AMSI

AUSTRALIAN MATHEMATICAL SCIENCES INSTITUTE

2010 Annual Report

Membership

FULL MEMBERS

The Australian National University
La Trobe University
Monash University
RMIT University
The University of Adelaide
The University of Melbourne
The University of New South Wales
The University of Queensland
The University of Sydney
The University of Western Australia

ASSOCIATE MEMBERS

Australian Bureau of Statistics
Australian Mathematics Trust
Commonwealth Scientific and Industrial Research Organisation (CSIRO)
Central Queensland University
Charles Sturt University
Curtin University of Technology
Deakin University
James Cook University
Macquarie University
Queensland University of Technology
Swinburne University of Technology
University of Ballarat
University of Canberra
The University of New England
The University of Newcastle
University of South Australia
University of Southern Queensland
University of Technology, Sydney
University of Western Sydney
University of Wollongong
Victoria University

SOCIETY MEMBERS

Australian Mathematical Society

CORPORATE MEMBERS

Gold membership

BlueScope Steel
Farrell Family Foundation

Silver membership

Australian Char Pty Ltd

About AMSI

The Australian Mathematical Sciences Institute (AMSI) was founded in 2002 in response to the need for collaboration in the mathematical sciences to strengthen the broad discipline, especially in universities. The highly successful Canadian institutes that encourage interactions between research, education and industry, especially Fields and the Pacific Institute for Mathematical Sciences (PIMS), have influenced its structure and operations.

From the outset AMSI has aimed to support discipline and cross-disciplinary research at all levels of business, in industry and the research sector; to enhance the undergraduate and postgraduate experience of students in the mathematical sciences and cognate disciplines; and to improve the supply of mathematically well-prepared students entering tertiary education.

The initial $1 million foundation grant was obtained from the Victorian Government's Science, Technology and Innovation infrastructure grants program. Six (now 10) leading universities entered into a Joint Venture Agreement that created the on-going framework for AMSI. Further support came from associate members, including the CSIRO (Commonwealth Scientific and Industrial Research Organisation), Australian Bureau of Statistics, the Australian Mathematics Trust and most of Australia's universities.

Many activities in AMSI's Science and Business, Industry and Government programs are collaborative with the Australian Research Council (ARC) Centre of Excellence for Mathematics and Statistics of Complex Systems (MASCOS). AMSI has held significant grants from the Australian Government, which have supported its flagship programs in Australia's schools and universities.

Details of AMSI's wide spectrum of activities can be found on our website at www.amsi.org.au and in the pages of this report.

Major achievements since 2002

- $16.3 million in government funding and $2.6 million in commercial revenues and corporate sponsorships generated by $4.7 million in member subscriptions
- 850 honours and postgraduate students attended eight summer schools
- 130 scientific workshops sponsored by AMSI and AMSI-MASCOS
- 240 undergraduate Vacation Research Scholarships
- $750,000 invested in a network of Access Grid Rooms in 11 Australian university mathematics and statistics departments
- 19 AMSI internship agreements (since 2008) between member universities and business, industry and government partners
- New partnership with Enterprise Connect to place 90 interns throughout a three-year period
- Dynamic advocacy of the strengths, importance and vital benefits of mathematics and statistics to journalists, university administrators, politicians, public servants and industrialists
- 53 per cent increase in cluster funding for mathematics and statistics ($17 million extra in 2008)
- Established international linkages with the Pacific Institute for the Mathematical Sciences (PIMS), Mathematics of Information Technology and Complex Systems Inc. (MITACS) and the Atlantic Association for Research in the Mathematical Science (AARMS)
- 100,000 *ICE–EM Mathematics* textbooks in Australian schools
- More than 200 international and national distinguished mathematicians sponsored to speak at Australian conferences
- Winner of the 2008 Fast Thinking-Open Universities Innovation Award for Science

Major achievements 2009/10

SCIENCE

- Fields Medalist Prof. Terry Tao and 51 other distinguished, international researchers visit Australia with AMSI support
- National research endeavour boosted by sponsorship of 17 research workshops

INDUSTRY

- A three-year partnership with Enterprise Connect to allow the placement of an additional 90 interns across a range of disciplines
- Industry collaboration through UNESCO-AMSI-MITACS industry workshop: *Future Models for Energy and Water Management Under a Regulated Environment*

EDUCATION

- $2 million Australian Government grant received for The Improving Mathematics Education in Schools (TIMES) project
- Australia and the UK are international leaders in the collaborative teaching of advanced mathematics via Access Grid Rooms (AGRs)

OUTREACH

- AMSI lauded in a Deloitte review of the Victorian Government's Science Technology and Innovation (STI) program
- AMSI's dynamic advocacy with government continues

Chair's report

'An organisation like AMSI is only successful by virtue of the efforts of a large number of people.'

This has been a year of considerable change and prog ress.

In September, we welcomed our third Director, Prof. Geoff Prince. Geoff has been an active par ticipant in AMSI's activities since its inception, including a period as Acting Director. Geoff brings new vigour and enthusiasm to the role after an extended interregnum following Philip Broadbridge's appointment to La Trobe University. While still facing many challenges, there have been many promising developments.

In terms of membership we were pleased to welcome moves by The University of Adelaide and The University of Western Australia to become joint venture par tners with AMSI. AMSI now has all of the Group of Eight (Go8) universities, together with RMIT University and La Trobe University, as joint venture par tners. During the year we were also pleased to welcome the Australian Mathematical Society (AustMS) as our first Society Member.

AMSI's range of activities has g rown during this year. In the last days of June 2009 AMSI received funding from the Australian Government for a national collaborative project targeting school mathematics education – The Improving Mathematics Education in Schools (TIMES) project. This was well-deserved recognition of the success of *ICE-EM Mathematics* and a BlueScope Steel sponsored outreach program in the Illawarra reg ion. The funding provided a major boost to AMSI's educational activities, repor ted in later sections of this repor t, and has seen the 'BlueScope Model' extended to five other reg ions in Queensland and Victoria.

The TIMES project provides an integ rated approach to increasing achievement in mathematics, especially in low socio-economic status communities; develops innovative resources to support the national mathematics curriculum; and raises awareness of career oppor tunities in occupations and professions requiring mathematical skills.

The success of the *ICE-EM Mathematics* textbooks continued, with a number of new schools choosing to adopt the books; sales in both V ictoria and Western Australia increased again this year. The writing team will begin work on second editions of the books, in line with the national curriculum, towards the end of the year. AMSI's Schools Project Manager, Dr Michael Evans and our Senior Schools Project Officer, Janine McIntosh, continued to serve on writers' panels for the new national curriculum development during the year.

In a welcome development, the scientific program was expanded this year. Funding of workshops is now competitive, with quarterly funding rounds and a separate allocation of funds for Hot Topic workshops. The scientific program will continue to grow, with a revival of the annual BioInfoSummer at the end of 2010 and increased funds allocated to the program during the next few years. A highlight of this year's scientific program was a visit by Prof. Terry Tao (University of California, Los Angeles) as the 2009 Clay Mahler Lecturer, supported by AMSI in partnership with AustMS. Prof. Tao undertook a well-received lecture tour of several states.

Funding is an ongoing challenge for organisations such as AMSI, although our continued professional delivery of programs is being more widely recognised. For example, the Collaboration and Structural Reform (CASR) grant launched the AMSI Industry Internship Program, which has grown in strength during the past three years with 20 interns placed in many diverse areas. The benefits of this program have been recognised and AMSI has partnered with Enterprise Connect to add another 90 internships, for small and medium enterprise, throughout the next three years. An additional partnership with the Victorian Life Sciences Computational Initiative (VLSCI) has added a further five internships, annually, to the program.

A recent collaboration agreement with Parks Victoria will see the appointment of a full time statistician at AMSI. The statistician will work part time with Parks Victoria, assisting with analysis and management of large data sets and design of experiments, and part time on industry consulting projects for AMSI. This is an exciting addition to the existing industry program.

It is now eight years since AMSI's inception in 2002 and it has been judged to be appropriate to undertake a formal review in the coming year. We are pleased that Dr Ron Sandlands has accepted our invitation to chair the review panel. Dr Sandland, a former Deputy Chief Executive of CSIRO, will lead the review later this year.

This year has seen many personnel changes for AMSI. As noted Prof. Geoff Prince became AMSI Director in September and I congratulate Geoff on a successful first year in the role. With the launching of the TIMES project we have been pleased to welcome Antje Leigh-Lancaster, Mark Mudge and Rob Moore as Project Officers; they have quickly established themselves as important members of the TIMES project assisting in the expansion of the BlueScope model into Gippsland, Sunshine Coast, Townsville, Geelong and Mandura.

An organisation like AMSI is only successful by virtue of the efforts of a large number of people. I particularly want to thank all who have accepted responsibility of being chairs of committees and the committee members for their contributions. Due to other commitments Prof. Peter Hall resigned as Chair of the Scientific Advisory Committee (SAC) during the year. Peter had made an invaluable contribution since AMSI's inception in 2002. Prof. Jon Borwein accepted the role of Chair of the SAC and has worked tirelessly with Geoff to expand the scientific program throughout the year.

Ms Judith Downes, a board member since AMSI's inception, also resigned due to work commitments. In her eight years on the board Judith provided invaluable support to AMSI and I acknowledge her incisive contributions with much appreciation. Dr Eileen Doyle joined the board during the year bringing much commercial and corporate experience with her. In addition to those mentioned above, I wish to acknowledge the support of all who have contributed to AMSI's success and especially thank AMSI staff members for their sustained hard work during the year.

Jim Lewis
Chair

Director's report

'One of our big successes this year has been the new internship scheme with Enterprise Connect, the Australian Government's support agency for small and medium enterprises.'

It is great to be back at AMSI, connecting with some old friends around Australia and helping to create opportunities for our broad discipline. My first task is to acknowledge the tremendous job that my predecessor, Prof. Phil Broadbridge, did for AMSI. He has left us stronger in many ways, especially on the industrial engagement and national curriculum fronts. During the long changeover period our Chair, Dr Jim Lewis took on the considerable burden of management and steered AMSI successfully through some delicate negotiations, particularly in the school education area. Jim's long-term commitment to the institute is remarkable.

I am particularly keen to grow AMSI networks; that is, to distribute policy making and activity around the AMSI membership. The full members of AMSI have been meeting with me once every couple of months to increase their direct input and to generate local AMSI programs. I believe that this approach will deliver significant benefits and create a stronger enterprise.

I am very pleased that the exchange of memberships between AMSI and the Australian Mathematical Society, including ANZIAM (the Australian and New Zealand Industrial and Applied Mathematics association), has been finalised. It has been a pleasure to work with the society's President, Prof. Nalini Joshi and the Council Steering Committee to bring this about. The success of our collaboration was shown in the enthusiastic response from the 70-odd participants in our first, joint Early Career Workshop on 27 September 2010 in the Adelaide Hills, just prior to the society's annual meeting. I am sure this event marked the beginning of a closer collaboration and will bring great benefit to Australia's mathematical scientists, especially those at the beginning of their careers.

Interaction with government is one of AMSI's most important roles. On the one hand the majority of AMSI's projects have been government funded: at the moment AMSI has Australian Government grants for The Improving Mathematics Education In Schools (TIMES) project and our higher education flagship programs such as the Summer Schools, internships, Vacation Research Scholarships and the Graduate School. On the other hand we find ourselves critical of the inaction of Australian governments on the desperate shortage of trained mathematics teachers. Our aspirations for a publicly-funded research program, along the lines of those of our sister institutes in Europe and North America, have also been frustrated because there is no grant scheme to accommodate such a program.

Nonetheless, there have been positive signs from government and the Australian Research Council (ARC) and, as a result, Nalini and I have obtained the agreement of the Australian Council of Heads of Mathematical Sciences (ACHMS) to launch a green paper/white paper process leading to a comprehensive proposal for all levels of mathematical sciences in Australia. The 2009 National Strategy Document will be used as an initial draft for the green paper and informed by the recent Group of Eight

report. It is our sincere hope that the Australian Government will follow its counterpart in the United Kingdom and declare the mathematical sciences a priority area, supported by legislated funding. On our website (www.amsi.org.au) you can see a presentation by Prof. Celia Hoyles, former mathematics advisor to the UK Government, given at the February 2010 meetings of the Australian Council of Heads of Mathematical Sciences and AMSI, in which she talks about the UK initiatives.

