b>	<b>7,159,759</b>
<b>EXPENDITURE BY PROGRAM</b>		
Directorate - including Governance and Outreach	739,163	820,898
Research and Higher Education	1,326,699	1,237,231
Schools Education - including the Choose Maths Program	4,338,043	2,901,645
Internships	1,530,323	865,448
<b>Total Expenditure</b>	<b>7,934,228</b>	<b>5,825,222</b>
Operating Surplus/(Deficit)	6,688,226	1,334,537

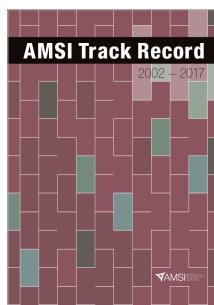
### Statement of Financial Position

	As at 31 December 2017	As at 31 December 2016
	\$	\$
<b>ASSETS</b>		
Funds on Hand:		
<b>Project 003058</b> - AMSI Core	815,821	292,386
<b>Project 099901</b> - Choose Maths BHP Billiton Foundation Grant	3,398,005	4,452,483
<b>Project 023424</b> - Commonwealth Grant for Internships	7,403,478	0
<b>Project 003059</b> - Commonwealth Grant Investing in Mathematics	40,164	20,712
<b>Net Assets</b>	<b>11,657,468</b>	<b>4,765,581</b>
<b>EQUITY</b>		
Retained income brought forward after prior period adjustments	4,969,242	3,634,705
Net of income over expenditure	6,688,226	1,334,537
<b>Net Equity</b>	<b>11,657,468</b>	<b>4,969,242</b>



# Publications

AMSI produces a suite of publications, resources and reports to support delivery of its core programs and enhance engagement with the Australian mathematical sciences and broader community. These can be accessed via the links provided below.



## AMSI TRACK RECORD

Providing a 'helicopter' view of AMSI's growth and impact since 2002, *AMSI Track Record* documents the evolution and key achievements of each of the institute's core programs.

[amsi.org.au/publications/2017-track-record/](https://amsi.org.au/publications/2017-track-record/)



## ANNUAL REPORT

This report provides an annual snapshot of AMSI's key achievements and activities, highlighting successes and growth across all program areas and the institute's impact on the mathematical sciences through policy, advocacy and outreach.

[amsi.org.au/publications/amsi-annual-report-2016/](https://amsi.org.au/publications/amsi-annual-report-2016/)



## DISCIPLINE PROFILE OF THE MATHEMATICAL SCIENCES

Released annually, the *Discipline Profile of the Mathematical Sciences* is Australia's most trusted 'go to' data resource for media, policy makers and discipline and community stakeholders interested in the state of Australian mathematics. This publication should be read with the core policy document below.

[amsi.org.au/publications/discipline-profile-mathematical-sciences-2017/](https://amsi.org.au/publications/discipline-profile-mathematical-sciences-2017/)



## IMPROVING AUSTRALIA'S MATHS GRADES

AMSI's core policy document in 2017, *Improving Australia's Maths Grades* sets the institute's key priorities for intervention at all stages of the mathematical pipeline as identified within the *Discipline Profile*.

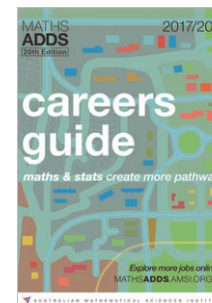
[amsi.org.au/publications/improving-australias-maths-grades/](https://amsi.org.au/publications/improving-australias-maths-grades/)



## RESEARCH REPORT

Illustrating the cross-discipline and industry impact of the mathematical sciences, this report documents the success and impact of AMSI's Research and Higher Education programs and annual research related activities.

[amsi.org.au/research-reports](https://amsi.org.au/research-reports)



## MATHS ADDS

Australia's leading mathematics career resource, this guide is updated annually to empower students with a full overview of the growing industry opportunities open to those with high-level mathematics.

