Annual Report 2006–07

National Collaboration in the Mathematical Sciences

"It's not magic.
Using mathematics, for instance,
you can see where all of science comes from,
a lot of technology. And it's really empowering.
You realise that the world is not this
incomprehensible scary place,
it's actually just built out of
very simple, logical ideas.
And so that's one thing a
mathematical education
can really give you."

Fields Medalist Prof. Terence Tao,
ABC Radio, Thursday, 28 September 2006

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AMSI MAJOR ACHIEVEMENTS 2006–07

SCIENCE
Facilitating research

- Sponsored 21 workshops and other events to further research
- First Theme Program "From Statistical Mechanics to Conformal and Quantum Field Theory" in January–February

BUSINESS, INDUSTRY AND GOVERNMENT
Promoting industry partnerships

- Workshop and industry shortcourse on "Electricity Supply and Pricing" was a resounding success
- Eight member institutions involved in AMSI-brokered industry projects

EDUCATION
Providing educational opportunities

- ICE-EM Mathematics program pilot expanded to cover Years 5–10
- Growth of the Access Grid Room network continued and shared honours courses commenced

OUTREACH
Raising the profile of mathematics

- Media campaign to highlight Australian Prof. Terence Tao's Fields Medal at the International Congress of Mathematicians in Madrid
- Major input to the National Strategic Review of Mathematical Sciences Research in Australia, completed in December

ABOUT AMSI

The Australian Mathematical Sciences Institute (AMSI) is a national, collaborative venture supporting the mathematical sciences. It was established in 2002 with initial funding from its member institutions and the Victorian Government's Science, Technology and Innovation Infrastructure grants program.

AMSI's mission is to promote and strengthen understanding and use of the mathematical sciences in Australia's culture, science and economy.

There are three main programs: Science, Education, and Business, Industry and Government. Each program has an Advisory Committee that provides advice to the Institute's Board. Member meetings held twice a year also inform the Board's deliberations.

AMSI manages the International Centre of Excellence for Education in Mathematics (ICE-EM) which is funded by the Australian Government through the Department of Education, Science and Training (DEST). ICE-EM supports a vibrant education program covering school mathematics through to advanced postgraduate courses.

Many activities in AMSI's Science and Business, Industry and Government programs are conducted in collaboration with the Australian Research Council (ARC) Centre of Excellence for Mathematics and Statistics of Complex Systems (MASCOS), of which AMSI is a partner. AMSI activities are also enhanced though a collaborative partnership with the Australian Centre of Excellence for Risk Analysis (ACERA).

MEMBERSHIP

FULL MEMBERS

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

ASSOCIATE MEMBERS

Australian Bureau of Statistics
Australian Mathematics Trust
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
The University of Adelaide
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
The University of Western Australia
University of Wollongong
Victoria University

CHAIRMAN'S REVIEW

The past twelve months has been a period of considerable achievement. Under Director Prof. Philip Broadbridge's able leadership, AMSI has continued to grow and now has thirty members. The significance of achieving such widespread support is that AMSI has been able to present to government with authority and credibility on matters of importance to the mathematics fraternity.

An example of this was the success we had in supporting the need for a change in the funding for the teaching of mathematics and statistics in the universities. The successful completion of the National Strategic Review of Mathematical Sciences Research in Australia was facilitated by AMSI financially. It also benefited from AMSI's Executive Officer, Ms Jan Thomas, giving considerable time as a member of the Working Party and Profs Broadbridge and Gaudry providing advice as members of the Advisory Council.

Jim Lewis

Following the launch of the Review, AMSI assisted the Working Party to organise a Forum in Canberra to highlight its importance. Substantial changes in the funding of mathematics and statistics were announced in the May budget. This result reflected the way in which AMSI is able to support collaborative actions to the benefit of mathematical sciences nationally.

AMSI's collaborative efforts continue to expand. As a partner in the Australian Centre of Excellence for Risk Analysis (ACERA), members have benefited by involvement in a number of projects.

"AMSI's collaborative efforts continue to expand"

During the year we were fortunate to have had Dr John Burgess accept an invitation to become Chair of the Industry Advisory Committee. He brings a wealth of talent and experience to guide AMSI's expanding industry program.

A new initiative this year was a very successful workshop and industry short course on electricity pricing, involving a number of partners and described on page 10. A similar event on water is being considered for 2008.

AMSI has also moved in to industry consulting in a modest way, largely as broker and project manager, with the work being contracted out to individuals in member institutions. This has expanded opportunities for members.

The Scientific Advisory Committee continues to make a significant contribution to the vitality of Australian academic mathematics. Our thanks to Prof. Peter Hall, Chair of the Committee, for his sustained commitment to this core activity that is fundamental to AMSI's operations. The ongoing support of the distinguished mathematicians on the Committee is a key to the success of this initiative. This support is greatly appreciated.

AMSI's Education Advisory Committee, under the capable leadership of Prof. Peter Taylor (Canberra) as Chair, has continued to provide advice and support to our educational programs. The contribution of Prof. Taylor and the Committee is acknowledged with appreciation.

The International Centre of Excellence for Education in Mathematics (ICE-EM) has made remarkable progress. Director, Prof. Garth Gaudry, and Dr Michael Evans and Ms Janine McIntosh are to be heartily commended. At the school level, the full suite of textbooks will be completed by 2008. The Professional Development program has also been very well received by teachers who participated.

At the university level, installation of Access Grid Rooms (AGR) in a number of member institutions is nearly completed. A number of honours programs are being delivered via AGR. The project allows students in any institution with an AGR to participate in these courses. This is a tremendous, tangible initiative that attacks the tyranny of distance and the small, dispersed population that challenge us as a nation.

The Federal Government has not yet seen fit to commit to ongoing funding, beyond the initial grants, to ICE-EM or to any of the International Centres of Excellence it formed three years ago. This is a matter of considerable concern and the Board and management are exercising our minds as to a strategic response.

We have been actively seeking support from the Corporate sector and from Philanthropic Trusts and Foundations to ensure that the work of ICE-EM can continue beyond mid 2008 if no further government support is forthcoming. At the time of writing, we are not in a position to report anything tangible, but are very hopeful of some of these initiatives bearing fruit in the near future.

Finally, I would like to acknowledge the generous support of the AMSI Board and the AMSI and ICE-EM staff, upon whom so much of the success of the AMSI depends. I believe that the achievements of this year have been substantial, and represent a sound basis for even more achievement in the coming year.

Jim Lewis
Chairman of the Board

AMSI DIRECTOR'S REPORT

This has been a very important year, not only for AMSI but for all of the mathematical sciences profession in Australia. Of particular significance was the finalisation of the National Strategic Review of Mathematical Sciences Research in Australia, *Mathematics and Statistics: Critical Skills for Australia's Future*.

The Review was partly funded by AMSI, using members' contributions. Following the release of the report by the Review Working Party, there were many follow-up meetings and discussions. For several months AMSI Executive Officer, Ms Jan Thomas, devoted most of her time to this work. All members of the Review Working Party, as well as the Chair of its Advisory Council must be thanked for this major contribution.

Philip Broadbridge

The Priority 1 Recommendation of the National Strategic Review of Mathematical Sciences Research, reporting in December 2006, was to raise mathematics and statistics to a higher-funded cluster within the DEST Relative Funding Model. This objective has now been achieved with a significant increase in funding for mathematics and statistics students announced in the federal budget.

"The Priority 1 Recommendation of the National Strategic Review was to raise mathematics and statistics to a higher-funded cluster. This objective has now been achieved."

The second major recommendation of the National Strategic Review was to provide ongoing Commonwealth funding for AMSI. In April, Minister Bishop invited AMSI to apply for a grant under the Collaboration and Structural Reform (CASR) Fund. We are very hopeful for a positive outcome, which will keep us buoyant at least for the next two to three years. We are strengthened by the addition of a new member, Charles Sturt University, by an increased but modest level of income from industrial consulting and by increased interest in sponsorship from the corporate sector.

Over the past year, we have been able to expand our scientific and industrial activities partly because of an increased level of cooperation with MASCOS, for which I am grateful. The first AMSI-MASCOS-MITACS Workshop and ICE-EM Industry Short Course, "Mathematics of Electricity Supply and Pricing", held in Surfers Paradise during the ANZAC week, was an outstanding success. More than half of the 61 participants were from industry. A number of very interesting topics arose.

AMSI also benefited from a collaborating partnership with the Australian Centre of Excellence for Risk Analysis (ACERA). It generated a number of projects for member institutions and added to AMSI's profile in government.

In January, we funded our first longer-term AMSI theme program, "From Statistical Mechanics to Conformal and Quantum Field Theory". This was well attended and very successful; congratulations are due to the organisers Paul Pearce (Melbourne), Giuseppe Mussardo (Italy) and Chaiho Rim (Korea). In November–December, we will be hosting the first joint AMSI-MASCOS Theme Program, "Concepts of Entropy and their Applications". This will tie in to a visit by the first AMSI-MASCOS Lecturer, Prof. Ingo Müller of Technical University Berlin.

We are proud that the 2006–07 AMSI Lecturer was Prof. Xiao-Li Meng, Chair of the Statistics Department at Harvard University. Prof. Meng has agreed to visit some other member institutions in mid 2008.

Our education activities also have been expanding. I am pleased that AMSI has been associated with the remarkable achievements of ICE-EM, especially in schools materials for Years 5–10, and in honours and postgraduate education. AMSI has become more involved in undergraduate education with the award of a Carrick Disciplines-Based-Initiatives grant for the project, "Mathematics for 21st Century Engineering Students". I am grateful for the enthusiastic work of Annabelle Lopez, Simi Henderson and Parvin Ahadi who have been employed on this project, along with project manager Graham Keen and many external members of the project committee. I have witnessed significant professional development of all staff this year.

For several years, AMSI benefited from the experience of Prof. Bob Watts as chair of its Industry Advisory Committee. We thank Bob for his guidance before his involvement with ARC assessments led him to resign. The position has now been taken up by another formidable force in industrial modelling, Dr John Burgess FTSE, who is already helping us to review and plan our business operations. I would like to thank all members of the Board and advisory committees, especially the chairs Dr Jim Lewis, Prof. Peter Hall and Prof. Peter Taylor, for their advice and voluntary work over a challenging but rewarding year.

Philip Broadbridge
Director of AMSI

ICE-EM DIRECTOR'S REPORT

The past year has been a very successful one for ICE-EM. The Centre increased its international involvements considerably and further developed its position as a leading provider of high quality education in mathematics at all levels, from primary school through secondary school to postgraduate courses, graduate courses and courses for industry.

The award of the Fields Medal to Australian Terence Tao at the International Congress of Mathematicians (ICM) in Madrid in August 2006 was arguably the most important event ever in the history of Australian mathematics. ICE-EM organised a national media campaign of the announcement and story through its media agents. This had enormous impact.

Garth Gaudry

In collaboration with AMSI and the Australian Mathematical Society, ICE-EM organised a booth at the ICM to showcase Australian mathematics. The Australian Ambassador to Spain, Ms Susan Tanner, visited the booth and met Terence Tao, International Mathematical Union officials and Australian delegates.

Other international initiatives included a week-long visit by Thai education delegates to gain first-hand experience of the Schools Program. Their feedback was positive and helpful. Meantime, other developments may follow from the assessment of ICE-EM schools materials undertaken in the UK and Spain and, subject to finance, the desire of ICE-EM to conduct postgraduate mathematics schools in Asia.