One of our most productive interactions with government has been with the new Australian mathematics curriculum. Both Dr Michael Evans and Ms Janine McIntosh have been heavily involved in the writing of the curriculum and Michael has senior roles in the consultation and implementation phases. There is no doubt that AMSI's long-term and high profile investment in school education in mathematics has borne fruit.

I had the pleasure of attending the CSIRO's *Big Day In* on 11-12 February at Macquarie University in Sydney. The AMSI Vacation Research Scholars have been participating in the *Big Day In* for a number of years, thanks to the generosity of CSIRO Mathematics, Informatics and Statistics. It is a tremendously upbeat event and a real credit to the CSIRO. The quality of the presentations by AMSI students was outstanding; a strong assessment but completely justified. The slideshows were high quality, the deliveries confident and fluent and, importantly, the discussions were enthusiastic and intelligent. It was clear to me that every one of these young undergraduates had spent a very productive summer on their scholarships. I was also very pleased to see so many of the supervisors there in support of their students.

The AMSI Summer Schools are now an established part of the higher education scene. The eighth Summer School was held at La Trobe University in January and February. Thanks to the Director, Dr Grant Cairns, and all my old friends at La Trobe for delivering another success in this flagship program. Both the students and the lecturers were in high spirits every time I saw them and the student feedback was unreservedly enthusiastic. I personally believe that this event is a significant factor in the increased cohesion among early career researchers around the country, evidenced, for example, by the enthusiasm and camaraderie at annual meetings of the Australian Mathematical Society.

Prof. Peter Hall left our Scientific Advisory Committee (SAC) in October 2009, having chaired the committee since its inception. Peter is one of Australia's most senior mathematical scientists and one of those rare people who seem not to sleep. I thank him sincerely for his dedication to AMSI's scientific program and for the sound advice he has dispensed to successive AMSI directors, including me.

It is a pleasure to welcome Prof. Jon Borwein as the new chair of the SAC. Jon has a wide mathematical range and deep international experience, which will be an invaluable asset to the institute. There have been changes to the funding arrangements for AMSI workshop and conference sponsorship in 2010. Assessment of proposals is now competitive and a number of funding rounds will be held throughout the year. In addition, the committee is funding Special Theme Programs and Hot Topics Workshops along the lines of those at the Institute for Mathematics and its Applications, in Minneapolis. Travel to AMSI events for early career researchers is funded through the member travel funds. The overall budget for the scientific program will grow from around $200,000 in 2010 to more than $300,000 by 2012.

One of our big successes this year has been the new internship scheme with Enterprise Connect, the Australian Government's support agency for small and medium enterprises. You will find the details later in this report. It will extend Enterprise Connect's Researchers in Business program, which is now formally recognised by the ARC in its consideration of Linkage Grant applications. It is my firm belief that this scheme, and others in the planning stage, will provide a significant incentive for postgraduate study in mathematics and increase retention of undergraduate domestic students. I also hope it will improve the interest by mathematicians in the ARC Linkage Grant scheme. I urge academics and students alike to take advantage of this new career-enhancing opportunity.

I would like to echo Jim Lewis's remarks and thank the committee and board members for their efforts, particularly Dr Eileen Doyle (Board), Prof. Jon Borwein (Scientific Advisory Committee), Prof. Kate Smith-Miles and Prof. Bob Staudte (Deputy Directors) for becoming part of AMSI and for their invaluable advice. Prof. Peter Taylor, the Head of Department at our lead agency The University of Melbourne, spends many hours on AMSI business, and as our advocate, and for this he has our wholehearted thanks.

Finally, and importantly, I want to pay tribute to the staff in the AMSI office. This group does not enjoy the benefits of what is generally known as tenure, yet they are dedicated to the institute and its work. And along with long-serving board and committee members they maintain AMSI's institutional memory, a fundamental resource for a new director. It is a pleasure to work with them all.

Geoff Prince
Director

Science

HIGHLIGHTS

- **2009 Clay-Mahler Lecturer, Prof. Terry Tao, completes a lecture tour of member universities**
- **AMSI sponsors 17 research workshops**
- **51 distinguished international researchers sponsored by AMSI to visit Australia**

THE SCIENTIFIC ADVISORY COMMITTEE

The Scientific Advisory Committee reviews and approves sponsorship by AMSI of a diverse range of symposia, workshops, theme programs and lecture tours. Prof. Jonathan Borwien (University of Newcastle) is Chair of the Scientific Advisory Committee, which comprises eminent national and international mathematical scientists. A full list of committee members appears on page 32.

WORKSHOPS, CONFERENCES AND SEMINARS

AMSI continues to sponsor a very successful scientific program of meetings and workshops organised by AMSI members. A number of funding rounds are held throughout the year and proposals assessed on a competitive basis. Workshops usually run from one day to a week and address a specific field, or even a particular research problem. Hot Topic workshops are focused on a specific area of emerging research and usually run for one week. Special Theme Programs support relatively long periods of research interaction, involving both workshop-type activity and conference research, addressing diverse research topics in theoretical mathematics. These are listed on page 11.

AMSI's funding usually supports the travel expenses of international and national keynote speakers. Travel funds are available for students and early career researchers through the departments' AMSI Travel Fund. Details may be found at www.amsi.org.au/events.php

Proposals for workshops, Hot Topic Workshops and Special Theme Programs can be submitted throughout the year. Assessment of proposals is based on scientific merit and likely national impact. Applicants are encouraged to use AMSI premises where practical, as they are well equipped and centrally located. See www.amsi.org.au/proposals.php

AMSI LECTURERS

Clay Mahler Lecturer: Terence Tao

The 2009 Clay Mahler Lecturer, co-sponsored by the Clay Mathematics Institute, the Australian Mathematical Society (AustMS) and AMSI, was Prof. Terence Tao. Prof. Tao visited Australia in August and September 2009. The Mahler Lectureship is awarded every two years to a distinguished mathematician who preferably works in an area of mathematics associated with the work of Professor Mahler. As part of the tour Prof. Tao was plenary speaker at the 53rd annual meeting of the AustMS and spoke at a number of member universities during his trip.

Prof. Tao was born in Adelaide, Australia in 1975 and has been a professor of mathematics at UCLA (the University of California, Los Angeles) since 1999. Terry's areas of research include harmonic analysis, PDE, combinatorics, and number theory. He has received a number of awards, including the Salem Prize in 2000, the Bochner Prize in 2002, the Fields Medal and SASTRA Ramanujan Prize in 2006, the MacArthur Fellowship and Ostrowski Prize in 2007, and the Waterman Award in 2008.

Prof. Tao also holds the James and Carol Collins Chair in Mathematics at UCLA, and is a Fellow of the Royal Society, the Australian Academy of Sciences (corresponding member), and the National Academy of Sciences (foreign member). Prof. Tao is also a member of AMSI's Scientific Advisory Committee.

Prof. Terry Tao's public lecture at The University of Melbourne

Visiting lecturers

Dr David Ellwood, Research Director at the Clay Mathematics Institute
Prof. Willy Sarlet, Ghent University

Other guest lecturers

Prof. Persi Diaconis, Stanford University
Adding numbers and shuffling cards
Prof. Celia Hoyles, Institute of Education, University of London
Strategies used to improve mathematics in the UK
Prof. Gavin Brown, Group of Eight
Review of Education in Mathematics, Data Science and Quantitative Disciplines
Dr Birgit Loch, Swinburne University
Using Tablet PCs and Screen Casting

Dr David Ellwood,
Clay Mathematics Institute

Dr Birgit Loch, Swinburne University

AMSI SCIENCE PROGRAM WORKSHOPS

13-17 July 2009	18th World Congress of The International Association for Mathematics and Computer Simulation/Modelling and Simulation Society of Australia & New Zealand (IMACS/MODSIM09)	Cairns, Australia
13-17 July 2009	AMSI-ANU Workshop on Spectral Theory and Harmonic Analysis	Australian National University
20-22 July 2009	Industry workshop and short course: *Future Models for Energy and Water Management*	Queensland University of Technology
26-27 September 2009	Singular Perturbations, Game Theory, Stochastics, Optimisation and Applications	Universty of South Australia
27 September 2009	AustMS Early Career Researchers Workshop	The University of Adelaide
9-12 November 2009	Summer School on Integral Geometry and Imaging	University of New England
23-25 November 2009	New Currents in Geometry in Australia	The University of Adelaide
8-10 December 2009	The 4th Australia-China Workshop on Optimisation: Theory, Methods and Applications	University of Ballarat
14-18 December 2009	New Directions in Geometric Group Theory	University of Queensland
20 January 2010	Using Tablet PCs and Screen Casting	AMSI
22-28 January 2010	Workshop on General Relativity and Geometric Analysis	Monash University
1- 4 February 2010	Statistical Modelling and Inference Conference	Queensland University of Technology
16 February 2010	Strategies Used to Improve Mathematics in the UK	AMSI
17-27 February 2010	Terry Rockafellar lecture series	The University of Newcastle
7–9 April 2010	Workshop on Nonlinear Partial Differential Equations	University of Wollongong

AMSI/MASCOS Sponsorships

6-10 July 2009	1st Pacific Rim Mathematical Association (PRIMA) Congress	The University of New South Wales
24-26 December 2009	Frontiers of Fundamental and Computational Physics (FFP10)	The University of Western Australia

Science

HOST VISITORS

AMSI has sponsored the following distinguished academics to visit Australia to present their research.

EUROPE	UNIVERSITY	RESEARCH INTERESTS
Daniel Alonso	Universidad de la Laguna	Non-Markovian dynamics on quantum systems
Paul Baird	Université de Brest	Nonlinear PDE, harmonic maps and differential geometry including Ricci flow
Jean-Marc Bouclet	Université Lille1	Partial Differential Equations and Mathematical Physics
Yves de Cornulier	Université de Rennes 1	Infinite group theory
Jacques Ganoulis	Aristotle University of Thessaloniki	Modelling water energy futures in a transboundary environment
Colin Guillarmou	Université de Nice Sophia-Antipolis	Spectral and scattering theory, differential geometry and PDE
Tuomas Hytonen	University of Helsinki	Spectral Theory and Harmonic Analysis
Shahbaz Khan	UNESCO	Land use management, surface and groundwater hydrology, modelling of groundwater flow and contaminant transport, surface-groundwater interactions, tile drainage, flood forecasting and storm drainage.
Marco Antonio Cerda Lopez	Alicante University	Optimisation and its applications
Tito Mendonça	Instituto Superior Tecnico	Photon acceleration and neutrino-plasmas, photon effective charge and time refraction, ultra-cold atoms
Graham Niblo	University of Southampton	Analytic, topological and geometric methods in group theory with applications in geometry
Stephane Nonnenmacher	Commissariat à l'énergie atomique et aux énergies alternatives	Quantum chaos, semiclassical limit of quantum mechanics
Claas Röver	National University of Ireland	Group theory, computational group theory and formal languages and automata
Padma Kant Shukla	Ruhr University Bochum	Theoretical plasma physicist
Gerard 't Hooft	University of Utrecht	Renormalisation theory, particle physics and general relativity
Stef Tijs	Tilburg University	Game theory, mathematical economics, operations research and social choice
Roland Triay	Universite de Provence	Theoretical physics, cosmology
Avgust Tsikh	Siberian Federal University	Complex analysis, algebraic geometry, Signal processing
Jan van Neerven	Technical University Delft	Stochastic Analysis, Functional Analysis and Evolution Equations
ASIA/PACIFIC		
Mukand Babel	Asian Institute of Technology	Modelling water energy and environmental tradeoffs
Vivek Borkar	Tata Institute of Fundamental Research	Markov decision processes, controlled diffusions, stochastic algorithms and stochastic games
Rod Gover	University of Auckland	Differential geometry and its relationship to representation theory
Paul-Andi Nagy	University of Auckland	Complex analysis and differential geometry
Michael O'Sullivan	University of Auckland	Computer modelling of geothermal fields and other environmemntal fluid dynamics and computational fluids dynamics problems.
Victor Palamodov	Tel Aviv University	Integral geometry to inverse scattering
B.G. Sidharth	B. M. Birla Science Centre	Fuzzy spacetime
Lixin Yan	Zhongshan University	Harmonic analysis, wavelets and partial differential equations.
Luo Yufeng	Hohai University	System dynamics approach for modelling water and energy cycle
Liansheng Zhang	Shanghai University	Optimisation and its applications