[amsi.org.au/publications/mathsadds-2017-18/](https://amsi.org.au/publications/mathsadds-2017-18/)

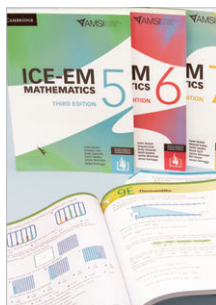
## Publications



### UPDATE

Spanning the mathematical sciences pipeline, this biannual magazine takes an in-depth view of the latest 'hot topics', industry successes and research from AMSI and Australia's mathematical sciences community.

[amsi.org.au/the-update-publication](https://amsi.org.au/the-update-publication)



### TEXTBOOKS

Available through Cambridge University Press, the *ICE-EM* series targets Years 5–10 to support transition from primary to secondary school. As well as required curriculum content, the books cover additional topics relevant and essential for a robust understanding of mathematics.

[amsi.org.au/publications\\_category/publications/textbooks](https://amsi.org.au/publications_category/publications/textbooks)



### CHOOSE MATHS & AMSI SCHOOLS

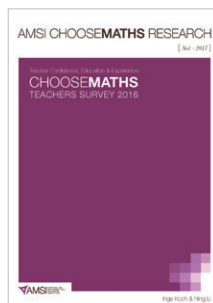
The Choose Maths program produces a number of reports each year based on surveys and research conducted by Choose Maths staff. In 2017 these included both *Teacher Confidence, Education and Experience: Choose Maths Teachers Survey 2016, No.1-2017*, and the *Gender Report 2017: Participation, Performance, and Attitudes Towards Mathematics*.

[amsi.org.au/publications/teacher-confidence-education-experience-choose-maths-teachers-survey-2016/](https://amsi.org.au/publications/teacher-confidence-education-experience-choose-maths-teachers-survey-2016/)

[amsi.org.au/publications/gender-report-2017-participation-performance-attitudes-towards-mathematics/](https://amsi.org.au/publications/gender-report-2017-participation-performance-attitudes-towards-mathematics/)

In addition, AMSI consultants Frank Barrington and Michael Evans produced the report *Year 12 Mathematics Participation in Australia 2007 – 2016*

[amsi.org.au/publications/year-12-mathematics-participation-australia-2007-2016/](https://amsi.org.au/publications/year-12-mathematics-participation-australia-2007-2016/)



### AMSI WEBSITES

[AMSI.ORG.AU](https://amsi.org.au)

[APRINTERN.ORG.AU](https://aprintern.org.au) (formerly [amsiintern.org.au](https://amsiintern.org.au))

[RESEARCH.AMSI.ORG.AU](https://research.amsi.org.au)

[HIGHERED.AMSI.ORG.AU](https://higher.amsi.org.au)

[SCHOOLS.AMSI.ORG.AU](https://schools.amsi.org.au)

[CHOOSEMATHS.ORG.AU](https://choosmaths.org.au)

[CALCULATE.ORG.AU](https://calculate.org.au)

[MATHSADDS.AMSI.ORG.AU](https://mathsadds.amsi.org.au)  
(includes content previously stored on [careers.amsi.org.au](https://careers.amsi.org.au))

### SOCIAL MEDIA SITES

#### Schools Education Program

[FACEBOOK.COM/AMSI SCHOOLS/](https://facebook.com/amsischools/)  
[FACEBOOK.COM/AMSI CHOOSEMATHS/](https://facebook.com/amsichoosemaths/)  
[INSTAGRAM.COM/AMSI CHOOSEMATHS](https://instagram.com/amsichoosemaths/)

#### Research & Higher Education Program

[FACEBOOK.COM/DISCOVERAMSI/](https://facebook.com/discoveramsi/)  
[TWITTER.COM/DISCOVERAMSI](https://twitter.com/discoveramsi)

#### APR.Intern Program

[LINKEDIN.COM/COMPANY/APRINTERN/](https://linkedin.com/company/aprintern/)  
[TWITTER.COM/APRINTERNAU](https://twitter.com/aprinternau)

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