The AMSI/ ICE-EM Summer School 2007, held at the University of Sydney, was an outstanding success. I am pleased to acknowledge the first-class work by the organisers, Ruibin Zhang, Daniel Daners and Georg Gottwald and the support for the event by Head of School, Don Taylor, and the University of Sydney generally.

The ICE-EM Australian Graduate School in Mathematics 2006 at the University of Queensland was once again a very successful event involving prominent international lecturers. Through the instruction given by international experts, the Graduate School enables students and researchers to learn about contemporary viewpoints and the latest advances in the selected topic areas.

BioInfoSummer continues to be a highlight of the industry program. Conducted by the Australian National University, it attracts large numbers of people with varied backgrounds, all working in either the mathematical and statistical aspects or the biomolecular and genetic sides of bioinformatics. It is a fine example of an interdisciplinary program.

There were industry courses in mathematical methods in finance, cryptography and on electricity supply and pricing. The latter was joint with AMSI, MASCOS and the Canadian centre MITACS. ICE-EM intends continuing this type of collaboration with leading local and international centres to present intensive courses of immediate interest to industry.

Dr Nancy Lane contributed greatly to these programs before leaving to pursue other interests. I thank her for her contributions to ICE-EM.

Remarkable progress was made during the year on the writing and revision of books in the *ICE-Mathematics* schools program. About 35 000 students in 140 schools throughout Australia are taking part in the second year of the pilot programs at primary and secondary levels.

What has been achieved so far in the schools program is extraordinary. It is safe to venture the view that never before have so many books for primary and secondary schools of such quality been produced in as short a time. This is thanks to the prodigious efforts of the team of writers, checkers, typesetters, support staff and especially Dr Michael Evans and Ms Janine McIntosh.

"What has been achieved so far in the schools program is extraordinary."

In late 2006, participants in the Access Grid Room (AGR) project met at La Trobe University to exchange ideas and plan the 2007 program of shared courses and collaborative research. Australian and international experts presented both remotely and on-site. The founding AGR coordinator, Assoc. Prof. Geoff Prince, stepped aside at the end of 2006. He provided superb leadership to this innovative program and I thank him for his contribution.

A considerable amount of thought is going into planning the future of ICE-EM post the period of the DEST grant. With the encouragement of Australian Education International, a meeting of all of the International Centres of Excellence was held at AMSI in June. This led to a joint report and recommendations about how to capitalise on the considerable achievements of the centres in the post-grant period.

Early in the 2007–2008 year, ICE-EM will announce financial support from a major public company. There are other encouraging possibilities also. I am confident that anticipated revenue will enable ICE-EM to have a bright future.

In conclusion, I wish to thank sincerely all of the ICE-EM staff, our interstate authors, and other contributors, for the magnificent work they have done over the past year. We have a superb team of people and, thanks to the University of Melbourne, enviable premises and facilities.

Garth Gaudry
Director of ICE-EM

SCIENCE PROGRAM

2006–07 highlights

21 research workshops and other events supported

AMSI Lecturer Xiao-Li Meng — Harvard University — spoke at the annual conference of the Statistical Society of Australia and the NZ Statistical Association, and at AMSI member universities

42 distinguished researchers supported to visit Australia

First Theme Program over five weeks in January–February

Workshops, conferences and seminars

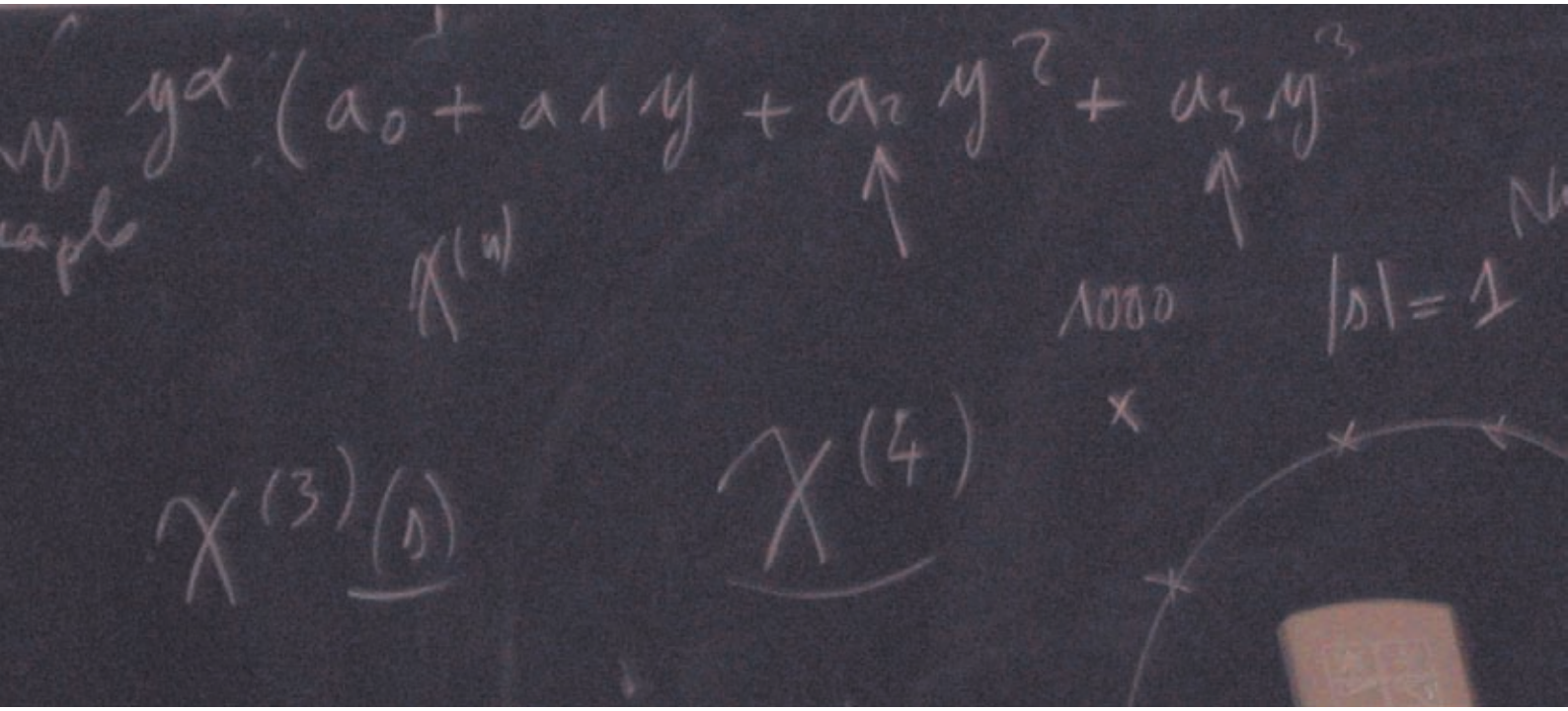
AMSI continues a very successful scientific program of meetings and workshops organised by AMSI members. Workshops usually run from two days up to a week, and address a specific field, or even a particular research problem. Special Theme Programs support relatively long periods of research interaction involving both workshop-type activity and collaborative research. As well as addressing diverse research topics in theoretical mathematics, for example geometry and differential equations, the program covered a broad range of applied topics, from neuroscience and bioinformatics to cryptography and electricity supply. These are listed on page 6.

AMSI's funding usually supports reimbursement for the travel expenses of international and national keynote speakers and travel grants for students and early career researchers. This year, arrangements were changed for delegate travel. Authority to disburse a notional annual travel budget was given to Heads of Discipline (Mathematical Sciences) in member institutions. The revised arrangements are described at **www.amsi.org.au/pdfs/Travel.pdf**

Proposals for both 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 if practicable as they are well equipped and centrally located. See **www.amsi.org.au/proposals.php**

Prof. Peter Hall is chair of the Scientific Advisory Committee which comprises eminent national and international mathematical scientists (see page 32).

Prof. Celso Grebogi at the Mini-workshop in Symmetries and Stability

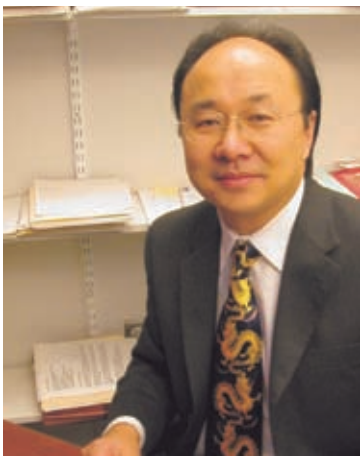


AMSI Lecturer

The AMSI lecturer for 2006–07 was Xiao-Li Meng who is Professor of Statistics and Chair of the Department of Statistics at Harvard University, Massachusetts, USA. In 2001 Prof. Meng received the prestigious Committee of Presidents of Statistical Societies (COPSS) award.

His research interests are in statistical inference under complex settings. These settings include partially observed data, pre-processed data and simulated data. Research activities include quantifying statistical information and efficiency in scientific studies involving scientific computation, genetics and environmental problems. He has developed effective deterministic and stochastic algorithms for Bayesian and likelihood computation and he has explored general statistical principles and foundations.

AMSI sponsored his visit to New Zealand and Australia in July 2006. He was the closing plenary speaker at the annual joint conference of the Statistical Society of Australia and the New Zealand Statistical Association, held at SKYCITY Auckland Convention Centre. His topic, *Size does matter, but you might be in for a surprise ...* was repeated in Sydney and Canberra. In Sydney and Canberra he gave a second presentation, *Life becomes more colorful when you know EM, Bayes and Wavelets.*



Prof. Xiao-Li Meng, AMSI lecturer for 2006–07

Other Guest Lecturers 2006–2007

Guest speakers at AMSI included:

- Dr Emma McBryde, Royal Melbourne Hospital: *Mathematical and statistical modelling of infectious diseases in hospitals* (11 July 2006)
- Dr Ejanul Haque, RMIT University: *Expansion of High Pressure Gas into Air— A More Realistic Blast Wave Model* (11 July 2006)
- Prof. Ed Smith, La Trobe University: *Alternative view of asymptotic expansions and the Stokes' phenomenon* (13 October 2006)
- Prof. John Grue, University of Oslo: *Fully Nonlinear Simulations of Rogue Waves in Three Dimensions, and Comparison with Experiments using Particle Image Velocimetry* (7 December 2006)

First special theme program: *From Statistical Mechanics to Conformal and Quantum Field Theory*

In January–February 2007 AMSI hosted its first Theme Program *From Statistical Mechanics to Conformal and Quantum Field Theory* at the University of Melbourne.

Topics for the workshop included:

- Bethe ansatz and finite-size corrections
- Bulk and boundary conformal and quantum field theory
- Logarithmic conformal field theory
- Solvable lattice models and integrable systems
- Stochastic Loewner evolution (SLE)

The meeting brought together leading experts from around the world in the areas of statistical mechanics and field theory. Approximately 60 participants came and almost half where from overseas. International participants came from Korea, Taiwan, Japan, France, Italy, Germany, Belgium, Hungary, Iran, UK and USA. The workshop included a total of 78 one-hour research seminars and lectures. A highlight was a Public Lecture by Prof. Giuseppe Mussardo on *Boltzmann, the genius of disorder.* Another highlight was a special presentation by Prof. Rodney Baxter, a luminary in the field of solvable lattice models.