AMERICA	UNIVERSITY	RESEARCH INTERESTS
Stephen Fienberg	Carnegie Mellon University	Log-linear modelling for categorical data, forensic statistics
Danny Calegari	California Institute of Technology	Topology and classical geometry
Daryl Cooper	University of California, Santa Barbara	3-manifolds and hyperbolic geometry, geometric group theory
Moon Duchin	University of Michigan	Dynamics, geometric topology, especially Teichmuller Theory and geometric group theory
Eugene Feinberg	University of New York	Operation research, operations management, statistics, and stochastic optimisation
Daniel Groves	University of Illinois at Chicago	Geometric group theory
Nan Laird	Harvard University	Development of statistical methodology in statistical genetics, longitudinal studies, missing or incomplete data, and analysis of multiple informant data.
Gary Lieberman	Iowa State University	Theoretical parabolic PDE
Joseph Maher	City University of New York	Geometric topology
Marius Mitrea	University of Missouri	Harmonic Analysis, Clifford Analysis and PDE's
Doug Osheroff	Stanford University, USA	Low temperature physics
Jorge Pullin	Louisiana State University	Quantum gravity
Sophia Rabe-Hesketh	University of California Berkeley	Multilevel and latent variable modelling
T.E.S Raghavan	University of Illinois	Algorithms for Structured Stochastic and Cooperative Games
R. Tyrrell Rockafellar	University of Washington	Optimisation methodology for modelling large-scale problems in decision or control over time
Donald Rubin	Harvard University	Computational methods, causal inference in experiments and observational studies in social and biomedical science
Richard Schoen	Stanford University	Analytic techniques in global differential geometry
Hart Smith	University of Washington	Harmonic and microlocal analysis
Tamas Terlaky	Lehigh University	Optimisation and its applications
Tatiana Toro	University of Washington	Partial differential equations and geometric measure theory
Akshay Venkatesh	Stanford University	Number theory and related topics, especially automorphic forms and representation theory
Shing-Tung Yau	Harvard University	Differential geometry, differential equations and mathematics physics

Business, Industry and Government

HIGHLIGHTS

- **20 AMSI internship projects successfully completed**
- **Enterprise Connect partnership funds another 90 interns over three years**
- **UNESCO-AMSI-MITACS industry workshop a great success**
- **Parks Victoria collaboration sees the appointment of full-time AMSI statistician**

THE INDUSTRY ADVISORY COMMITTEE

New and stronger links with business, industry and government are being established under the guidance of the Industry Advisory Committee (IAC). This year the IAC welcomed Prof. Philip Broadbridge and Dr Elliot Tonkes. The AMSI program seeks to identify industry needs and opportunities that can be addressed using the mathematical sciences, promoting collaboration between mathematicians from member institutions, industry and government. The program demonstrates the relevance of mathematical sciences to Australian industry through the Industry Internships Program, industry forums, workshops and short courses and consulting projects.

CONSULTING

This year we successfully undertook two industry projects:

Parks Victoria

Parks Victoria manages National Parks and reserves on behalf of the Victorian Government and its agencies. In this role, Parks Victoria has collected a large amount of data on the occurrence and abundance of pest plants throughout Victoria. AMSI, in association with Monash University, has been assisting to analyse this data and suggest ways to further develop the processes for monitoring and managing pest plants in Victoria.

Dairy Australia

As an organisation representing the interests of those participating in the Australian dairy industry, Dairy Australia has long had an interest in nutrition and the importance of milk products in the diet of Australians. This year AMSI and its members assisted Dairy Australia to take a closer look at the role of dairy in the diets of Australian children by analysing data from the 2007 Australian National Children's Nutrition and Physical Activity Survey.

INDUSTRY INTERNSHIPS

The AMSI Industry Internship Program is designed to promote collaboration between academia and industry. AMSI offers industry partners the opportunity to use an intern's mathematical and statistical skills, guided by an academic mentor, to facilitate research relevant to the industry partner. Launched in 2008 the program continues to grow in popularity, with 20 interns placed to date.

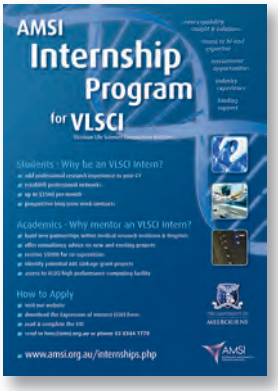
ENTERPRISE CONNECT
Shaping Business, Transforming Industry

Enterprise Connect

This year AMSI entered a three-year partnership with the Australian Government's Enterprise Connect. The partnership will significantly expand the AMSI internship program, funding an additional 90 AMSI industry internships during the next three-years. Interns will bring new analytical techniques to problems in areas ranging from supply chain logistics to gene sequencing. Guided by their academic mentors, the interns will typically spend four or five months in industry placements working on innovative solutions to commercial and industrial problems.

Benefits to industry partners include: creating links with AMSI members, gaining access to new skills and problem solving abilities, and recruitment opportunities. Benefits to AMSI members include: $5,000 to staff members who act as academic mentors, a stipend of up to $12,500 over five months per intern, and the opportunity to build a track record with the Australian Research Council (ARC), facilitated by our new links with Enterprise Connect.

Victorian Life Sciences Computation Initiative



An agreement with the Victorian Life Sciences Computation Initiative (VLSCI) also funded an additional five internship placements to encourage the use of a new super-computing facility based at The University of Melbourne. VLSCI placements are open to interns from all AMSI member institutions and are intended to advance developments in areas such as medical image analysis, bioinformatics, modelling of structures such as the heart and brain, fisheries management and research into medical conditions such as epilepsy, arthritis, cancer and diabetes.

Business, Industry and Government

PROJECT

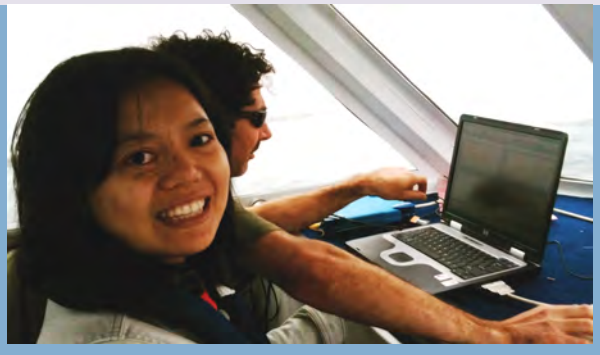
An evaluation of new progressive addition spectacle lenses designed to retard the progression of myopia in juveniles aged 6 to 12 years

Mentor: Assoc. Prof. Andrew Metcalfe, The University of Adelaide
Intern: Gemma Hansen, The University of Adelaide
Industry Partner: Carl Zeiss Vision Pty Ltd
Project Duration: March – June 2010

This project assisted the company to analyse data collected as part of a study, initiated in 2008, to test the ability of custom designed progressive addition lenses to retard the onset and progression of juvenile myopia in children between the age of 6 and 12 years. The analysis examined changes in a range of eye measurements recorded throughout the trial, after taking into account the influence of sub-group selection and factors such as sex, parental history of myopia, phoria and frame size.

Dr Andrew Metcalfe, Gemma Hansen, Hilke Fitzsimons and Dr Saulius Varnas

PROJECT



Liping Jin (University of Ballarat) heading out to sea with Stephen Dobson (Marshall Day Acoustics)

Modelling the underwater acoustics of desalination plants

Mentor: Assoc. Prof. Adil Bagirov, University of Ballarat
Intern: Liping Jin, University of Ballarat
Industry partner: Mr Tim Marks, Marshall Day Acoustics
Project duration: January – April 2010

All industrial facilities have acoustic signatures and desalination plants are no exception. This project used hydrophone recordings to examine and contrast the underwater acoustics generated by a desalination plant. Recordings were made over a range of distances and the resultant data used to create a generalised model to guide the environmental design of desalination plants.

PROJECT

Weed management models for the You Yangs Regional Park

Mentor: Dr Andrew Robinson, The University of Melbourne
Intern: Kean Weng Wong, The University of Melbourne
Industry Partner: Dr John Wright, Parks Victoria
Project Duration: December 2009 – March 2010

This project collated and analysed historic survey data on the distribution and growth patterns of an exotic weed, Boneseed (*Chrysanthemoides monilifera ssp. monilifera*), growing in the You Yangs Regional Park, 55km south west of Melbourne. An assessment was made of the merits of the available data sets and how future monitoring might be adapted to achieve desirable management outcomes.

Chrysanthemoides monilifera

Tony Varcoe (Parks Victoria) and Prof. Geoff Prince (Director of AMSI)

Dr Dimetre Triadis talking chocolate

Prof. Mike O'Sullivan and Prof. Shabaz Khan

AMSI-PARKS VICTORIA COLLABORATION

AMSI recently entered into a three-year collaboration agreement with Parks Victoria to assist with the analysis and management of large data sets and the design of experiments. The new collaboration will underpin the development of: new models for parks management, improved evidence-based policy, gains in productivity and strengthen links between AMSI members and natural resource management agencies in Victoria.
The first phase of the collaboration involves the appointment of an AMSI statistician and a workshop with Parks Victoria to develop the scope of works for the next three years.

AMSI-MASCOS INDUSTRY RESEARCH FELLOW

After two successful years at AMSI as our Industry Research Fellow Dr Dimetre Triadis recently left to take up a post-doctoral appointment at La Trobe University. During his time at AMSI Dimetre proved to be an invaluable member of the team, making several significant contributions to collaborative projects with organisations such as the Australian Prudential Regulation Authority (APRA) and Dairy Australia. He also spoke widely on the analysis of chocolate sensory data.

INDUSTRY EVENT

This year's industry event focused on the relationship between the water and energy sectors and future models for energy and water management in a regulated environment. Topics addressed included: energy and water economy in a regulated environment, renewable energy sources, network modelling and management, risk management, power system stability, network optimisation and demand forecasting.
The event attracted the support of UNESCO and a range of international participants from as far afield as Greece, Denmark, Thailand and Italy. Prof. Shahbaz Khan (UNESCO), Dr Elliot Tonkes (Energy Edge) and Dr Graham Wier (IRL-NZ) generously delivered three short courses on energy and water management, while the five invited speakers covered topics ranging from long range market modelling under carbon pricing, to the challenges in planning and operating power systems through the National Electricity Market. On the final day participants drafted the Brisbane Statement, a series of recommendations arising from the workshop, to be circulated by the United Nations to governments, international donors and regional and local authorities regarding future opportunities for water and energy management. Participants also made a site visit to the Bundamba Advanced Water Treatment Plant, a flagship of the Queensland Government's water infrastructure program.
For more information see: www.amsi.org.au/ews09.php

Education



TIMES Project professional development sessions

HIGHLIGHTS

- **AMSI receives $2 million for The Improving Mathematics Education in Schools (TIMES) project**
- **AMSI facilitates collaboration with the mathematics community on the national mathematics curriculum**
- **Australia and the UK international leaders in the collaborative teaching of advanced mathematics via Access Grid Rooms**
- **Continuing success of AMSI Summer School and Vacation Scholarships**

THE EDUCATION ADVISORY COMMITTEE

The Education Advisory Committee provides general program advice on education related activities carried out under the auspices of the International Centre of Excellence for Education in Mathematics (ICE-EM), the education division of AMSI. The committee is chaired by Prof. Peter Taylor (Australian Mathematics Trust) and comprises classroom teachers, mathematicians and mathematics educators (see page 32). For the duration of the TIMES Project (August 2009 – December 2010), the AMSI Education Advisory Committee has acted as the advisory committee for the project.