Prof. Giuseppe Mussardo at the first Theme Program: *From Statistical Mechanics to Conformal and Quantum Field Theory*

A motivation for the meeting was to stimulate and enhance collaborative activities among the strong groups in statistical and mathematical physics at the University of Melbourne, the ANU and the University of Queensland. Many ongoing collaborations were revitalised and many new collaborations were forged. Graduate and postdoctoral students were able to gain insight into the latest international developments, fulfilling one of AMSI's major objectives in its science program which is to enhance the breadth of experience available to young researchers.

International Research Collaboration

In February 2007, AMSI signed a memorandum of understanding with the Atlantic Association for Research in the Mathematical Sciences (AARMS). Based at Dalhousie University, Nova Scotia, AARMS has operated since 1996 and is supported by three mathematical research institutes funded by the Canadian Government and by Canadian universities in the Atlantic region.

Like AMSI and ICE-EM, AARMS conducts workshops, a regular summer school and has an annual distinguished lecturer. It is recognised as a world leader in access grid room (AGR) technology. Its Director, Prof. Jonathan Borwein, a member of ICE-EM's International Advisory Committee, provided advice to AMSI and ICE-EM during an earlier visit to Australia. He has already participated in a session using AGRs at AMSI member universities arranged by La Trobe University.

Possible joint activities with AARMS include workshops, collaborative research projects, the exchange of research students, access grid lectures and an annual graduate course. These have the potential to expand existing collaborations with MITACS.

In addition, some scholarships and subsidies may be available to research students through AMSI's membership of the Pacific Rim Mathematical Association (PRIMA).

AMSI Science Program Workshops

The Mathematics of String Theory
Australian National University
13–23 July 2006

Recent Advances in Nonlinear Partial Differential Equations
University of New England
16–21 July 2006

Workshop on Mathematical and Computational Neuroscience
Queensland Brain Institute, University of Queensland
13–14 August 2006

Algebraic Attacks on Stream Ciphers
Deakin University
25–26 September 2006

Mathematical Formulation of Micro and Macro Thermodynamics
AMSI
10 October 2006

Pairing-based Cryptography Workshop
University of Melbourne
30–31 October 2006

Global and Non-smooth Optimisation for Problems in Data Analysis and Engineering (in association with the 5th Ballarat Workshop on Optimisation)
University of Ballarat
28–30 November 2006

8th Pacific Rim Geometry Conference
Australian National University (held at South Durras)
11–15 December 2006

Symposium on Amenability of Groups and Algebras
Australian National University
4–8 January 2007

Summer School on Nuclear Astrophysics and Nucleosynthesis
Monash University
8–19 January 2007

From Statistical Mechanics to Conformal and Quantum Field Theory: a Special Theme Program
University of Melbourne
8 January– 8 February 2007

Workshop on Universal Structures in Mathematics and Computing
Australian National University
5–7 February 2007

Expansions, Inequalities and Approximations
University of Sydney
5–6 March 2007

Workshop on Designs, Graphs and their Topological Representations
University of Queensland
10–13 April 2007

Mini-Workshop on Symmetries and Stability
University of Canberra
26–29 June 2007

Joint AMSI & MASCOS workshops

Symmetries and Integrability of Difference Equations (SIDE VII)
University of Melbourne
10–14 July 2006

Summer School and workshop on Granular Materials
Australian National University
4–8 December 2006

Complex Systems Beyond the Metaphor: Your Mathematical Toolset
University of New South Wales
5–9 February 2007

3rd Australian Postgraduate Workshop On Stochastic Processes and Modelling
University of New South Wales
11–14 February 2007

Workshop on High Dimensional Approximation
Australian National University
19–22 February 2007

Industry Workshop on the Mathematics of Electricity Supply and Pricing
Gold Coast
22–27 April 2007

Host visitors

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

EUROPE

NAME	UNIVERSITY	EXPERTISE
Kenny Paterson	Royal Holloway College, University of London	Cryptography
Hans Duistermaat	Universiteit Utrecht, Netherlands	Classical and stochastic mechanics, symplectic geometry, partial differential equations
Gil Cavalcanti	University of Oxford	Generalised complex structures and related objects
Herbert Amann	Universität Zürich	Differential and integral equations
Pilar Gil Pons	Universitat Politècnica de Catalunya, Barcelona	Astronomy and astrophysics
Robert Izzard	Universiteit Utrecht, Netherlands	Modelling stellar evolution and nucleosynthesis
Giuseppe Mussardo	International School of Advanced Studies, Trieste	Statistical Field Theory and relations to Elementary Particle Physics
Denis Bernard	Centre National de la Recherche Scientifique Paris	Conformal field theories, integrable systems, statistical field theories
Patrick Dorey	Durham University	Integrable Systems, ODEs and relations to Field Theory and PT Invariance
Vladimir Rittenberg	Universität Bonn	Theoretical physics and statistical mechanics, supersymmetry, non-equilibrium statistical mechanics
Jacques Peyriere	Université Paris-Sud	Harmonic analysis
Ioannis Vardoulakis	National Technical University of Athens	Constitutive theory, stability theory, computational and experimental mechanics
Claudia Wulff	University of Surrey	Hamiltonian dynamics, nonlinear PDEs and pattern formation
Bjorn Sandstede	University of Surrey	Hamiltonian dynamics with symmetry, pattern formation

ASIA / PACIFIC

NAME	UNIVERSITY	EXPERTISE
Sunil Mukhi	Tata Institute of Fundamental Research, Mumbai	Quantum field theory and string theory
Yiming Long	Nankai University, China	Differential equations
Subhamoy Mehta	Indian Statistical Institute, Calcutta	Cryptography
Robert Exell	King Mongkut's University of Technology , Thailand	Thermodynamics
Rod Gover	University of Auckland	Differential geometry and its relationship to representation theory
Kang-Tae Kim	Pohang University of Science and Technology, Korea	Several complex variables, complex differential geometry
Kengo Hirachi	University of Tokyo	CR geometry, parabolic invariant theory, the Bergman kernel
Takeo Ohsawa	Nagoya University	Cohomology, holomorphic functions on complete Kähler manifolds
Tetsuji Miwa	Kyoto University	Integrability in statistical mechanics and field theory, infinite dimensional Lie algebras
Kun-Yang Wang	Beijing Normal University	Harmonic analysis and approximation theory

Host visitors

NORTH AMERICA

NAME	UNIVERSITY	EXPERTISE
Jim Gates	University of Maryland	Mathematical physics and string theory
Huai-Dong Cao	Lehigh University, Pennsylvania	Geometric analysis
Jingyi Chen	University of British Columbia	Differential geometry and partial differential equations
Richard Hamilton	Columbia University	Partial differential equations, differential geometry
Simon Brendle	Stanford University	Differential geometry, theory of geometric flows; mathematical finance
Fereidoun Ghahramani	University of Manitoba	Functional analysis, abstract harmonic analysis
Rostislav Grigorchuk	Texas A&M University	Combinatorial group theory
Tony Lau	University of Alberta	Amenability relating to groups and algebras
Volker Runde	University of Alberta	Banach algebras, harmonic analysis and amenability
Yong Zhang	University of Manitoba	Functional analysis, Banach algebras, harmonic analysis
Barry McCoy	State University of New York, Stony Brook	Ising model, classical statistical mechanics, integrable models and conformal field theories
Feng Dai	University of Alberta	Classical analysis
Jim Byrnes	Prometheus Inc.	Applied harmonic analysis, signal processing
George Bluman	University of British Columbia	Symmetries and differential equations, conservation laws
Bob Behringer	Duke University, North Carolina	Condensed matter, nonlinear dynamics and low-temperature physics
Matt Davison	University of Western Ontario	Risk management in non-financial businesses, partial differential equations
Tony Ware	University of Calgary, Alberta	Risk management and pricing of derivatives for energy markets
Tamás Terlaky	McMaster University, Ontario	Linear and non-linear optimisation, especially engineering applications

BUSINESS, INDUSTRY AND GOVERNMENT PROGRAM

2006–07 highlights

John Burgess appointed as new head of the AMSI Industry Advisory Committee

Electricity Supply and Pricing industry event a resounding success

Eight member institutions involved in AMSI-brokered industry projects

First seven projects initiated under AMSI-ACERA partnership

Introducing Dr John Burgess

Dr John Burgess became Chair of the AMSI Industry Advisory Committee after inaugural Chair, Prof. Bob Watts, had to relinquish the role in May 2006 due to ARC commitments. Dr Burgess comes with an impressive history of achievement in the mining industry and in academia. He has a PhD in chemical engineering and is a fellow of the Australian Academy of Technological Sciences and Engineering and the Institution of Chemical Engineers in the UK.

With a long career in research and management, Dr Burgess rose at BHP to become Vice-President Safety, Environment and Technology, before moving into private practice as a consultant in minerals processing and as a coach and mentor to corporate executives. He has worked as an advisor to a number of organisations including RMIT, CSIRO, Qantas, Dupont, the Sugar Research Institute and now AMSI.

Dr John Burgess

With a particular interest in strategy and corporate governance, he brings a wealth of talent and achievement to the Industry Advisory Committee. AMSI was fortunate to secure his services to guide its expanding industry program.

All at AMSI extend their thanks to Dr Watts for his contribution to the foundations established under his leadership of the Industry Advisory Committee.

Industry Workshop — *Electricity supply and pricing under the mathematical microscope...*

The objective of AMSI's industry events is to promote the use and understanding of the mathematical sciences in industry and to forge linkages between members and industry. AMSI's expanding industry program was exemplified this year when the one-day Industry Forum was replaced with a three-day event.

The AMSI-MASCOS-MITACS Workshop and ICE-EM Industry Short Course on the Mathematics of Electricity Supply and Pricing was an outstanding success. Sixty-one people attended and more than half were from industry. There were a number of participants from Canada which enhanced the international perspective and strengthened AMSI's relationship with MITACS.

"Great information on the physical configuration of the grid and also operation of the market."

"The level of presenters and the balance of industry and academia were very good."

"Very interesting to see the range of methodologies being used for the same problems."

Feedback from conference participants

The workshop received very positive feedback from industry participants and it will be exemplary for planning future events. Talks covered topics such as the limitations in market modelling, the valuation of swing options, modelling renewable energy certificate prices, network reliability and future developments. The event also showcased NEMWatch software which displayed the spot price of electricity in real time in each of the Australian markets. For more details, including presentations, see **www.amsi.org.au/Electricity.php**

Network reliability

In SE Queensland there are twenty-five to thirty-five storm events each year and 500 to 5000 ground strikes per storm with winds up to 100km per hour. Understanding the impact and importance of such storm events on network reliability was just one of the topics discussed

Weather and line reliability – Thunderstorms

Stephen Wallace, Intelligent Energy Systems, praying for a price rise or praying prices don't go up too much. Spot prices rose from $70 to $110/KWh during the meeting causing nervousness among some people in the market

MITACS students Matt Lyle, Natasha Kirby, Scott Beatty

AMSI AUSTRALIAN MATHEMATICAL SCIENCES INSTITUTE

MITACS

INTERNATIONAL CENTRE OF EXCELLENCE FOR EDUCATION IN MATHEMATICS

AUSTRALIAN RESEARCH COUNCIL Centre of Excellence for Mathematics and Statistics of Complex Systems

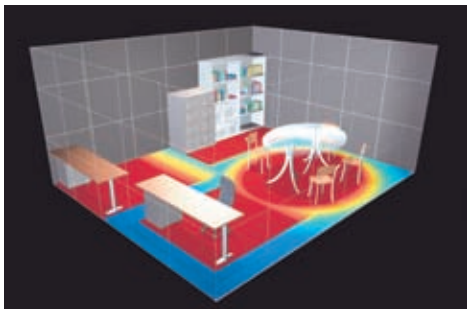
The Kann Finch ARC Linkage Project

As an architect and Director of Kann Finch Pty Ltd, Mr Paul Bondin has long recognised that not all office space is equal. Despite the high cost of buildings, he realised that the layout of some offices simply does not equate particularly well with its intended use or to an organisation's occupancy needs. This realisation led him to develop a proprietary system called *Use Factor Analysis* that enabled him to mathematically compare buildings in terms of their shape, layout and intended use.

Two years ago AMSI linked Mr Bondin with the team at the Centre for Informatics and Applied Optimisation (CAIO) based at the University of Ballarat. Together they are combining some sophisticated optimisation techniques to produce better measures of how well a floor space design will accommodate a particular organisation.

The project got off to a difficult start with the death of the chief-investigator Prof. Alex Rubinov. Prof. John Yearwood and Dr Musa Mammadov assumed leadership of the project and it is now past its halfway point. The team includes Dr Fusheng Bai and Mr Jason Giri and has been able to produce efficiency estimates for a range of differently shaped areas.

AMSI acknowledges the initial leadership of Prof. Rubinov and was saddened by the death of a world-renowned mathematician at a member institution.

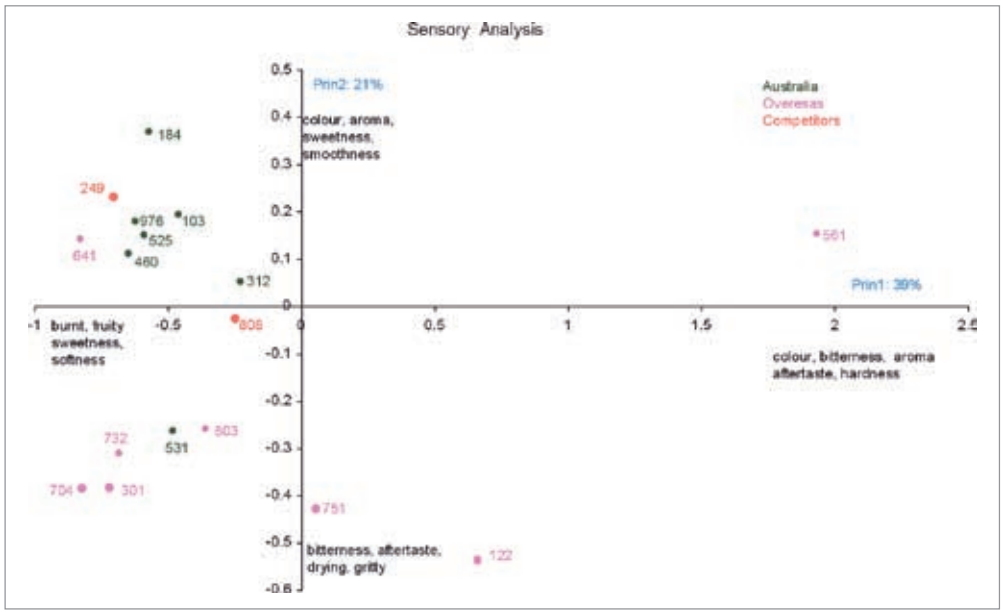


"What is the best office layout?"
The CIAO team is working with an architect to develop software that models an office to find the most efficient layout

Consulting Projects

This year AMSI has undertaken a number of projects that have drawn on the talents and collaborative efforts of staff at RMIT, the University of Melbourne and the University of Wollongong and is in the process of developing projects with the University of South Australia and the University of New South Wales. Efforts have been focused on servicing manufacturing and mining. In manufacturing AMSI has been assisting with development of sensory and marketing models and with better management of compliance obligations.

Developing industry projects and promoting collaboration on a national scale is challenging. However unleashing the considerable capabilities resident in our members offers considerable benefits to all stakeholders and to the nation.



Analysis of sensory attributes of food

The ACERA partnership

AMSI is a collaborating partner in the Australian Centre of Excellence for Risk Analysis (ACERA). ACERA's funding agreement is managed by the Bureau of Rural Sciences in the Department of Agriculture, Fisheries and Forestry. AMSI has leveraged considerable project funding for its members. Projects funded this financial year were:

- Volume of trade and period of trace
- Combining disparate data sources to demonstrate pest/disease status
- A method to simplify invasion models
- The role of quantitative and qualitative modelling in import risk assessment
- Evaluating frameworks for dealing with low probability — high consequence events
- New spatial analysis methods for improved hazard/risk identification
- Optimal allocation of resources to emergency response actions for invasive species.

Member institutions participating in the projects were:

- CSIRO
- University of Melbourne
- RMIT University
- University of New South Wales
- University of Queensland
- University of Wollongong.

Professional Development courses for industry

This year AMSI ran its first professional development course for the Australian Accounting Standards Board. Assoc. Prof. John Handley from the University of Melbourne delivered an afternoon program on options pricing.

The delivery of professional development courses presents significant opportunities for AMSI. Training courses help build relationships with industry partners and build an industry presence that can lead to other industry opportunities including project work, workshops and sponsorship.

Benchmarking

The benchmarking study undertaken by Dr Thomas Montague, AMSI Industry/Marketing Manager, at the end of the last reporting period supported the approach AMSI is taking to a number of issues. Discussions were held with staff at MITACS (Canada), Matheon (Germany), The Smith Institute (UK) and the Oxford Centre for Industrial and Applied Mathematics (UK). All have government-provided core funding to support the uptake of mathematics by industry.

AMSI is vigorously pursuing the initiatives suggested by the study and many were incorporated into the CASR grant application. The contacts made will assist future industry collaborations with major international industrial mathematics research centres.

EDUCATION PROGRAM

2006–07 highlights

***ICE-EM Mathematics* in 140 schools and reaching 35 000 students**

Access Grid Room network links mathematical sciences departments

Research project undertaken into the teaching of mathematics to engineering students

Continued success of Summer School and Graduate School

Wide-ranging Industry Specific Short Courses

ICE-EM Mathematics — the schools mathematics program for Upper Primary to Secondary Year 10

ICE-EM Mathematics continues to grow. In 2007 some 35 000 students and 140 schools throughout Australia are participating in the pilot program which now spans Years 5–10. Pilot schools receive free professional development and assistance, and in return provide valuable feedback for incorporation into the final versions of the books. This model has worked well.

The year has involved a huge effort from the writing teams, which will continue until the end of 2007. Pilot textbooks for the Upper Years of primary school—titled Transition 1 and Transition 2—were each written in two parts and distributed to pilot schools. The production of pilot books for secondary schools continued with Secondary 1C, 2C, 3A, 3B, 4A and 4B provided to pilot schools. Concurrently, the team revised the pilot Secondary 1 and Secondary 2 books in response to feedback from teachers to produce four commercial editions that were released in late 2006.

A marketing program for the introduction of the commercial versions of Secondary 1 and 2 was launched in August 2006. ICE-EM engaged Span Communications to provide additional expertise. The program included promotional brochures and magazine inserts, direct mailings to all secondary schools in Australia, booths at mathematics teachers conferences and a dedicated website at **www.icemaths.org.au**

ICE-EM administration and IT personnel have developed and implemented a combined "online shopping" and "purchase on credit" system to manage the sale and distribution of the schools textbooks. It enables all types of sales transactions to be processed and provides for detailed analysis of sales data. McPhersons Printing Group provides warehousing and distribution facilities.

Schools Project Officer, Janine McIntosh, conducting a professional development session

Both the primary and secondary textbooks continue to be well received and the outstanding teacher professional development sessions presented by Janine McIntosh and Michael Evans are proving to be a key element in the success of the program.

The full range of textbooks and teacher support material for Upper Primary to Secondary Year 10 will be available for the 2008 school year.

Research into school mathematics

Two updates of research reports were published. An earlier report, *Comparison of Year 12 Pre-tertiary Mathematics Subjects in Australia 2004–2005,* by Dr Frank Barrington and Mr Peter Brown, had made a detailed comparison of mathematical content and assessment procedures for advanced and intermediate mathematics courses in the States and Territories. In a new report, this comparison has been extended to the International Baccalaureate (IB) syllabuses. The authors consider that the IB courses are neither upmarket nor downmarket compared to the equivalent NSW and Victorian offerings.

Dr Barrington also updated *Participation in Year 12 Mathematics Across Australia 1995–2004*. The new figures should be of national concern. Participation in both the intermediate and advanced levels mathematics has continued to decline markedly across Australia.

The report updates are available at **www.ice-em.org.au/publications.html**

Access Grid Rooms

The construction phase of the ICE-EM Access Grid Room (AGR) project is almost complete. The final funding round closed on 16 February 2007. AGRs have now been installed or are in the process of being installed at:

La Trobe University
Macquarie University
University of Newcastle
Victoria University
University of Wollongong
Monash University
University of Southern Queensland
University of Technology, Sydney
University of South Australia
RMIT University
University of Sydney

The recently completed AGR at the School of Mathematical Sciences at Monash University

In late 2006, participants in the AGR project met at La Trobe University for a two-day workshop to exchange ideas and plan the 2007 program of shared courses and collaborative research. Both academic and technical representatives attended and discussed technical requirements and facility management. Australian and international experts presented both remotely and on-site.

Prof. Jonathan Borwein, Chair of International Mathematical Union's Committee on Electronic Information and Communication (CEIC), gave a presentation from Canada. Also taking part from Canada were Prof. John Ball, President of the International Mathematical Union, and Prof. Alf van der Poorten of Macquarie University, who is also a member of the CEIC. Building on the success of the workshop, there will be a follow-up event late in 2007.

Jason Bell presenting at CQU, as seen from La Trobe University

In Semester 1 2007, three universities delivered five honours courses and eight universities are scheduled to deliver 10 courses in Semester 2. See the AGR website for details: **www.ice-em.org.au/agr.html**

The AGR project is receiving recognition both nationally and internationally. The Carrick Institute for Learning and Teaching in Higher Education invited Assoc. Prof. Geoff Prince to speak about the project at two of its workshops, and a UK consortium sought advice about establishing a similar program.

Assoc. Prof. Geoff Prince, founding AGR coordinator, returned full-time to La Trobe University at the end of 2006. AMSI/ICE-EM are indebted to his leadership and hard work in the implementation of this important project.

Prof. Bill Blyth (RMIT) is the 2007 AGR coordinator and works one day a week at the AMSI office.

Summer vacation research scholarships

Third-year undergraduates at AMSI member universities who were completing a major in mathematical sciences and intended proceeding to an honours year were again offered summer vacation scholarships. The scholarships provided $350 per week for up to six weeks. Students completed a small research project with a member of their university's academic staff. Forty-two offers were taken up. All participants attended the *Big Day In* organised by CSIRO in February where they each gave a presentation on their project and met their fellow scholars from around Australia.