TIMES PROJECT

The TIMES Project has enabled ICE-EM to extend our outreach program in schools and collaboratively develop materials to support teachers of mathematics.

The TIMES Project is managed by Janine McIntosh with Michael Evans as Project Director. Three project officers, Antje Leigh-Lancaster, Mark Mudge and Rob Moore, joined them in 2010. Antje works with Wollongong and Gippsland schools, Mark with Sunshine Coast, Townsville and Geelong schools, while Rob's focus has been on the careers aspect of the project.

The TIMES project has four components:

1. Outreach Working with teachers in schools has been shown to be crucial in supporting them and helping them to enhance their mathematics programs. The focus of the outreach program is to help teachers understand the big ideas in mathematics and how they are connected.

Building on the successful BlueScope/AMSI project, the TIMES project takes the schools cluster idea and extends it into regions where there is a demonstrated need.

Our regions for 2010 are:

- Gippsland, Victoria
- Townsville, Queensland
- Mandura, West Australia
- Geelong, Victoria
- Sunshine Coast, Queensland
- Expansion in the Illawarra region, New South Wales

All outreach cluster regions have been visited frequently. We are working with 54 schools, of which 13 are secondary schools, 38 are primary and three are K–12 schools. TIMES staff delivered 123 days of school visits within the first six months of the project.

Each project officer works with participating schools in a variety of ways, building professional relationships with teachers and meeting with them regularly to discuss issues related to the teaching of mathematics in their schools:

- Building an appropriate scope and sequence for the teaching of mathematics
- Targeting specific mathematical needs of students
- Sourcing information about the teaching of mathematics

The TIMES project aims to bring primary and secondary schools together to strengthen their connections and approaches to mathematics teaching.

All teachers in the outreach cluster are invited to attend professional development sessions focussing on the development of mathematics content knowledge.

In some regions we have been able to provide extra support by employing a part-time regional contact person. This provides continuing support and ensures local involvement over and above the visiting support from AMSI project staff.

2. Modules The modules are resources for teachers, written to help them access content knowledge within a specific topic area of mathematics pertinent to their teaching. Each module covers related topics within the

Education

Claire Yeo, Meteorologist with the BoM

national curriculum and is aimed at increasing teachers' knowledge and understanding of classroom mathematics. They are used as a source of information for planning lessons, building teacher confidence with the teaching of topics and as a stimulus for discussion about strateg ies and pedagogies. They are written in stages: K–4, 4–7, 7–8 and 9–10, with 70 modules planned for release later in 2 010.

Teachers in outreach clusters are working with us to develop the modules and feedback is also being sought from mathematicians and mathematics educators. Towards the end of 2010, a CD containing all modules will be provided free of charge to every primary and secondary school in Australia. The modules will also be available online.

3. Careers In 2010, through the TIMES Project, AMSI had the opportunity to expand its careers materials por tfolio. Materials will be developed to assist students, their parents and teachers to understand the place and impor tance of mathematics in career choices. Project Officer Rob Moore took a lead role in the careers component of the TI MES project. An initial research and review process established key directions, with a broad range of employer g roups and key stakeholders involved in the process. T he aim is to broaden our current suite of careers products so that both 'careers in mathematics' and 'mathematics in your career' information is available to help students 'stick' with mathematics in preparation for whatever career they choose. The target is to provide careers awareness material both electronically, via a careers website, and through the distribution of materials, such as posters and brochures, to every primary and secondary school in the country .

4. CSIRO Collaboration

CSIRO and AMSI are jointly developing and operating a regular e-newsletter called *Maths by Email*. Based on the highly successful *Science by Email*, it is aimed at primary and secondary teachers, and students aged 10+ and their parents.

Each fortnight *Maths by Email* delivers stories from the cutting edge of mathematics, and hands-on activities from all areas of mathematics. *Maths by Email* includes brainteasers, facts, web links and discussions of mathematics in the news. By the end of its fifth month *Maths by Email* had 5000 subscribers, with 200 users reporting they had been referred by AM SI. To subscribe: www.csiro.au/mathsbyemail

AMSI is also promoting the CSI RO *Mathematicians in Schools* program with its members and encourages mathematicians everywhere to consider taking par t.
See www.mathematiciansinschools.edu.au.

ICE-EM MATHEMATICS

The *ICE-EM Mathematics* materials continue to do well, with new schools taking up the program in 2010. It was expected that the incoming Australian national curriculum would have some impact on sales, however we have managed to achieve expected sales targets. Janine and Michael continue to deliver professional development for participating schools and all members of the expanded schools team have made presentations at teacher education conferences around the country, including the Mathematics Association of Victoria conference in December, the Mathematics Association of South Australia conference in April and the Queensland Association of Mathematics Teachers' conference in June. In conjunction with the Mathematical Association of Victoria we supported *The Age Careers Expo* at Caulfield Race Course in Melbourne.

AUSTRALIAN CURRICULUM, ASSESSMENT AND REPORTING AUTHORITY (ACARA)

In April 2008 the inaugural meeting of the interim National Curriculum Board was held in Canberra. Prof. Barry McGaw was appointed chairman of this board. Consultation began in June of that year with key stakeholders.

At the inaugural meeting the then Deputy Prime Minister Julia Gillard reinforced the importance of the collaborative process and the essential role that Australian and international evidence would play in creating a national curriculum that underpins world class educational outcomes.

"We have a rare opportunity here to create a curriculum that helps achieve educational excellence across the whole community and it should be shaped by the best material and experience there is," Ms Gillard said.

The ACARA board was announced in May 2009 with Prof. Barry McGaw AO as chair.

ACARA is responsible for:

- A national curriculum from Kindergarten to Year 12 in specified learning areas
- A national assessment program aligned to the national curriculum that measures student progress
- A national data collection and reporting program that supports: analysis, evaluation, research and resource allocation, and accountability and reporting on schools and broader national achievement.

AMSI has continued its involvement in the development of the Australian national curriculum for mathematics throughout the past year. AMSI representatives attended a number of forums where discussion took place about the curricula at both the K-10 years and senior levels.

Janine McIntosh and Michael Evans were members of the writing team for the initial draft of the curriculum for K-10 and Michael Evans was involved with and took a coordinating role in writing of the senior curriculum. The K-10 curriculum is now being redrafted after an extensive consultation period that is continuing. The first consultation periods for the senior courses concluded at the end of July 2010.

STUDENTS MEET PROF. TERRY TAO

As part of the Clay-Mahler lecture tour, AMSI hosted a morning tea where Prof. Terry Tao met prizewinners in the University of Melbourne/BHP Billiton mathematics competition. Amid much laughter and more serious discussion the students, including Mathematical Olympiad gold medallist Andrew Elvey Price, of Brunswick Secondary College, questioned Terry enthusiastically for an hour. It was a very special occasion and AMSI thanks Terry for giving so much time to this special group of talented students.

Students meet Prof. Terry Tao as part of the Clay-Mahler lecture tour

EDUCATION AFTERNOON

AMSI again supported the special afternoon session for teachers at the Australian Mathematical Society annual meeting, held at the city campus of the University of South Australia. The number of participants surpassed other years and the mathematical talks were particularly well received by the teachers. Following talks and a panel discussion, *The Future is Mathematics*, participants and speakers enjoyed drinks and nibbles prior to a public lecture by Terry Tao.

Education

Vacation Research Scholarship students at CSIRO's *Big Day In*

VACATION RESEARCH SCHOLARSHIPS

In 2009–10 AMSI awarded 17 competitive Vacation Research Scholarships, funding students to undertake a six-week research project during the summer holiday. At the culmination of the project students come together with CSIRO vacation scholars and attend CSIRO's *Big Day In* at Macquarie University, in Sydney. *Big Day In* is a very upbeat and inclusive event and AMSI scholar talks were of a very high quality, with impressive in-depth discussions at the end of each talk.

Student reports may be viewed at: www.amsi.org.au/vs10.php

SUMMER SCHOOL

The 2010 AMSI Summer School was held at La Trobe University from 11 January to 5 February 2010. Ninety-three students from 18 tertiary institutions from around Australia attended. Most were either honours, PhD or research masters students.

The subjects offered were:
Soap films – minimal surfaces and partial differential equations
Maria Athanassenas (Monash University)

Applications of mathematics and statistics to bioinformatics
Conrad Burden (The Australian National University)

Geometry and group actions
Grant Cairns (La Trobe University)

Nonparametric curve estimation
Aurore Delaigle (University of Melbourne)

Introduction to the numerical approximation of partial differential equations
Markus Hegland (The Australian National University)

Computational complexity in theory and practice
Marcel Jackson (La Trobe University)

Measure theory
Marty Ross (ex University of Melbourne)

Students also had the opportunity to attend one-off lectures from Prof. Persi Diaconis and Prof. Rick Schoen, both from California's Stanford University.

Many thanks to Grant and his colleagues for providing an excellent program.

See: www.amsi.org.au/ss2010.php

AMSI SPONSORS STUDENTS

July 2009 was an exciting month for mathematicians in Australia. From 6–10 July the first *Pacific Rim Mathematical Association Congress* was hosted at The University of New South Wales. AMSI and MASCOS were major sponsors. In the following week, 12–17 July, the *18th World IMACS Congress and MODSIM09 International Congress on Modelling and Simulation* was held in Cairns, and again AMSI was a major sponsor. Due to these major events the 2009 AMSI Graduate School was cancelled with funds instead used to sponsor a number of students to attend these international conferences. This gave many students, who would otherwise not have been able to attend, the opportunity to participate in these exciting events.

DELTA 2013

AMSI is facilitating the 2013 DELTA conference — the *Southern Hemisphere Symposium on Undergraduate Mathematics and Statistics Teaching*, held every two years.

ACCESS GRID ROOMS

The Access Grid Room (AGR) network provides high-end videoconferencing to facilitate collaboration in both research and advanced teaching within the mathematical sciences and professional community. Through AGR, international experts who are visiting, lecturing or giving workshop keynote addresses can address a national audience that is geographically dispersed. The AGR network also provides a means of carrying out collaborative research with peers within Australia and internationally. AMSI member institutions with AGRs can present seminars, lectures, honours and masters courseware and multimedia resources, remotely and interactively, and in return participate in events presented by other AMSI institutions.

In 2008, Assoc. Prof. Bill Blyth was appointed AGR coordinator. The position, based at AMSI, is supported in part by The University of Sydney's Collaborative and Structural Reform (CASR) funded extension to the AMSI/ICE–EM AGR project, *National Collaboration in Higher-Level Mathematics Instruction using High-Speed High-Bandwidth Internet-Based Communication Technology*.

Honours courses in the mathematical sciences delivered over the AGR network continue to be successful; 22 honours courses were offered in 2010. In the UK during the past year, 20 universities have used AGRs to provide about 50 taught courses for PhD students in the mathematical sciences. Australia and the UK are international leaders in the collaborative teaching of advanced mathematics via AGRs.

A highlight of the year was the September 2 009 tour of the Clay-Mahler Lecturer for 2009, Prof. Terry Tao, Fields Medallist. As part of an extensive lecture tour, organised by the Australian Mathematical Society in partnership with the Clay Mathematical Institute and supported by AMSI, Prof. Tao delivered four of his lectures from various AGRs. Many AMSI member universities from across the nation participated; for example, colleagues from Townsville and many places in-between participated in Prof. Tao's lecture from the Perth AGR. Additionally, a Clay Lecturer, Prof. Mohammed Abouzaid, also presented one of his lectures via the AGR network.

Another highlight was the outstanding Prof. Terry Rockafellar series of three lectures on the *Mathematics of Risk*, given via the AGR in February 2010. This was sponsored by AMSI and ANZIAM and hosted by the Centre for Computer Assisted Research Mathematics and its Applications (CARMA) at The University of Newcastle.

AMSI Summer School 2010

An AMSI AGR Optimisation Colloquium Series, conducted by the new Optimisation Special Interest Group of ANZIAM, based at the universities of Newcastle, RMIT and South Australia, commenced in November 2009. Extensive planning meetings were held via the AGR, as were sessions to test AGR software, hold trial presentations and discuss AGR seminar protocols (available on the AMSI website). It is hoped that this seminar series will provide an exemplar for others to follow.