See **www.ice-em.org.au/students.html** for short reports on the projects.

Stephen Maher (University of Wollongong) gives a talk at the *Big Day In*

Improving mathematics teaching of undergraduate engineers

Late in 2006 AMSI was awarded a Carrick Institute grant to study the teaching of mathematics to engineering students. The Carrick Institute for Learning and Teaching in Higher Education is the Federal Government's vehicle for funding research into teaching in higher education. Its Discipline-Based Scheme funds initiatives that engage with professional, industry and community stakeholders in identifying contemporary challenges relevant to the preparation of graduates of specific disciplines.

Engineering was chosen because it is representative of a rapidly evolving technological discipline with a diversifying student body. The grant proposal aimed to generate a clearer picture of what strategies are being used or planned, and how they are improving the learning outcomes of contemporary students. These strategies might involve combinations of lectures, tutorials, drop-in centres, computer-assisted laboratory projects, computer-assisted diagnostic tests, problem-based learning, capstone projects, and other activities.

An Advisory Board has been established with representatives of engineering and the mathematical sciences from all states. The team consists of the AMSI Director as Project Director, a full-time Research Assistant, a half-time Administrative Assistant and a part-time Project Manager. So far a literature review has been completed to provide an international picture of engineering mathematics education practice. A survey instrument has been prepared and is being sent to every mathematical sciences department and engineering school or faculty in Australia. The project will culminate in a one-day workshop in December 2007.

Carrick Steering Committee Meeting discussing strategies for improving the mathematics teaching of undergraduate engineers

ICE-EM/AMSI Summer School 2007

The fifth annual ICE-EM/AMSI Summer School hosted by the University of Sydney was a great success. Organisers from the University of Sydney, Ruibin Zhang, Daniel Daners and Georg Gottwald, together with ICE-EM staff, provided an excellent and well-run program that was warmly appreciated by the 111 post-graduate and incoming honours students who attended.

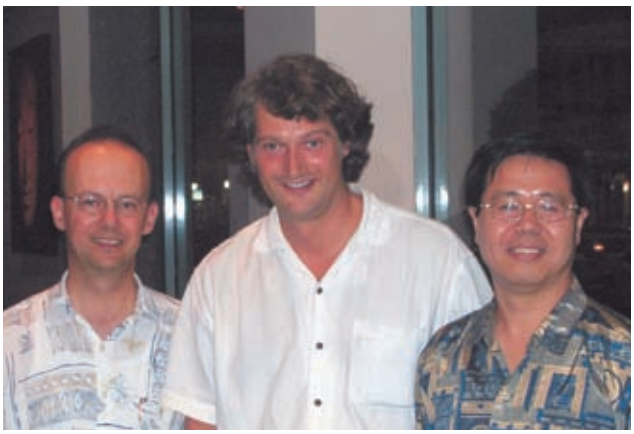
Students included two from the banking industry, nine from Asia (Hong Kong, Malaysia, Vietnam, Indonesia, the Kyrgyz Republic, South Korea), one from New Zealand, and a large number from AMSI member institutions.

The Summer School courses were presented by outstanding mathematicians from Australia, Germany and New Zealand. Two courses, on Lie Algebras and Cryptography, were filmed and will be available on the ICE-EM web site. Ten courses from past Summer Schools are available at **www.ice-em.org.au/students.html**

Course	Lecturer
Measure Theory	Marty Ross (University of Melbourne)
Differential Geometry	Tanya Schmah (Macquarie University)
Lie Algebras	Anthony Henderson (University of Sydney)
Cryptography	David Kohel (University of Sydney)
Wavelets and Computation	Markus Hegland (Australian National University)
Time Series Analysis	Niels Wessel (University of Potsdam) and Hagen Malberg (Forschungszentrum Karlsruhe)
Stochastic Analysis	John van der Hoek (University of Adelaide)
Financial Mathematics	David Colwell (University of New South Wales)
Geophysical Fluid Dynamics	Marcel Oliver (International University Bremen)
Dynamical Systems	Arno Berger (University of Canterbury, NZ)

The 2008 Summer School will be held at Monash University. See the ICE-EM website for details.

Tanya Schmah gives a lecture on differential geometry at the ICE-EM/AMSI Summer School



Daniel Daners, Georg Gottwald and Ruibin Zhang enjoying a social occasion at the Summer School

ICE-EM Australian Graduate School in Mathematics 2006

The second Graduate School was held from 2–20 July 2006 at the University of Queensland. Forty-eight postgraduate students in mathematics and cognate disciplines attended, including twelve international students—four from Vietnam, two from Thailand, two from Indonesia, one from Japan and three from New Zealand. All students gave 30 to 60 minute presentations on their research interests.

Lie Theory speakers and students at the ICE-EM Australian Graduate School in Mathematics

Prof. Tony Bracken, University of Queensland welcoming students at the opening of the Graduate School

The courses and presenters at the 2006 School were:

Course	Lecturer
Mathematical Physics	
Symmetry	Gustav Delius (University of York)
The importance of being integrable	Murray Batchelor (Australian National University)
Computation	
Optimisation with partial differential equations	Boris Vexler (Australian Academy of Sciences)
Geometric numeric integration	Robert McLachlan (Massey University)
Geometric Analysis	
Geometric evolution equations	Ben Andrews (Australian National University)
Theory of nonlinear parabolic differential equations	Gary Lieberman (Iowa State University)
The isoperimetric inequality, geometric evolution equations and the mass in general relativity	Gerhard Huisken (Max Planck Institute)

The Graduate School was opened by Mr Allan Paull, General Manager of the Hyshot Scramjet ground and flight test program, a 2006 Australian of the Year finalist. Dr Michael Bulmer, Department of Mathematics at the University of Queensland, winner of one of the 2005 Australian Awards for University Teaching, gave a public lecture on Making Music with Maths. CSIRO Mathematical and Information Sciences (CMIS) sponsored Dr Paul Jackway, CMIS Principal Research Scientist/Image Analyst located at the Queensland Bioscience Precinct to present a talk at the mid-term dinner.

Once again the team at the University of Queensland provided a well-organised event that was greatly appreciated by the participants. Articles by four students were published in the November 2006 edition of the Australian Mathematical Society Journal. This is available online at **www.austms.org.au/Publ/Gazette/2006/Nov06/winterschool.pdf**

Industry courses

Prof. Freddy Delbaen at the workshop

Mathematical Methods in Finance Workshop was held at the AMSI premises from 25–29 September 2006. It focused on managing risk in banks and the stock exchange and attracted 50 people including mathematicians from Indonesia, China and Vietnam. Presenters included the internationally acclaimed Swiss mathematician Prof. Freddy Delbaen and Prof. Uwe Kuechler from Humboldt University in Berlin.

Several AMSI students and five international participants—two from Vietnam and one each from Brunei, Indonesia and Hong Kong—received ICE-EM subsidised travel and accommodation.

International students at the Mathematical Methods in Finance Workshop

Students at BioInfoSummer 2006 with organiser Dr Lucia Santoso (second from left)

BioInfoSummer 2006: ICE-EM Summer Symposium on Bioinformatics, was held from 4–8 December 2006 at ANU. It is an exemplary interdisciplinary program and ICE-EM was again the major sponsor. In excess of 20 international students were assisted to attend. The symposium this year covered four broad topics:

- Sequence to Structure
- Comparative Genomics
- Regulatory Networks
- Analysis of Gene Expression.

Each topic was presented in a number of formats including background lectures in the mornings, and keynote speakers and specialist talks in the afternoons.

The Mathematics of Electricity Supply and Pricing (see page 10) included a short course sponsored by ICE-EM. Three sessions were presented by:

Adam Kucera	Applied forecasting and risk management in the Australian electricity market
Elliot Tonkes	Derivative pricing and trading strategies
Ian Rose	Maths built the grid—Can maths revitalise the grid?
Matt Davison	Insights from a simple hybrid model for electricity spot prices
Tamás Terlaky	Interior point optimisation methods for the power industry
Tony Ware	Valuation of swing options in electricity markets

Industry participants were appreciative of the quality and usefulness of the program.

Prof. Kenny Paterson presenting at pairing-based cryptography workshop

Workshop on Pairing-Based Cryptography was presented by the Information Security Institute (ISI) at QUT, in collaboration with ICE-EM and the Research Network for a Secure Australia (RNSA) and was held at QUT from 25–29 June 2007. Participants learned of the latest developments and research challenges in the area of pairing-based cryptography.

The workshop was divided into two events:

- Intensive Short Course: The first two days introduced pairing-based cryptography to participants new to the field.
- Keynote Lecture Series: The last three days comprised keynote lectures including international researchers Prof. Xavier Boyen, Prof. Andreas Enge, Prof. Kenny Paterson and Prof. Michael Scott.

International collaboration and promotion

Visit by Thai teachers

In February 2007 six teachers from leading schools in Thailand spent a week visiting ICE-EM. During their visit they were introduced to the ICE-EM teaching materials and observed the teacher professional development programs being presented in several schools. They were also introduced to the Australian Mathematics Trust, the Victorian Curriculum and Assessment Authority, and the University of Melbourne Early Learning, Development and Inclusion cluster. Participants reported favourably on the ICE-EM texts and efforts will continue to build on the relationships established.

Dr Siriporn Thipkong, Kasetsart University, Thailand, discussing mathematics education in Thailand

International collaborations

ICE-EM continued to strengthen its international collaborations by attracting high profile international lecturers to its Summer and Graduate Schools and Industry courses and by supporting international students to attend these events.

Dr Michael Evans and Ms Janine McIntosh at the Mathematical Association of Victoria Conference

Communicating with mathematics teachers

AMSI and ICE-EM have contributed sessions to a number of conferences organised by State associations of mathematics teachers. These meetings provide an important avenue for teachers to learn about *ICE-EM Mathematics* and other current developments in the mathematical sciences.

Dr Michael Evans participated in two Victorian Schools Heads of Mathematics meetings held in March and May 2007. Ms Janine McIntosh presented at the annual conferences of the Mathematical Society of Victoria in December 2006 and Riverina Mathematical Society in May 2007. Ms Jan Thomas was an invited speaker at the Mathematical Society of South Australia in June 2007.

Dr Evans continues his close association with senior mathematics teachers in Victoria as Chief Examiner for the Victoria Certificate of Education Mathematics Method course.

Marketing

ICE-EM shared a booth with the Australian Mathematical Society at the International Congress of Mathematicians held in Madrid in August 2006. Many delegates were interested in the ICE-EM textbooks and the potential for honours and postgraduate students to participate in Australian programs. A booth at the Mathematical Association of Victoria annual conference in December 2006 also attracted considerable interest.

Marketing of specific AMSI and ICE-EM activities has also been via posters, use of electronic lists, the websites and the regular newsletters and bulletins. ICE-EM Update published a Summer 2006 and Winter 2007 edition and distributed around 30,000 copies, mainly as inserts into mathematical newsletters and mathematics education publications. The AMSI/ICE-EM Bulletin is published five times a year and distributed primarily to member institutions.

The website **www.ice-em.org.au** had 46 000 visitors during the year, up 28% from last year.

OUTREACH PROGRAM

2006–07 highlights

Major participant in the National Strategic Review of the Mathematical Sciences Research in Australia

Extraordinary media coverage of Professor Terence Tao's Fields Medal

Education Afternooon at Australian Mathematical Society meeting a big success

AMSI and the Review of Mathematical Sciences Research in Australia

AMSI was a major sponsor of the ARC funded National Strategic Review of Mathematical Sciences Research in Australia. During 2006–07 AMSI support was critical to the timely completion of the Review. Ms Jan Thomas, Executive Officer of AMSI, was a member of the Review's Working Party and Prof. Broadbridge and Prof. Gaudry were members of the Advisory Committee.

In the latter part of 2006 Ms Thomas worked extensively with the editors and designers to ensure that the report was finished in time to be launched in December. AMSI's infrastructure was a key factor in the report being printed before Christmas. The editors and designers had completed work for AMSI in the past and provided expertise that the Working Party would have found hard to find in the limited time available.

Mathematics and Statistics: Critical Skills for Australia's Future was launched on 14 December 2006 at the Australian Academy of Science. Short speeches were given by Prof. J Hyam Rubinstein FAA, Chair of the Review Working Party and Prof. Graham Farquhar FAA FRS. The Review was formally launched by Dr Phillip McFadden FAA, Chief Scientist, Geoscience Australia and Treasurer, Australian Academy of Science. The Review had two priorities for action—improving the funding for the teaching of mathematics and statistics in the universities and support for AMSI.

AMSI provided administrative support to the Review Working Party for a Forum in Canberra on 7 February to highlight the Review's findings. This attracted both a good audience and considerable sponsorship.

Pat Farmer MP, Parliamentary Secretary to the Minister for Education, Science and Training, gave the opening address and was followed by the Opposition spokesperson on Industry, Innovation, Science and Research, Senator Kim Carr. Mr Farmer invited a number of those present to Parliament House at the end of the day to hear more about the Review and the outcomes of the day. Those present were Profs Gaudry, Broadbridge and Rubinstein, Dr Michael Evans and Ms Thomas.

"There is no area of science in which fluency in mathematics is not absolutely critical"

Dr Phillip McFadden FAA, Treasurer, Australian Academy of Science and Chief Scientist, Geosciences Australia

Mr Stephen Smith, Shadow Minister for Education, was unable to attend the Forum but came before proceedings began and was able to meet with key people. Mr Smith also met with Prof. Gaudry, Dr Evans and Ms Thomas on the day prior to the Forum.

The bipartisan support for the Review and its findings was unparalleled, as was the support of cognate disciplines and employers of mathematical sciences.

The May budget yielded a large increase in support for the teaching of mathematics and statistics in the universities. It is now up to the universities to use this wisely and rebuild mathematical sciences in Australia.

Minister Bishop has invited AMSI to apply for a grant from her fund for Collaboration and Structural Reform (CASR). The grant will stabilise AMSI's basic operations while it pursues a commitment to increased and ongoing funding commensurate to that of similar institutes overseas.

These outcomes are a tangible demonstration of what can be achieved when actions are supported by the collaborative infrastructure of the AMSI membership and office.

Professor Terence Tao awarded Fields Medal

A major highlight of 2006 for Australian mathematics was Prof. Terence Tao's prestigious Fields Medal, often described as the Nobel Prize in mathematics, awarded at the International Congress of Mathematicians held in Madrid in August 2006. ICE-EM managed a professional and highly successful media campaign. Coverage was extraordinary and the leading newspapers, radio and television stations ran special stories and programs.

Prof. Tao's mentor and teacher until he went to Princeton for his PhD studies, Prof. Gaudry, was in Madrid for this momentous occasion. The Australian Ambassador in Spain, Ms Susan Tanner, visited the Congress venue and met with Prof. Tao, Australian delegates and International Mathematical Union officials.

In March 2007, Prof. Gaudry gave a well-received presentation concerning Prof. Tao's research to the Melbourne University Mathematics and Statistics Society.

Susan Tanner, Terence Tao and Garth Gaudry

"Terry is like Mozart; mathematics just flows out of him."

John Garnett, Prof. and former chair of mathematics at UCLA.

Education Afternoon—Australian Mathematical Society Annual Conference

On 26 September 2006, ICE-EM sponsored and organised an Education Afternoon at the Australian Mathematical Society's 50th Annual Conference at Macquarie University. One of the featured speakers was Prof. Tao. His attendance at the conference and Education Afternoon attracted more media attention, especially from journalists who had wanted to interview him when he received his Fields Medal. There were a number of newspaper articles and an ABC *7.30 Report* feature.

The afternoon was exceptionally well attended with some 80 teachers registering and many participants from the conference also attending. The other speakers were Prof. Steve Evans (University of California, Berkeley), Dr Mary Myerscough (University of Sydney) and Prof. Ngaiming Mok (University of Hong Kong).

Following a reception for the teachers and speakers, expatriate Australian Chris Wardlaw, Deputy Secretary for Education and Manpower in Hong Kong, gave a public lecture on recent developments in Hong Kong education, with perspectives on the success of Hong Kong students in international mathematics tests.

Videos of the talks can be viewed at **www.ice-em.org.au/publications.html**

Chris Wardlaw speaking at the AustMS Teachers Day

"I would like to be an example that Australians can excel in just about anything, I think. It's not just sport"

Terence Tao, interviewed by Scott Bevan, ABC *7.30 Report*, 27 September 2006

Supporting the wider mathematical sciences community

Annual Heads meeting

For some years the Annual Heads of Mathematical Sciences Departments meeting has been held adjacent to the AMSI Members and Board meeting in February. Other key members of the mathematical sciences community, including Presidents of professional societies, attend this important meeting which provides a unique opportunity to review the state of mathematical sciences and plan action for the coming year. Previously supported by the AustMS, that role has now been taken by AMSI.

It is expected that the Australian Mathematical Sciences Council (AMSC) will be disbanded at the end of 2007. AMSC has been responsible for providing representation on the Federation of Australian Scientific and Technological and Scientific Societies (FASTS) Board. The mathematical sciences need a mechanism for ensuring the best possible representation on the FASTS Board and it is likely that this will become part of the Annual Heads meeting.

Australian Society for Operations Research (ASOR)

The Victorian Branch of ASOR uses the AMSI premises for meetings and seminars. AMSI invites other mathematical societies or groups to also consider making use of this resource.

Promoting issues, garnering support…

AMSI and ICE-EM promote the mathematical sciences through meetings, submissions and attendance at key events.

- In February Prof. Gaudry and Dr Evans met with the Australian Academy of Science National Committee for the Mathematical Sciences to discuss the ICE-EM schools project.
- In October 2006, Prof. Broadbridge and Ms Thomas met with Mr Peter Taylor, Chief Executive of Engineers Australia and a number of DEST people.
- In March 2007, Ms Thomas attended some of the Science Meets Parliament activities and met Prof. Lyn Beazley, the Western Australian Chief Scientist.
- Prof. Gaudry and Ms Thomas travelled to Perth in June and had further discussions with Prof. Beazley who will also visit the AMSI offices later in 2007. While in Perth they also met with Stephen Smith MP and David Wood from the Curriculum Council.
- On 13 June 2007, AMSI hosted a meeting of the International Centres of Excellence. A report is being prepared that documents the shared achievements and concerns of the ICEs.
- On 26 June, Prof. Gaudry, Ms McIntosh and Ms Thomas appeared before the Senate Standing Committee on Employment, Workplace Relations and Education concerning its enquiry on academic standards.
- Ms Thomas has been involved in several meetings with Dr Jim Peacock, Chief Scientist, concerning the National Review.
- Visitors to AMSI and ICE-EM have included Dr David Kemp, Senator Kim Carr and Lindsay Tanner MP.
- Ms Thomas attended the World Conference of Science Journalists, Melbourne, April 2007

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.

A draft action plan promoting mathematical sciences and careers was completed in the second half of 2006 following a workshop held 23 May 2006. AMSI and ICE-EM will continue to seek funding for a major careers program to supplement the resources already produced.

Promoting careers in the mathematical sciences

Maths ad(d)s

ICE-EM publishes *Maths ad(d)s* annually in conjunction with La Trobe University. The 24-page booklet contains selected job advertisements from newspapers and the Internet that require mathematics or statistics and illustrates the great variety of rewarding careers requiring these skills. Twelve thousand copies are printed and distributed via AMSI's members and at careers expos. It is a very successful and popular product.

Career expos

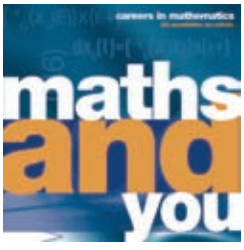
ICE-EM continued its program of support for booths and materials for careers expos in Melbourne, Perth, Adelaide, Brisbane, Sydney and Canberra. AMSI members, and mathematics teacher associations in some states, provided expert staff for the booths.

Careers website

Ten young mathematicians were interviewed about their careers. The result was video, audio and transcripts of young professionals talking about what they did at school, university and what they love about their work—see **www.mathscareers.org.au** CSIRO Mathematical Sciences and the Australian Bureau of Statistics sponsored a number of their staff to be included in the project and the media work was done by CSIRO Media.

Other careers material

ICE-EM has also produced a careers brochure *Maths and you* targeted at senior high school students and undergraduates. This encourages students to continue their study of mathematics for the benefit and rewards it brings to their careers. There is also a series of four A3 colour posters suitable for notice boards. See **www.ice-em.org.au/careers.html** for details.



CORPORATE GOVERNANCE

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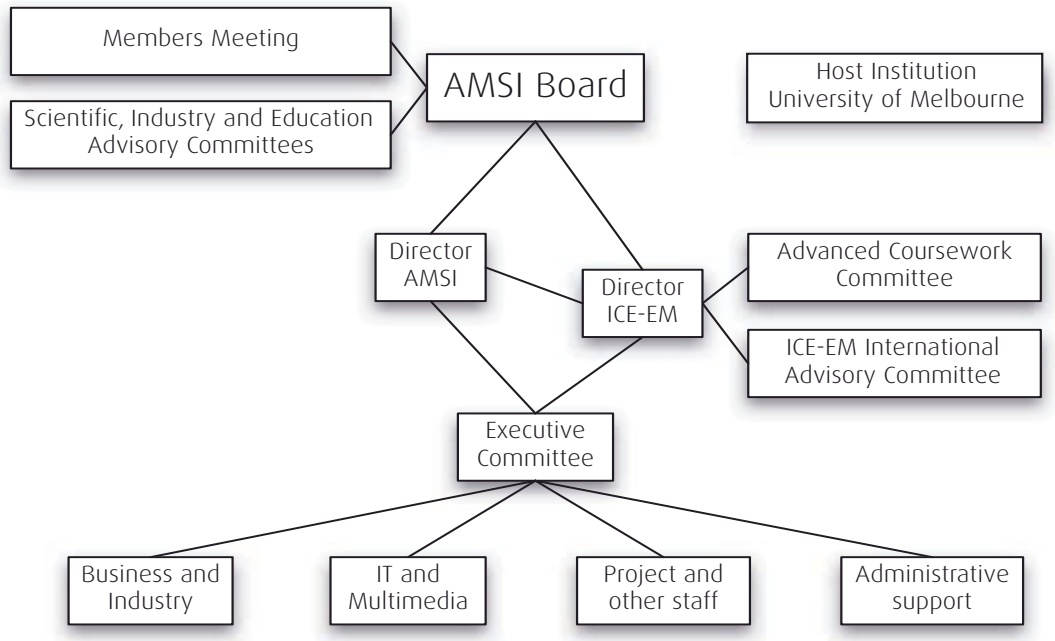
Structure of AMSI

AMSI is a collaborative unincorporated joint venture involving universities and other bodies related to the mathematical sciences. A Joint Venture Agreement (JVA) was signed by six Full Member universities in 2002, with a further two Full Members joining in 2004. A complete list of AMSI members appears on page iii of this report.