The number of AGR seminars is increasing, with the number of seminars held in the first half of 2010 matching the number for the 12 months of 2009. These events included a Distinguished Lecture Series by Prof. Jon Borwein, given from the University of South Australia AGR on 29 March 2010.

AMSI's Workshop Program supports a variety of national research workshops featuring high profile keynote speakers, often from overseas. In an innovative development, the three keynote lectures at two AMSI-sponsored workshops at The University of Newcastle were broadcast over the AGR.

These are the AMSI – CARMA Workshops:

- Exploratory Experimentation and Computation in Number Theory (July 2010); and
- Functional and Non-linear Analysis (October 2010).

For details and updates, visit the URL:
carma.newcastle.edu.au/carmaevents.shtml

For the first time in February 2010, the Maths in Industry Study Group (MISG) at RMIT University used the AGRs to connect the main research team at RMIT with a remote team at The University of Western Australia. Of particular interest was that AGR sessions used Virtual Network Computing (VNC) to enable interactive control of digital ink via interactive whiteboards (unlike standard presentations for lectures and seminars, which do not allow interactive control from the remote AGRs).

eTeaching and eAssessment via AGR.

AGR coordinator Assoc. Prof. Bill Blyth gave several presentations and keynote addresses at conferences in the UK, South Africa and Australia throughout the year, focussing on eTeaching, eAssessment and collaboration via the AGR network:

September 2009: Bill visited the UK to speak on eTeaching and eAssessment, with a colleague from the University of Oxford, at the CETL-MSOR Conference 2009 at the Open University. He also visited the Mathematics Online team at the Open University and visited the AGR at the University of Oxford.

November 2009: Bill gave a presentation at the DELTA09 conference in Cape Town, reporting on joint work that is published as: Bill Blyth and Aleksandra Labovic, Using Maple to implement eLearning integrated with Computer Aided Assessment, *Int J Maths Ed Sci Technol*. 40(07), pp. 975-988, 2009. DOI: 10.1080/00207390903226856

December 2009: Bill gave a keynote lecture at the Engineering Mathematics and Applications Conference, EMAC 2009, on *Mathematical Tales of Technology and Collaboration*. This focused on several aspects of the AMSI AGR Honours courses as well as delivering and developing eTeaching and eAssessment collaboratively via the AGR.

February 2010: Bill gave a keynote lecture *Technology and Collaboration in Learning and Assessment of Mathematics*, at the Australian Learning and Teaching Council (ALTC) Symposium at the University of Wollongong. The symposium was part of an ALTC-funded project for which the project partners were the University of Wollongong in NSW and the Central Queensland University. Regular project meetings were held using the AGR and this is a good example of how the AGR enables a project team to be assembled without the need for physical co-location or substantial travel. Bill's presentation included demonstrations and discussions about several ways in which AGRs facilitate national collaboration.

Outreach

HIGHLIGHTS

- **Prof. Celia Hoyles, former UK Government advisor on mathematics, presents to the Australian Council of Heads of Mathematical Sciences**
- **AMSI continues its dynamic advocacy with government**
- **AMSI showcased by Deloitte as an example of a Science Technology and Innovation funded project that continues to raise science awareness and leverage funding support for members**

PROMOTING ISSUES, GARNERING SUPPORT

AMSI promotes the mathematical sciences through meetings, submissions and attendance at key events. Administrative support is provided to the Australian Council of Heads of Mathematical Sciences (ACHMS) and there is close collaboration with the National Committee for the Mathematical Sciences of the Australian Academy of Sciences.

PROF. TERRY TAO

A highlight of the 2009 mathematical calendar was the Clay-Mahler lecture tour by Prof. Terry Tao, supported by AMSI, the Australian Mathematical Society (AustMS) and the Clay Mathematics Institute. The Clay Institute also funded Mohammed Abouzaid and Danny Calegari as Clay-Mahler lecturers, presented at the AustMS meeting in Adelaide. Full details of the tour can be found online at: tinyurl.com/austms-clayMahler

Enthusiastic reports were received by mathematicians in Townsville who participated in a lecture delivered from Perth via an AMSI Access Grid Room (AGR).

Prof. Tao attracted media attention before he arrived and AMSI and the AustMS jointly funded consultants Margot Gorskii and Diana Wolfe to manage the media during his visit, resulting in some excellent coverage. Terry's lecture tour began at The University of Melbourne, in an event jointly managed by the University and AMSI, which attracted an overflow crowd requiring the use of a second theatre. All of Terry's public lectures, held across the country, attracted good audiences. See http://tinyurl.com/terrytao-unimelb to see media coverage and view the University of Melbourne lecture.

Another highlight of Terry's visit was a morning tea for prizewinners in The University of Melbourne/BHP Billiton mathematics competition.

At the end of the Clay-Mahler lecture tour, Dr David Ellwood, Research Director at the Clay Mathematics Institute, visited AMSI and useful discussions were held regarding the tour and possible future collaborations.

GOVERNMENT RELATIONS AND ADVOCACY

One of AMSI's most important functions is that of advocacy on behalf of the mathematical sciences. This ranges, in the government arena, from formal submissions to parliamentary enquiries to letters to ministers in support of the science and mathematics Olympiad programs.

We also write to vice-chancellors in support of mathematics and statistics programs and negotiate partnerships with careers teacher's associations. We are not alone in this, but our increasing co-operation with professional bodies such as the AustMS, the Statistical Society of Australia and the Australian Association of Mathematics Teachers, means that our voices are often heard in unison.

Our exposure in the print media on the issue of school mathematics and the supply of trained teachers has been significant this year, in the lead up to the much-anticipated national standards on pre-service education for teachers, due in 2011.

In this past year we have met with advisors in the ministerial offices at the Departments of Innovation, Industry, Sciences and Research (DIISR) and Education, Employment and Workplace Relations (DEEWR). These meetings have covered our portfolio interests in industry, research, school and higher education. Our new Enterprise Connect internship program came out of one of these meetings. Other meetings had less tangible benefits but significantly improved our understanding of government processes, especially those around the distribution of Australian Government funds to state governments under the Smarter Schools initiative. This understanding is vital to our efforts to secure ongoing support for the TIMES project.

This year we had the opportunity to make submissions to DIISR on two research related issues. One was the new Collaborative Research Networks scheme, which links the research enterprise of smaller universities with that of larger, research intensive ones. We made the point that AMSI was a model for many aspects of the scheme and that, for example, new statistical support services could be cloned from those universities that already have them. The second DIISR project we have been closely and productively involved with is the Research Workforce Strategy exercise. This involvement began with a meeting with a ministerial advisor and, thanks to Jan Thomas's serious engagement with senior staff in DIISR, AMSI can take credit for the mathematical sciences being chosen as a case study. This exercise will mark a significant change in research workforce planning by government with the

AMSI members meeting

Prof. Gavin Brown, Go8

Prof. Johann Englebrecht

mathematical sciences being a canonical example of a discipline in serious need of a decadal workforce plan.

Finally, AMSI was involved with the parliamentary inquiry into Australia's international research collaborations, under the auspices of the House of Representatives Standing Committee on Industry, Science and Innovation. In our submission we identified the international nature of the mathematical sciences and the strategic importance of Australian engagement with overseas partners. We made three recommendations:

- The ARC fund its Discovery Project grants at a much higher rate (while mathematical sciences had the highest success rate in the 2010 round, successful applicants only received around 55 per cent of the funds they requested).
- The ARC institute a small grants scheme similar to that in Canada; such a scheme would greatly boost international collaboration and fund many more researchers in mathematics and statistics.
- AMSI receive an Australian Government operating grant for its research program, including funds to complete its e-research network.

As a result of our submission, and our subsequent appearance at the committee's hearings, the June 2010 report of the inquiry recommended to DIISR that a small grants scheme be investigated. The report also encouraged our discipline to do its utmost "to access and develop its e-research facilities". In addition to these specific issues, AMSI also advocated the need to overhaul the visa arrangements for international visitors and the restitution of the International Sciences Linkage Scheme. Overall, the committee's report was particularly supportive of the importance of international collaboration and the need to extend it. AMSI was one of very few discipline peak bodies to appear before the inquiry and our impact, as evidenced in the final report, was gratifying.

Reference: House of Representatives Standing Committee on Industry, Science and Innovation (2010). Australia's International Research Collaboration. Available online at: www.aph.gov.au/house/committee/isi/intresearch/index.htm

ACHMS ANNUAL MEETING

As in previous years the annual meeting of the Australian Council of Heads of Mathematical Sciences (ACHMS) was held in conjunction with the February meetings of AMSI members and board. The AMSI Education Advisory Committee and the national committee met on the day prior to these meetings. In the afternoon AMSI and ACHMS jointly sponsored an update on the national mathematics curriculum and a presentation by Prof. Celia Hoyles, former UK Government advisor on mathematics.

The morning session included a presentation by Prof. Gavin Brown, Chair of the Group of Eight Universities (Go8) review of mathematical sciences, and Alan Mackay from the Go8 Secretariat. While the review was yet to be released, Mr Mackay gave background to it and Prof. Brown shared the key findings with the meeting. The review, *Review of Education in Mathematics, Data Science and Quantitative Disciplines* was released on 9 March and received considerable media interest. Prof. Prince has been involved in meetings to discuss its implementation.

Outreach

In the afternoon, Ms Liz Yuncken from CSIRO Education gave an update on *Mathematicians in Schools* and information on *Maths by Email*, a joint initiative between CSIRO and AMSI that emulates the successful *Science by Email* program. The meeting was also privileged to hear a short presentation from Prof. Johann Engelbrecht, concerning the South African Mathematics Foundation. The annual ACHMS and AMSI dinner was held at University House. Guests included Prof. Hoyles and former AMSI Director Prof. Phil Broadbridge.

ACARA CONSULTATION MEETINGS

There have been on-going consultations between AMSI, ACHMS and professional societies in regard to the national mathematics curriculum. Representatives of the Australian Curriculum, Assessment and Reporting Authority (ACARA) gave briefings at the AustMS meeting in Perth in September and in February prior to the annual ACHMS meeting. These concerned the K-10 curriculum. The February meeting was particularly useful as it allowed a very representative group to attend. There have been follow-up consultation meetings, including ones for feedback on the Year 11-12 courses. To ensure that the views of the mathematical community are heard, AMSI liaises with ACHMS and the professional societies in seeking representatives for these meetings. At this stage there is cautious optimism concerning the final curriculum.

Prof. Celia Hoyles

PRESENTATION BY PROF. CELIA HOYLES

Former UK Government advisor on mathematics Prof. Celia Hoyles presented successful strategies used to improve mathematics in the UK. She briefed the audience on the various measures that have been used to put the mathematical sciences on the front foot in England. The presentation gave many insights into actions that could improve the status of mathematical sciences in Australia. AMSI arranged for the presentation to be recorded and Prof. Hoyles gave generously of her time to assist with links and the final product. AMSI and ACHMS thank her and look forward to an on-going exchange of ideas.
See: www.amsi.org.au/hoyles.php

DELOITTE STUDY SHOWS AMSI'S IMPACT

A study by Deloitte on the impact of the Victorian Government's Science Technology and Innovation initiative (STI), has showcased AMSI as an example of an STI funded project that continues to raise science awareness and leverage funding support for members. Since its establishment in 2002, AMSI has gone from strength to strength by leveraging additional funds from the Australian Government in support of the mathematical sciences. See: www.amsi.org.au/deloitte.php

MEETINGS AND SEMINARS ON AMSI PREMISES

Throughout the year AMSI premises were used for meetings and seminars for the following organisations:

- Australian Society for Operations Research
- Australian Mathematics Trust
- Melbourne Joomla User Group

We invite other mathematical societies or groups to also consider making use of this resource.

REVIEWS AND SUBMISSIONS

In January, Prof. Prince, Dr Eileen Doyle and Ms Thomas had two days of meetings in Canberra where they met with the Chief Scientist for Australia, Prof. Penny Sackett, representatives from DEEWR and DIISR and the team at CSIRO Education, in a meeting chaired by Dr Jim Peacock. The meeting came as a result of AMSI being sought to give input into a review of projects in the office of the Minister for Innovation, Industry, Science and Research, the Hon. Kim Carr, concerned with science promotion. Meetings have also been held in Melbourne with ministerial representatives from both Ministers Carr and Gillard's offices.

Advice has been sought from DIISR in regard to the Research Workforce Strategy currently under development. A teleconference meeting was held in March between DIISR representatives, Prof. Prince, Ms Thomas and Prof. Hyam Rubinstein. In May, Prof. Prince and Ms Thomas attended a meeting in Melbourne to assist with the development of a mathematics and statistics case study for the strategy.

AMSI appeared before the House of Representatives Standing Committee on Industry, Science and Innovation review of International Research Collaboration.

PROMOTING CAREERS IN THE MATHEMATICAL SCIENCES

AMSI and ICE-EM are committed to providing young people and their parents with well-informed advice on careers in the mathematical sciences. We have two main objectives: that young people appreciate mathematics as a discipline and that they are aware of the career options that emanate from the study of mathematics and statistics. AMSI has received a grant from DEEWR that will support mathematics in schools, including careers awareness. See: www.times.org.au

Careers Pack

AMSI has developed a Careers Pack containing the following products produced by AMSI and ICE-EM. The pack is available to all members and can be ordered from the ICE-EM website. See: www.amsi.org.au/careers_resources.php

Maths ad(d)s

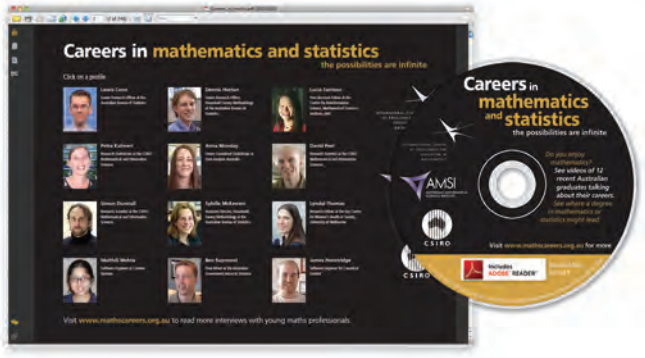
ICE-EM annually publishes *Maths ad(d)s* in conjunction with La Trobe University. The booklet contains advertisements, from newspapers and the internet, for jobs that require mathematics or statistics, illustrating the great variety of rewarding careers that require these skills. We print and distribute 12,000 copies via our members, at careers expos and to secondary school teachers. It is a very successful and popular product.

Maths and you

ICE-EM also produces a careers brochure *Maths and you* targeted at senior high school students and undergraduates. This brochure encourages students to continue their study of mathematics for the benefit and rewards it can bring to their careers. There is also a series of four, A3 colour posters suitable for notice boards. See: www.amsi.org.au/careers.php for details.

Careers website

The careers in mathematics and statistics website, featuring interviews with 10 young mathematicians, continues to be a useful resource, encouraging students to continue their study of mathematics for the benefit and rewards it can bring to their career. See: www.mathscareers.org.au.



Mathematicians in Schools

The highly successful *Scientists in Schools* project, initiated by Dr Jim Peacock when he was Chief Scientist, has been now expanded to include *Mathematicians in Schools*. Both projects are managed by the CSIRO. AMSI met with Dr Peacock and project leaders. Presentations were made at the ACHMS meeting in February and at the AustMS meeting in September. The scheme aims to promote the relevance and importance of mathematics and statistics in future working life. The partnerships are flexible and can take a variety of forms. For more details visit www.mathematiciansinschools.edu.au

AMSI will continue to promote this project and advertise the benefits of participation to potential schools and mathematicians. It will be linked to the careers awareness work that forms part of the new grant from DEEWR.

Governance

STRUCTURE OF AMSI

AMSI is a collaborative unincorporated joint venture involving universities and other bodies related to the mathematical sciences. Six full member universities signed a Joint V enture Agreement (JVA) in 2002. Since then four additional universities have become full members. All Group of Eight universities are full members. A complete list of AM SI members appears on page 2 of this repor t.

MANAGEMENT OF AMSI

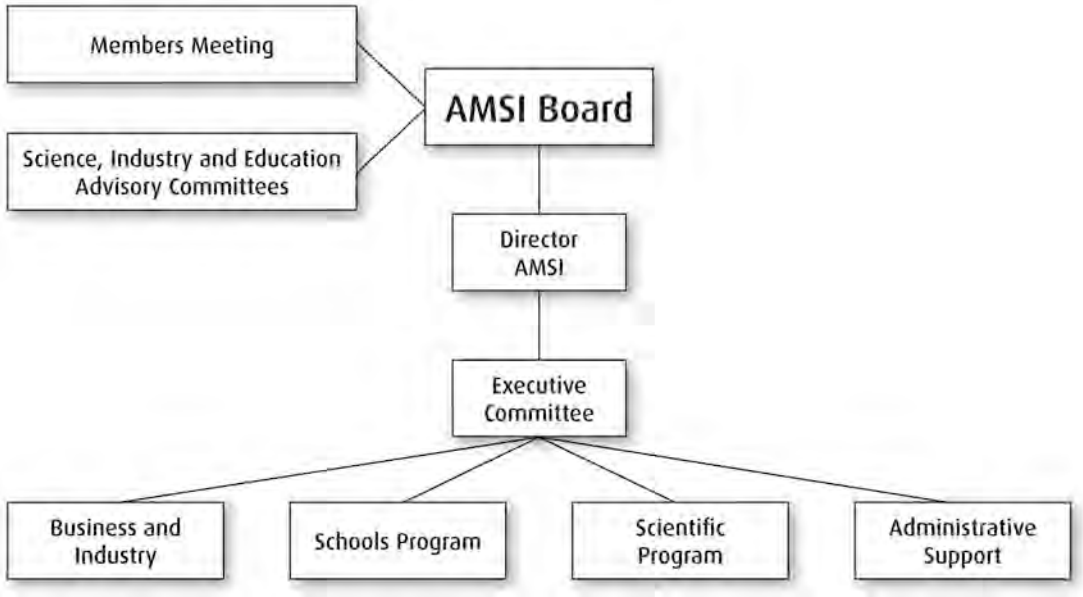
The JVA empowers the AMSI Board to be responsible for the overall direction of the Institute, formulation of policies, and management of activities in the areas of:

- Science
- Business, government and industry
- Education

External advice is provided by three high profile advisory committees.

Activities are detailed in the Business Plan and Budget document, as authorised annually by the Members and the Board. Management of the Institute and its activities, as detailed in the Business Plan and Budget document, is the responsibility of the Executive Committee authorised to perform such functions by the Board. (Members of the Executive Committee are listed on page 3 2).

ORGANISATIONAL STRUCTURE



THE AMSI BOARD

Composition

The Board comprises up to nine persons being:

- An independent Chair appointed by the full members
- The Institute Director
- The Deputy Director appointed by the full members
- One person representing The University of Melbourne
- One person representing the full members appointed by mutual agreement of the full members
- One person representing the associate members appointed by mutual agreement of the associate members
- Two or three independent members representing business and industry appointed by mutual ag reement of the full members

No non-executive members of the Board are remunerated.

Term of board members

The persons comprising the Board are appointed for terms of one year but are elig ible to serve for one or more fur ther terms if re appointed in accordance with clause 1 8.2 of the JVA.

Governance

BOARD MEMBERS 2009/10

Dr James E. Lewis BE, BA, PhD, FIChemE

Independent member and Chair

Jim is President of the Parkview Group Pty Ltd and director of several other companies. He has had a long career in industry and for a significant period was responsible for the research effort of one of Australia's major corporations.

Ms Judith S. Downes BA (Hons), Dip Ed, Grad Dip Acc, FCPA FCA

Independent member to February 2010

Judith is Chief Financial Officer at Alumina Limited. She joined Alumina in January 2009. Previously she was Chief Financial Officer and Chief Operating Officer, Institutional Division at Australia and New Zealand Banking Group Limited (ANZ). She is a member of the International Financial Reporting Standards Advisory Council of the International Accounting Standards Board, a past Director of ING Australia, and a past member of the Australian Accounting Standards Board.

Dr Eileen Doyle BMath, MMath, PhD, FAICD

Independent Member

Eileen has more than three decades of diverse business experience at both the executive and board level. She has held executive roles in the steel industry, the water and wastewater industry and the timber industry. She has significant line and profit centre management experience as well as broad functional appreciation. Her non-executive director roles have covered a wide range of industries including research, financial services, business services, building and construction, steel, mining, logistics and export. Eileen is currently Chair of the Hunter Valley Research Foundation and Director of OneSteel, CSIRO, Boral, GPT, Hunter Founders Forum and Ross Human Directions.

Prof. Robert Staudte AB, ScB, MSc, PhD

Deputy Director from 18 February 2010

Robert is Professor and Head of the Department of Mathematics and Statistics at La Trobe University. He is Associate Editor for *Statistics and Probability Letters* and a member of the American Mathematical Society, the Statistical Society of Australia and the Sigma Xi Honorary Scientific Society. His research interests are robust statistics, foundations of statistics, in particular evidentiary statistics, and meta analysis.

Prof. Kate Smith-Miles BSc (Hons), PhD, FAustMS

Deputy Director to 18 February 2010

Kate Smith-Miles is a Professor and Head of the School of Mathematical Sciences at Monash University. Her research interests are combinatorial optimisation, meta-heuristics, operations research, neural networks, and data mining. She has published more than 180 refereed papers on these topics and regularly acts as a consultant to industry. She was elected Fellow of the Institute of Engineers Australia (FIEAust) in 2006, and Fellow of the Australian Mathematical Society (FAustMS) in 2008.

Prof. Geoff Prince BSc, DipEd, PhD, FAustMS

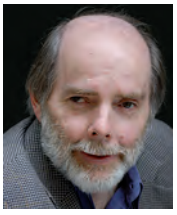
Director of AMSI

Prior to joining AMSI Geoff was Head of the Department of Mathematics and Statistics at La Trobe University, sat on the board of the Australian Centre of Excellence for Risk Analysis (2006-2009) as AMSI's representative and was Vice President of the Australian Mathematical Society (2008-2009). Geoff's involvement with AMSI dates to 2004-2006 when he was deputy director, executive director, acting director and Access Grid Room coordinator. His research interests are in the field of applications of differential geometry to ordinary and partial differential equations and, in particular, the use of jet bundle techniques and exterior differential systems in the study of differential equations arising in mathematics and mathematical physics.

Prof. Peter G. Taylor BSc (Hons), PhD

Nominee of The University of Melbourne

Peter is Head of the Department of Mathematics and Statistics at The University of Melbourne, host department of AMSI. He is internationally known for his research in applied probability and stochastic modelling. He is Editor in Chief of *Stochastic Models* and an Associate Editor of *Queueing Systems* and a member of the editorial board of the *Journal of Applied Probability/Advances in Applied Probability*. In 2008, Peter became one of the five trustees of the Applied Probability Trust. From February 2006 to February 2008, Peter was Chair of the Australia and New Zealand Division of Industrial and Applied Mathematics. He is incoming President of the Australian Mathematical Society.



Prof. Geoff McLachlan BSc(Hons), PhD, DSc, FAustMS

Representative of the full members to 18 February 2010

Geoff was Head of Mathematics at the University of Queensland until December 2009.His research interest is statistics with a focus on statistical computation and bioinformatics. He also has a joint appointment in the Institute for Molecular Bioscience, where he is a Chief Investigator in the Australian Research Council (ARC) Centre of Excellence in Bioinformatics. Geoff serves on a number of editorial boards.

Prof. Tony Dooley BSc, PhD, FAICD

Representative of the full members from 18 February 2010

Tony is Head of the School of Mathematics and Statistics at The University of New South Wales. His research interests are in harmonic analysis on lie groups: ergodic theory. He is a member of the College of Experts EPSRC (United Kingdom), the MIST panel PBRF (New Zealand), sits on the board of the National Institute of Dramatic Art and sat on the ARC MICS expert advisory panel (2001-2004).