Organisation structure



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 Board on behalf of the Full Members. 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 30).

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 agreement 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 eligible to serve for one or more further terms if re-appointed in accordance with clause 18.2 of the Joint Venture Agreement.

THE DIRECTORS

The Directors for 2006–07 were as follows:

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

Independent member and Chairman

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 corporates.

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

Independent member

Judith is Chief Financial Officer and Chief Operating Officer, Institutional Division, Australia and New Zealand Banking Group Limited (ANZ). Previously she was Group General Manager Finance of ANZ. She joined ANZ Bank Group in 1996. She is also a member of the Standards Advisory Council of the International Accounting Standards Board and a Director of ING Australia.

Assoc. Prof. Alan Pryde MSc, PhD

Deputy Director to 14 February 2007

Alan has been Head of the School of Mathematical Sciences at Monash University since 2003. His research interests are functional analysis, spectral theory and harmonic analysis. He is an Associate Editor of the *Journal of the Australian Mathematical Society.*

Assoc. Prof. Grant Cairns BE (Hons), BSc, Doctorat d'Etat

Deputy Director from 14 February 2007

Grant has been Head of the Department of Mathematical and Statistical Sciences at La Trobe University since 2005. He describes himself as a "maths enthusiast" and has research interests in Lie algebras, the dynamics of group actions, differential geometry, combinatorial game theory and elementary number theory.

Prof. Philip Broadbridge BSc (Hons), DipEd, PhD

Director of AMSI

Prior to joining AMSI, Philip was Chair of the Department of Mathematical Sciences at the University of Delaware, USA (2002–05) and Professor of Applied Mathematics at the University of Wollongong, NSW (1991–2001). His research interests involve applied nonlinear partial differential equations. He is a member of the editorial board of *Journal of Mathematical Analysis and Applications, Mathematical and Computer Modelling, Applicable Analysis* and *Lecture Notes of the Australian Mathematical Society.*

Prof. Peter 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, which is the 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*. He is also a member of the INFORMS Applied Probability Awards Committee whose duty is to select, worldwide, the best young researcher and the best publication in alternate years.

Prof. Tony Bracken BSc (Hons), PhD, MAIP, FAustMS

Representative of the Full Members to 14 February 2007

Tony is Head of the Discipline of Mathematics in the School of Physical Sciences at the University of Queensland. His research interests are areas of mathematical physics—especially quantum mechanics—and biomathematics.

Assoc. Prof. Stephen Roberts, BSc (Hons), PhD

Representative of the Full Members from 14 February 2007

Stephen has been Head of the Department of Mathematics at the Australian National University since 2006. His research interests are computational fluid dynamics and numerical algorithms for high dimensional predictive modelling. From 2004–2006 he was the national convenor of the Australian Partnership in Advanced Computing Education, Outreach and Training program.

Prof. Kok Lay Teo BSc, MASc, PhD, SMIEEE

Representative of the Associate Members to 14 February 2007

Kok Lay is Professor of Applied Mathematics and Head of the Department of Mathematics and Statistics at Curtin University of Technology, WA. Previously, he was Professor of Applied Mathematics and Head of Department of Applied Mathematics at Hong Kong Polytechnic University, Hong Kong. He is Editor-in-Chief of the *Journal of Industrial and Management Optimization*. His main research interests are in the areas of operations research, optimal control, and signal processing in telecommunications engineering.

Prof. Anthony Roberts BMathSci (Hons), PhD

Representative of the Associate Members from 14 February 2007

Anthony is Professor of Applied Mathematics at the University of Southern Queensland. He is a member of the Expert Advisory Committee for Mathematics, Information and Communication Sciences, Australian Research Council. Anthony is the world leader in using and further developing a branch of modern dynamical systems theory, in conjunction with new computer algebra algorithms, to derive mathematical models of multiscale complex systems. He is also the Electronic Editor for the *ANZIAM Journal*.

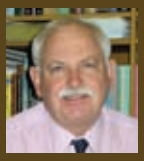
Board Observers

The Chairs of the three Advisory Committees and Director of MASCOS are also invited to sit on the Board as observers.

Prof. Peter Hall BSc (Hons), MSc, DPhil, DHC, DSc, FAA, FAustMS, FRS, FRSE

Chair of the Scientific Advisory Committee

Peter was Professor of Statistics at the Australian National University from 1987 to 2006, moving during that year to the University of Melbourne as a Federation Fellow. His research interests include theoretical statistics and applications of statistics. During 2006 he was Vice-President, and later President, of the Australian Mathematical Society.



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, Director of its Trustee Company AMTT Ltd and is a Professor of Mathematics and Adjunct Professor of Education at the University of Canberra. He is currently co-Chair of the International Commission on Mathematical Instruction (ICMI) Study 16 *Challenging Mathematics in and outside the Classroom* and Immediate Past President of the World Federation of National Mathematics Competitions, an affiliated study group of ICMI.

Dr John Burgess FTSE, BE, ME, PhD, DEng, CPEng, FIChemE, FIEAust

Chair of the Industry Advisory Committee

Principal, Scena Consulting Pty Ltd. Previously Vice President Safety, Environment and Technology, BHP Ltd. John has wide-ranging experience as a senior executive and research leader in industry, in strategy development and functional leadership, as an academic in chemical engineering and as a member of various advisory boards and committees. In 2003 John was awarded a Centenary Medal for service to Australian Society in Chemical Engineering.

Prof. Tony Guttmann MSc, PhD, FAustMS, FAA

Director of MASCOS

Tony was Interim Director of AMSI upon its foundation, and is currently Director of MASCOS, a past President of the AustMS, and an organiser of the BHP Billiton/University of Melbourne School Mathematics Competition. His research interests are in mathematical models of phase transitions, enumerative combinatorics and critical phenomena in general.

Board Meetings

The Board met in person or by teleconference four times in 2006–07. Attendance was as follows.

Dr James E. Lewis	4 of 4
Ms Judith Downes	2 of 4
Prof. Peter G. Taylor	0 of 4
Prof. Phil Broadbridge	3 of 4
Assoc. Prof. Alan Pryde (to 14 February 2007)	2 of 2
Assoc. Prof. Grant Cairns (from 14 February 2007)	3 of 3
Prof. Tony Bracken (to 14 February 2007)	2 of 2
Dr Steven Roberts (from 14 February 2007)	2 of 3
Prof. Kok Lay Teo (to 14 February 2007)	2 of 2
Prof. Anthony Roberts (from 14 February 2007)	2 of 3

Committee Membership

Scientific Advisory Committee

Prof. Peter Hall (University of Melbourne) (Chair)
Prof. Phil Broadbridge (Director, ex officio)
Prof. Frances Kirwan (University of Oxford)
Prof. Terry Speed (University of California, Berkeley; Walter and Eliza Hall Institute)
Prof. Terence Tao (University of California, Los Angeles)
Prof. Neil Trudinger (Australian National University)
Prof. Chris Heyde (Australian National University)
Prof. Ezra Getzler (Northwestern University, Chicago)

Education Advisory Committee

Prof. Peter Taylor (Australian Mathematics Trust) (Chair)
Mr Bill Akhurst (Australian Mathematics Trust)
Dr Frank Barrington (University of Melbourne)
Mr Peter Brown (University of New South Wales)
Ms Elizabeth Burns (Loreto Mandeville Hall)
Ms Teresa Dickinson (Australian Bureau of Statistics)
Prof. Peter Galbraith (University of Queensland)
Dr Bill Pender (Sydney Grammar School)
Prof. Cheryl Praeger (University of Western Australia)
Ms Jan Thomas (AMSI)
Prof. Garth Gaudry (ICE-EM Director, *ex officio*)
Dr Nancy Lane (Manager, ICE-EM, *ex officio*) until 31 January 2007

Industry Advisory Committee

Dr John Burgess (Chair)
Prof. Bill Appelbe (Victorian Partnership for Advanced Computing)
Dr James E. Lewis (Parkview Group)
Dr Thomas Montague (AMSI and MASCOS)

Executive Committee

Prof. Phil Broadbridge (AMSI Director)
Prof. Garth Gaudry (ICE-EM Director)
Assoc. Prof. Alan Pryde (Deputy Director to 14 Feb 2007)
Assoc. Prof. Grant Cairns (Deputy Director from 14 February 2007)
Dr Nancy Lane (Manager, ICE-EM to 31 January 2007)
Ms Jan Thomas (Executive Officer)
Mr Richard Barker (Business Development/Marketing Manager)
Dr Thomas Montague (Industry/Marketing Manager)

Advanced Coursework Committee

Prof. Neil Trudinger (Chair) (Australian National University)
Prof. Michael Eastwood (University of Adelaide)
Prof. Garth Gaudry (Director ICE-EM)
Prof. Mark Gould (University of Queensland)
Dr Markus Hegland (Australian National University)
Prof. Kathy Horadam (RMIT University)
Prof. Nalini Joshi (University of Sydney)
Prof. Matt Wand (University of New South Wales)
Dr Nancy Lane (Manager ICE-EM) to 31 January 2007

ICE-EM International Advisory Committee

Prof. Hung Hsi Wu, University of California, Berkley
Prof. Jonathan Borwein, Dalhousie University, Canada
Prof. Yongwimon Lenbury, Mahidol University, Thailand

Stakeholders

Members

Full Members and Associate Members are listed on page iii. They meet as a group twice a year, normally in February and June or July. In the 2006–07 year, the meetings were:

- 15 February 2007 at the University of Melbourne
- 25 June 2007 at the University of Adelaide

February 2007 meeting at AMSI discussing issues in the mathematical sciences

Member representatives at the June 2007 meeting hosted by the University of Adelaide

Other stakeholders

AMSI was established through 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. However, AMSI still had reporting responsibilities to the Victorian Government until 31 July 2007.

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) in January 2004 and this project is being funded for four years from July 2004. Comprehensive progress reports and updated business plans are presented to DEST twice a year in accordance with the Funding Agreement.

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 and ICE-EM Directors' monthly reports on activities are emailed to Board members, committee members and AMSI member representatives.

The Joint Venture Agreement members do not meet separately as a group. Their interests are catered for through the Deputy Director of AMSI, one other representative on the Board and the AMSI Deputy Director on the Executive Committee.

Employees

Policies and procedures

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

Senior staff

Director of AMSI, Prof. Philip Broadbridge, was profiled in the Board section on page [30].

Prof. Garth Gaudry BSc (Hons), PhD, Hon Fil Dok

Director of ICE-EM

Garth is Director of the International Centre of Excellence for Education in Mathematics. He was previously foundation Director of AMSI and Professor of Pure Mathematics and Head of School at the University of New South Wales. He is known internationally for his research in harmonic and functional analysis and has been influential nationally in school mathematics education.