Prof. Tim Marchant BSc (Hons), PhD, FAustMS

Representative of the associate members to 18 February 2010

Tim is Dean of Research and a Professor of Applied Mathematics at the University of Wollongong. Tim's research interests are nonlinear optics, nonlinear waves and combustion theory. He is Chair of Australian and New Zealand Industrial and Applied Mathematics and a fellow of the Australian Mathematical Society. He was director of the Mathematics and Statistics in Industry Study Group (MISG) from 2007 to 2009.

Prof. Andrew Bassom BA, PhD

Representative of the associate members from 18 February 2009

Andrew is Head of School and Winthrop Professor of the School of Mathematics and Statistics at The University of Western Australia. His research interests are boundary-layer theory, fluid and solid mechanics and differential equations. He is a member of the executive committee of Australian and New Zealand Industrial and Applied Mathematics (ANZIAM), Chief Examiner TEE Calculus for the Curriculum Council, joint Chief Editor of the *ANZIAM Journal*, Associate Editor of the *Quarterly Journal of Mechanics and Applied Mathematics*, the *Journal of Engineering Mathematics* and the IMA *Journal of Applied Mathematics*.

BOARD OBSERVERS

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

Prof. Jon Borwein FRSC, FAAAS, FAA

Chair of the Scientific Advisory Committee

Jon is Laureate Professor of Mathematics at The University of Newcastle and Director of the Centre for Computer Assisted Research Mathematics and its Applications. His research interests span pure mathematics (analysis), applied mathematics (optimisation), computational mathematics (numerical and computational analysis), and high performance computing. He has also worked at Carnegie-Melon, Dalhousie, Simon Fraser, and Waterloo Universities and has held two Canada Research Chairs. He is a past winner of the Chauvenet Prize (1 993) and received an honorary degree from l'Université de Limoges (1 999). Jon is a Fellow of the Royal Society of Canada (1 994), of the American Association for the Advancement of Science (2 002) and the Bulgarian Academy of Sciences (2003). In 2010 he was elected as a Fellow of the Australian Academy of Science.

Prof. Peter J. Taylor FACE, CMath, FIMA, FTICA BSc, PhD

Chair of the Education Advisory Committee

Peter is Executive Director of the Australian Mathematics Trust and a Professor of Mathematics and Adjunct Professor of Education at University of Canberra. He co-chaired the International Commission on Mathematical Instruction (ICMI) Study 16, *Challenging Mathematics in and Beyond the Classroom*, and is a former President of the World Federation of National Mathematics Competitions, an affiliated study group of ICMI.

Prof. Tony Guttmann MSc, PhD, FAustMS, FAA, FTSE, FSIAM

Director of MASCOS

Tony was Interim Director of AMSI upon its foundation and a past president and organiser of the BHP Billiton/The University of Melbourne School Mathematics Competition. His research interests lie in mathematical models of phase transitions, enumerative combinatorics and critical phenomena in general.

Prof. Nalini Joshi BSc (Hons), MA, PhD FAA

President of the Australian Mathematical Society

Nalini is Chair of Applied Mathematics and Director of the Centre for Mathematical Biology at The University of Sydney. Her research interests lie in integrable differential equations, difference equations, extended versions of cellular automata. She is a fellow of the Australian Academy of Science and has held visiting positions around the world.

Governance

BOARD MEETINGS

Dr James E. Lewis 5 of 5
Ms Judith Downes 2 of 2
Dr Eileen Doyle 3 of 4
Prof. Peter G. Taylor 4 of 5
Prof. Geoff Prince 5 of 5
Prof. Kate Smith-Miles (to 18 February 2010) 3 of 3
Prof. Robert Staudte (from 18 February 2010) 2 of 3
Prof. Geoff McLachlan (to 18 February 2010) 2 of 3
Prof. Tony Dooley (from 18 February 2010) 2 of 3
Prof. Tim Marchant (to 18 February 2010) 2 of 3
Prof. Andrew Bassom (from 18 February 2010) 3 of 3
Prof. Nalini Joshi 2 of 3

COMMITTEE MEMBERSHIP/STAKEHOLDERS

Committee membership

Scientific Advisory Committee

Prof. Jon Borwein (The University of Newcastle) (Chair)
Prof. Phil Broadbridge (La Trobe University)
Prof. Ezra Getzler (Northwestern University, Chicago)
Prof. Frances Kirwan (University of Oxford)
Prof. Geoff Prince (Director, ex officio)
Prof. Terry Speed (University of California, Berkeley; Walter and Eliza Hall Institute)
Prof. Terence Tao (University of California, Los Angeles)
Prof. Neil Trudinger (The Australian National University)

Education Advisory Committee

Prof. Peter Taylor (Australian Mathematics Trust) (Chair)
Mr Abdulmoeed Arayne (Brunswick Secondary College)
Dr Frank Barrington (The University of Melbourne)
Mr Peter Brown (The University of New South Wales)
Dr Steve Barry (The Australian National University)
Prof. Jim Denier (The University of Adelaide)
Dr Michael Evans (AMSI)
Ms Janine McIntosh (AMSI)
Assoc. Prof. Jacqui Ramagge (University of Wollongong)
Ms Jan Thomas (AMSI)
Mr David Treeby (Ivanhoe Girls' Grammar School)
Dr Leigh Wood (Macquarie University)

Industry Advisory Committee

Prof. Bill Appelbe (Victorian Partnership for Advanced Computing)
Dr James E. Lewis (Parkview Group)
Dr Thomas Montague (AMSI and MASCOS)
Dr Elliot Tonkes (Energy Edge)

Executive Committee

Prof. Geoff Prince (AMSI Director)
Prof. Kate Smith-Miles (Deputy Director to 18 February 2010)
Prof. Robert Staudte (Deputy Director from 18 February 2010)
Ms Jan Thomas (Executive Officer)
Mr Richard Barker (Business Development/Marketing Manager)
Dr Thomas Montague (Industry/Marketing Manager)
Dr Michael Evans (AMSI)

Stakeholders

Members

Full members and associate members are listed on page 2. They meet as a group twice a year, normally in February and June or July. In the 2009–10 year, the meetings were:

- 18 February 2010 at The University of Melbourne
- 7 June 2010 at The University New South Wales

Other stakeholders

AMSI was established with a grant from the Victorian Government and with in-kind input by The University of Melbourne. Funding through this grant ceased on 30 June 2005. The following additional funding has been received since inception:

2004: AMSI won a tender from the Department of Education, Science and Training (DEST) for an International Centre of Excellence for Education in Mathematics (ICE–EM). The project was funded for four years until July 2008.

2007: AMSI received funding from the Department of Education Employment and Workplace Relations (DEEWR) under the Collaboration and Structural Reform Fund (CASR). The three-year *National Collaboration in the Mathematical Sciences: Integrating Research, Industry and Education* grant, funds many of AMSI's flagship programs.

2009: AMSI received further funding from DEEWR for The Improving Mathematics Education in Schools (TIMES) project. The project is funded for one year and extends AMSI's education program.

2010: AMSI has entered into a three-year partnership with Enterprise Connect, an initiative of the Department of Innovation, Industry, Science and Research. The partnership expands the AMSI internship program.

Comprehensive progress reports and updated business plans are presented in accordance with the Funding Agreements.

Communication with stakeholders

All full and associate members of AMSI have nominated a person to be their representative to communicate with AMSI. In the case of member universities this is almost always the Head of the Department or School or Discipline of Mathematics and Statistics. These 'member representatives' or their proxies are invited to meet as a group every six months to hear reports of progress on current matters and to raise matters of common interest and concern.

The AMSI Directors' monthly reports on activities are emailed to board members, committee members and AMSI member representatives.

The Joint Venture Agreement members meet bi-monthly to provide input on AMSI activities.

EMPLOYEES

Policies and procedures

Staff members are employed on fixed term contracts through The University of Melbourne and its policies and procedures are followed.

Senior staff

Director of AMSI, Prof. Geoff Prince, is profiled on pages 30 and 34.

Ms Jan Thomas BSc (Hons), DipEd, BEd (TESOL)
Executive Officer

As Executive Officer for AMSI Jan's principal responsibilities are policy analysis and response, promoting careers in the mathematical sciences and supporting the director of AMSI. She is a former teacher, curriculum advisor and teacher educator.

Dr Thomas Montague BSc, MSc, DipEd, DPhil (Oxon)
Industry/Marketing Manager, AMSI and MASCOS

Thomas coordinates the AMSI Industry Program. This includes the Industry Internship Program, identifying and coordinating partnerships between end-users and member staff participating in AMSI-sponsored projects. His prior experience includes as science advisor to the Victorian Government, research scientist and academic, private consultant on environment and resource management, and company director.

Dr Michael Evans BSc, Ph.D, DipEd
Schools Project Manager

Before coming to ICE-EM, Michael was Head of Mathematics at Scotch College, Melbourne, and involved with the Victorian Curriculum and Assessment Authority (VCAA) in various capacities. In 1999 he was awarded an honorary Doctor of Laws by Monash University for his contribution to mathematics education. In 2001 he received the Bernhard Neumann award for contributions to mathematics enrichment in Australia.

Ms Janine McIntosh DipT
Schools Project Officer

Janine McIntosh is the TIMES Project Manager. Her role is to develop school mathematics material and to work with teachers to enhance the mathematics experiences of the children they teach. Janine is an experienced primary teacher who has also worked as curriculum writer for the VCAA and the Australian Curriculum, Assessment and Reporting Authority (ACARA), in mathematics education at The University of Melbourne and is a member of the Maths Challenge committee of the Australian Mathematics Trust.

Assoc. Prof. Bill Blyth BSc (Hons), DIC, PhD
Access Grid Room coordinator

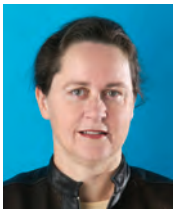
Access Grid Room (AGR) activities focus on national teaching of honours level courses and seminars. Bill was previously Head of Department of Mathematics at RMIT University. He is Chair of the Engineering Mathematics Group of Australia, a centre affiliate at the International Centre for Classroom Research at the University of Melbourne, and led the design and construction of the RMIT University AGR. His research interests are mathematics education in technology-rich classrooms and numerical solution of differential and integral equations.

Governance

Dr Jim Lewis, Dr Eileen Doyle and Prof. Geoff Prince


Prof. Phil Broadbridge


Prof. Geoff Prince


Ms Judith Downes


Dr Eileen Doyle


Prof. Peter Hall


Prof. Jonathan Borwein

CHANGING FACES

AMSI Directors

Prof. Phil Broadbridge

In September 2009 AMSI's second director, Prof. Philip Broadbridge, left to take up the position of Head of the School of Engineering and Mathematical Sciences at La Trobe University.

Phil brought many skills to AMSI; he worked tirelessly with all members and developed new projects such as the Australian Learning and Teaching Council funded *Mathematics Education for 21st Century Engineering Students* project in 2007-08, and the Australian Government supported internship program, which provided the basis for a new internship program in 2010. He also introduced the AMSI Member Travel accounts providing travel funds to attend AMSI-sponsored workshops. Phil left AMSI in good shape before passing the baton to the new director, Prof. Geoff Prince, in 2009. A mini-symposium and dinner was held in conjunction with the June members' and board meetings to thank Phil for his numerous contributions to AMSI. See: www.amsi.org.au/pb.php

Prof. Geoff Prince

Geoff Prince became the third Director of AMSI on 7 September 2009. Like his predecessors, he brings an accomplished and varied mathematical history to the role.

Geoff completed his undergraduate studies and a DipEd at Monash University. He completed his PhD at La Trobe University under the supervision of C.J. Eliezer and profited greatly from early mentoring by a man with diverse and broad international experience. He has held positions at the Dublin Institute for Advanced Studies, Royal Melbourne Institute of Technology, The University of New England and La Trobe University.

Geoff has been an active contributor to AMSI since his appointment as Deputy Director in 2004, which led to a period as Acting Director in 2005. He became a keen supporter of the use of Access Grid Rooms and championed their potential for honours and postgraduate teaching and in collaborative research. Through his energy and enthusiasm the Australian mathematical sciences community has been at the forefront in using Access Grid Room technology.

Board members

Ms Judith Downes

A foundation board member from AMSI's establishment in 2002, Judith was a great supporter and contributor to AMSI. Judith was the Chief Financial Officer and Chief Operating Officer, Institutional Division, Australia and New Zealand Banking Group Limited (ANZ) during her tenure as a board member of AMSI, having joined the ANZ in 1996 as the General Manager of Finance.

Her finance background and business experience in executive roles was a source of sound advice and guidance in many areas. Judith accepted a role as Chief Financial Officer of Alumina Limited and with these new responsibilities found continued involvement difficult, resigning from the board in February 2009.

Judith is a member of the Standards Advisory Council of International Accounting Standards Board and a past director of ING Australia and has been a member of the board of the Australia Maths Trust for a decade. As a member of the AM SI

Prof. Peter Hall

board Judith provided valuable guidance and an external perspective on the way the Institute could interact with business and conduct its affairs in a professional manner.

Her input and advice helped AMSI to cultivate its diverse programs and develop a vision reaching beyond academia. Judith's support over the eight years she was involved was greatly appreciated by all associated with AMSI and we wish her well in her new role.

Dr Eileen Doyle

Eileen has had a distinguished career as an executive in the manufacturing, materials and water industries in Australia. Eileen is also an experienced company director. She is a member of the CSIRO board and a non-executive director of OneSteel Limited, GPT Group and Ross Human Directions Limited. She is also on the board of two non-profit organisations, Hunter Valley Research Foundation (Chair) and Hunter Founders Forum (Director). Eileen also has deep management experience, having spent five years in senior operational roles with CSR Limited, including a period as Chief Executive Officer of CSR's Panels Division. Eileen has a PhD in Applied Statistics from The University of Newcastle. She is a Fulbright Scholar and has an Executive MBA from Columbia University Business School. We welcome Eileen to the Board and look forward to her contribution.

Scientific Advisory Committee

Prof. Peter Hall

Peter is currently a Professor and ARC Federation Fellow at the Department of Mathematics and Statistics, The University of Melbourne, and also has a joint appointment at the University of California at Davis. He is among the world's most prolific and highly cited authors in both probability and statistics. He received his Bachelor of Science degree from The University of Sydney, Master of Science from The Australian National University and his PhD from Oxford University. Peter has made substantial and important contributions to nonparametric statistics, in particular for curve estimation and re-sampling: the bootstrap method, smoothing, density estimation, and bandwidth selection. He has worked on numerous applications across fields of economics, engineering, physical science and biological science. Peter has also made groundbreaking contributions to surface roughness measurement using fractals. In probability theory he has made many contributions to limit theory, spatial processes and stochastic geometry. Peter was the foundation chair of AMSI's Scientific Advisory Committee and served in this role for eight years with distinction and energy. His enthusiasm and his leadership was sustained during this time, which saw the establishment of AMSI's scientific workshop program and AMSI's focus on the development of early career researchers. The mathematics community has been truly well served by Peter's untiring efforts in this role.

Prof. Jonathan Borwein

Jon has succeeded Peter Hall as Chair of AMSI's Scientific Advisory Committee (SAC). He is currently Laureate Professor in the School of Mathematical and Physical Sciences at The University of Newcastle and directs the University's Priority Research Centre in Computer Assisted Research Mathematics and its Applications (CARMA). A number of CARMA workshops have been held across the AMSI Access Grid Room network. Jon's research interests span pure (analysis), applied (optimisation), computational (numerical and computational analysis) mathematics, and high performance computing. Since taking over as Chair of the SAC Jon has introduced a competitive process for applications for sponsorship of scientific workshops and a separate category for the funding of Special Theme Programs and Hot Topics workshops, based on the scheme at the Institute for Mathematics and its Applications in Minneapolis. Jon has a keen interest in AMSI's outreach program through public awareness lectures and web-based utilities for school students of mathematics. We welcome Jon and look forward to his ongoing leadership in this important area of AMSI's endeavours.

Financial statements

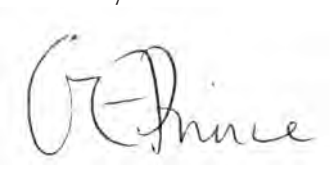
Financial records are administered by AMSI staff in conjunction with, and using the facilities of, The University of Melbourne. All financial statements are reconciled to the university's integrated system – Themis – to ensure compliance and to verify the unspent AMSI funds held by the university.

Further funding from the Australian Department of Education Employment and Workplace Relations (DEEWR) provided $2 million to be spent in 2009 and 2010 under *The Improving Mathematics Education in Schools* project. Additional staff members and external contractors have been engaged to work on this project. Prudent spending of the DEEWR funds, for the project *National Collaboration in the Mathematical Sciences: Integrating Research, Industry and Education*, has enabled the extension of the project into 2011 to fund an additional Summer School in Mathematics and a further round of Vacation Research Scholarships. Through its Enterprise Connect initiative the Australian Department of Innovation, Industry, Science and Research has agreed to provide $1.7 million throughout three years to fund an extensive internship program, with the initial payment of $196,300 received in June 2010.

Quarterly reporting to the AMSI Board has ensured tight control over expenditure with the Statement of Financial Position indicating a healthy level of carry-forward funds in all areas.

The University of Melbourne undertakes to provide audited financial statements for all contractually funded activities but not for the overall AMSI Group. In the absence of such an overall audit statement, the following certification is provided.

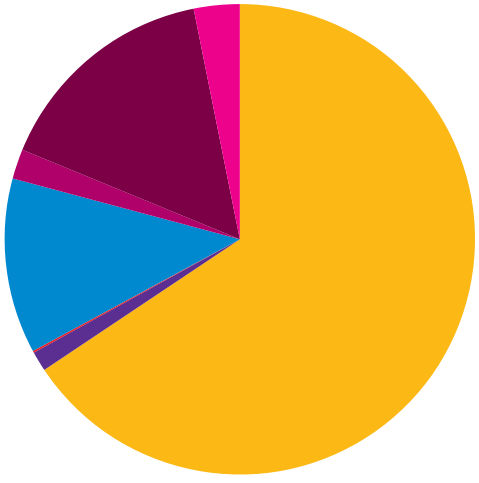
We hereby certify that the funds received by the AMSI Group during 2009/10 and the expenditure incurred during that period were in accordance with the relevant funding agreements, with the AMSI Joint Venture Agreement, and with the approved Business Plan. The balance of the unspent funds as at 30th June 2010 is in agreement with the records of The University of Melbourne.



Geoff Prince, Director

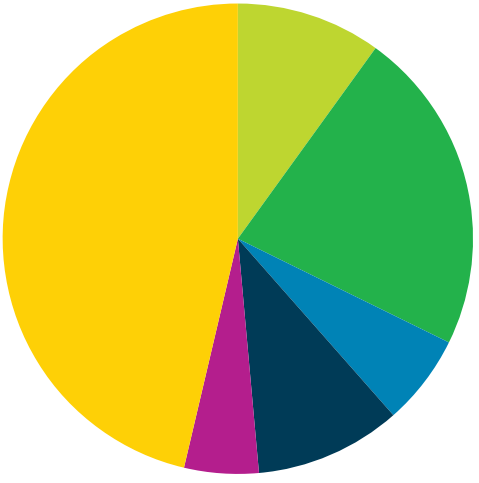
Richard Barker, Business Manager

GROUP INCOME 2009–10



Government Funding	2,685,500
Donations	56,000
Course Fees Charged	5,041
Sale of Publications	492,814
Internships-Industry Contributions	83,800
AMSI Member Subscriptions	639,924
Consulting Services	128,899

GROUP EXPENDITURE 2009-10



Higher Education	295,362
Schools Programs	661,593
Business, Government & Industry	184,845
Science Programs	298,492
Administration	151,648
Staff Salaries	1,373,659

STATEMENT OF FINANCIAL PERFORMANCE

	July 2009 to June 2010	July 2008 to June 2009
Income	**$**	**$**
Government Funding:		
DIISR – Enterprise Connect, Internships	195,300	0
DEEWR – Improving Mathematics Education in Schools	2,000,000	0
DEEWR – Equity and Structural Reform Branch	490,200	900,000
Donations		
Australian Char Pty Ltd	6,000	0
Farrell Family Foundation	50,000	50,000
Sponsorship		
BlueScope Steel Limited	0	75,000
Course fees and charges	5,041	45,833
Sale of publications	489,311	546,990
Internships – industry contribution	83,800	185,000
Consortium member contributions	639,924	610,000
Consulting services	128,899	65,593
Contribution – Federation Fellowship Fund	0	40,000
Other income	3,503	5,502
Total Income	**4,091,978**	2,523,918
Expenditure by Category		
Personnel		
Salaries, permanent and casual	1,550,471	1,277,638
External salary support	-176,812	-61,387
	1,373,659	1,216,251
Materials, supplies and services		
Scholarships		
Undergraduate vacation scholarships	38,760	48,460
Top-up scholarships, AMSI Members	20,000	20,000
Internships	*72,000*	*144,788*
Supplies		
Consumable materials	59,182	10,640
Services		
Contracted, professional services	331,755	61,989
Internal services – The University of Melbourne	28,335	28,422
Utilities	9,701	9,130
Sponsorship		
Workshops, seminars – member institutions	75,768	97,454
Research Fellows at MASCOS nodes.	180,000	120,000
General expenses		
Printing, photocopying, subscriptions	228,820	172,063
Books taken from stock	56,078	32,102
Freight, cartage	45,722	34,147
Grants – Other	*0*	*46,001*
Public relations and promotion		
Domestic advertising & promotion	11,877	6,609
Entertainment	22,443	9,577
Finance – FBT	2,119	3,169
Equipment		
Computer software & services	7,221	4,817
Expenses Assets	25,619	20,017
Travel and Conferences		
Travel & accommodation – domestic	100,772	76,461
Travel & accommodation – international	7,489	23,003
Conducting/attending seminars, conferences	252,929	229,095
AMSI Members' travel allowance	15,350	21,999
	1,591,940	1,219,943
Total Expenditure	**2,965,599**	2,436,194
Net of actual income over expenditure	**1,126,379**	87,724
Expenditure by Program		
Personnel		
Salaries, permanent and casual	1,550,471	1,277,638
External salary support	-176,812	-61,387
	1,373,659	1,216,251
Administration	151,648	170,283
Programs:		
Science		
Sponsorship: workshops, conferences, seminars		
researchers, guest lecturers and visiting fellows	298,492	304,437
Business, Industry and Government		
Intern program, focused workshops, costs re		
consulting projects	184,845	222,954
Education		
Schools — teacher PD, promotion of careers,		
schools materials for students and teachers	661,593	266,074
Higher Education — summer school, graduate		
theme program, AGRs, vacation scholars	295,362	256,195
	1,591,940	1,049,660
	2,965,599	**2,436,194**

Financial statements

Statement of Financial Position

	July 2009 to June 2010	July 2008 to June 2009
	$	**$**
Assets		
Funds on Hand		
AMSI – Core Executive, commercial operations and administration of member contributions.	654,779	509,694
Project 80005 – National Collaboration in the Mathematical Sciences: integrating research, industry and education. Funded by DEEWR through the Equity and Structural Reform Branch.	400,650	611,744
Project 80019 – Improving Maths Education in Schools. Funded by DEEWR.	1,049,781	0
Project 80027 – Scenario Models of Population Dietary Intake. Funded by Dairy Australia.	3,385	0
Project 80028 – Internship program. Funded by DIISR/Enterprise Connect.	195,300	0
	2,303,895	1,121,438
Stock on Hand		
ICE-EM Mathematics textbooks.	93,462	149,540
	93,462	149,540
	2,397,357	1,270,978
Equity		
Retained income brought forward	**1,270,978**	1,183,254
Net of income over expenditure:		
AMSI	89,007	-204,008
Project 80005	-211,094	291,732
Project 80019	1,049,781	0
Project 80027	3,385	0
Project 80028	195,300	0
	1,126,379	87,724
	2,397,357	1,270,978
As at 30 June 2010		

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