Dr Nancy Lane BA, MSIS, PhD

Manager, ICE-EM (to 31 January 2007)

Nancy coordinated a number of ICE-EM educational programs and their promotion nationally and internationally, including the ICE-EM Australian Graduate School in Mathematics, the ICE-EM/AMSI Summer School and various industry workshops.

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

Executive Officer AMSI

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

Dr Thomas Montague BSc, MSc, DipEd, DPhil

Industry/Marketing Manager, AMSI and MASCOS

Thomas coordinates the industry outreach program for AMSI and MASCOS. This includes identifying and promoting partnerships between users and providers of the mathematical sciences. His prior experience includes Science Advisor to the Victorian Government, private consultant on environment and resource management, company director, research scientist and academic.

Dr Michael Evans (Ph.D, DipEd)

Schools Project Manager, ICE-EM

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

Ms Janine McIntosh (DipT)

Schools Project Officer, ICE-EM

Janine McIntosh is the ICE-EM Schools Project Officer. Her role is to develop primary 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, in Mathematics education at the University of Melbourne and is a member of the Maths Challenge committee of the Australian Mathematics Trust.

FINANCIAL STATEMENTS

Financial accounts are kept by the University of Melbourne and audited reports are provided in accordance with the requirements of the JVA and the funding agencies.

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ICE-EM Statement of Financial Position	37
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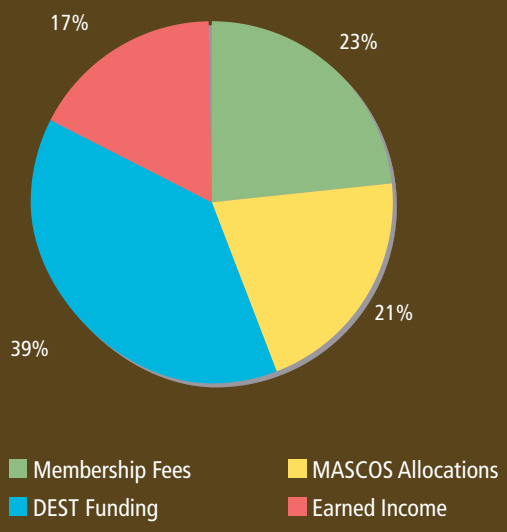
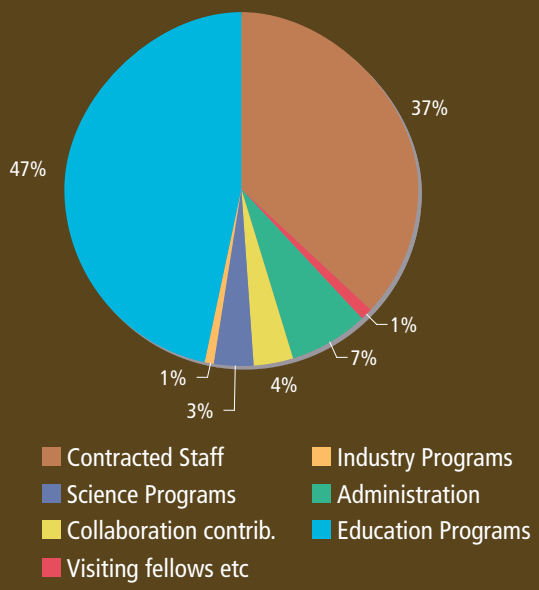
Income earned through the sale of textbooks is beginning to be a more significant part of group revenue

AMSI Group Income 2006/07



Investment in the schools textbook program dominates expenditure; staffing costs remain stable at 37%

AMSI Group Expenditure 2006/07



Australian Mathematical Sciences Institute
Statement of Financial Performance

	July 2006 to June 2007		July 2005 to June 2006	
	$	$	$	$
Income				
State of Victoria - STI Grant	0		0	
Consortium member contributions	610,000		625,000	
Collaboration partner (MASCOS) contribution	534,409		507,520	
Sponsorships	9,000		4,600	
Event registrations	22,561		8,742	
Consultancy services	35,000		10,000	
Other income	7,094		8,931	
Total Income		1,218,064		1,164,793
Expenditure				
Personnel				
Salaries, permanent and casual	925,622		770,567	
Grants- visiting fellows, top-up scholarships	53,000		20,000	
Internal- University of Melbourne (Maths & Stats admin.)	10,166		5,242	
External salary support	-22,746		-96,009	
		966,042		699,800
Materials, Supplies and Services				
Supplies				
Consumable materials & provisions	20,550		19,041	
Services				
Contracted or professional services	6,131		71,494	
Internal services - University of Melbourne	6,276		1,169	
Charges re consultancy services by Member Institutions	5,379		0	
Utilities	6,191		5,342	
Sponsorship				
Workshops, seminars - Member Institutions	141,621		111,848	
National Strategic Review	32,869		0	
Careers Forum	3,000		0	
General expenses				
Printing/photocopying/subscriptions	31,427		15,414	
Freight/cartage	0		19,900	
Public relations & promotion				
Domestic advertising & promotion	6,117		21,161	
Entertainment	16,780		13,340	
Collaboration partner contribution -				
MASCOS	100,000		100,000	
ACERA	85,000		28,333	
Finance - FBT and payroll tax	2,168		2,908	
		463,509		409,950
Equipment				
Computer software & services	6,095		8,960	
Expensed assets	4,071		14,232	
Minor equipment components	72		1,111	
		10,238		24,303
Travel & conferences				
Travel & accommodation-domestic	116,928		87,356	
Travel & accommodation-I' national	26,247		45,175	
Living away from home	0		1,084	
		143,175		133,615
Total Expenditure		1,582,964		1,267,668
Net of actual income over expenditure		-364,900		-102,875

Expenditure by Program	AMSI	AMSI/ MASCOS	AMSI	AMSI/ MASCOS
Personnel				
Staff salaries, permanent and casual	454,979	129,442	361,469	134,519
Internal- University of Melbourne (Maths & Stats admin.)	10,166			
Professorial and research fellows, less sponsor support		318,455		183,813
Fellowships, PhD top up scholarships		53,000		20,000
	465,145	500,897	361,469	338,332
Administration	171,144	21,567	204,748	15,792
Advisory committee and program projects	142,874	96,337	138,581	80,413
Collaboration contributions				
MASCOS	100,000		100,000	
ACERA	85,000		28,333	
	964,163	618,801	833,131	434,537
Total AMSI, AMSI/MASCOS combined		1,582,964		1,267,668

Australian Mathematical Sciences Institute
Statement of Financial Position

		30th June 2007 $	$	30th June 2006 $	$
Assets					
Cash	AMSI	403,828		710,174	
	AMSI/MASCOS Ref. general note (c)	889,664		948,219	
			1,293,492		1,658,393
Property, plant and equipment					
Capitalised expenditure (Note 1)			0		0
Total Assets			1,293,492		1,658,393
Liabilities					
Provisions for employee entitlements (Note 2)					0
Equity					
Retained funds brought forward					
	AMSI	710,174		889,677	
	AMSI/MASCOS	948,219		871,589	
			1,658,393		1,761,266
Profit/(Loss) for the year					
	AMSI	-306,346		-179,504	
	AMSI/MASCOS	-58,555		76,630	
			-364,901		-102,874
Total liabilities and equity			1,293,492		1,658,392

Note 1 The requirement of The University of Melbourne is that Departments treat all assets as having been expensed in the period of purchase.

Note 2 Employee entitlements are deducted from AMSI funds by The University of Melbourne on an accrual basis.

General notes to the accounts

(a) The financial accounts and payroll records are maintained for AMSI by The University of Melbourne in its role as lead agency for the JV consortium. Expenditure authorisation and income/expense allocations are the responsibility of AMSI personnel using the UoM policies and procedures.

(b) AMSI directors, the chairman and members of the Board plus members of advisory committees, are reimbursed for travel related costs incurred in attending meetings. No other payments are made to Board or committee members.

(c) As a party to the Collaboration Agreement that obtained and ARC Centre of Excellence Grant to establish MASCOS, AMSI makes an annual contribution of $100,000 to MASCOS and in turn receives an allocation from MASCOS (2007 $534,3390). Use of these monies for research and industry linked activities is administered by an advisory committee. Separate financial records pertaining to the annual allocation from MASCOS are maintained within AMSI under the heading AMSI/MASCOS.

International Centre of Excellence for Education in Mathematics
Statement of Financial Performance

	July 2006 to June 2007 $		July 2005 to June 2006 $	
Income				
Government funding				
Department of Education, Science and Training		1,000,000		2,300,000
Non Grant Income				
Course Fees & Charges	73,232		13,445	
Sponsorships	54,491		32,733	
Commercial income ICE-EM Mathematics	253,124		1,440	
Other Income	97		3,130	
		380,944		50,748
Total Income		1,380,944		2,350,748
Expenditure				
Personnel				
Salaries, permanent and casual	1,319,004		1,083,347	
External salary support	0		-22,148	
		1,319,004		1,061,199
Materials, Supplies and Services				
Scholarships				
Undergraduate vacation scholarships	95,200		81,836	
Supplies				
Consumable materials	13,937		10,476	
Services				
Contracted or professional services	193,789		188,235	
Internal services	17,198		5,733	
Utilities	7,608		6,502	
General expenses				
Printing, copying, subscriptions	346,427		172,356	
Freight/cartage	101,028		62,857	
Grants - AGR's	342,818		224,000	
Public relations & promotion				
Domestic marketing & promotion	11,609		93,027	
Entertainment	17,035		13,786	
Finance - FBT and payroll tax etc	2,815		662	
		1,149,464		859,470
Equipment				
Computer software & services	3,725		5,339	
Expensed assets	2,786		6,593	
Minor equipment components	65		306	
		6,576		12,238
Travel & conference				
Travel & accommodation — domestic	77,012		97,719	
Travel & accommodation — students	29,074		11,975	
Conducting/attending seminars, conferences, workshops	622,704		410,597	
Living away from home allowance	26,381		23,529	
		755,171		543,820
Total Expenditure		3,230,215		2,476,727
Net of actual income over expenditure		-1,849,271		-125,979

Expenditure by Program	$	$
Higher Education	702,828	518,997
(Summer School, Access Grid Rooms, student access to researchers)		
Schools		704,418
(Teacher PD, promotion of careers in mathematics, schools materials for students and teachers)	820,621	
	153,939	
(Cost of textbooks and CDs sold, distribution and promotional costs)	97,756	
(Cost of unsold textbooks)		
Research, business & industry	362,543	220,200
(Advanced specialist courses)		
Internationalisation of the mathematical sciences	57,167	32,102
(Marketing and promotion)		
Personnel	897,407	875,538
(Permanent staff)		
Administration	137,954	125,472
	3,230,215	2,476,727

International Centre of Excellence for Education in Mathematics
Statement of Financial Position

	30th June 2007 $	30th June 2006 $
Assets		
Cash	1,373,855	3,223,126
Property, plant and equipment		
Capitalised expenditure (Note 1)	0	0
Total Assets	1,373,855	3,223,126
Liabilities		
Provisions for employee entitlements (Note 2)	0	0
Equity		
Retained funds brought forward	3,223,126	3,349,105
Net of actual income over expenditure	-1,849,271	-125,979
Total liabilities and equity	1,373,855	3,223,126

Note 1 The requirement of the University of Melbourne is that Departments treat all assets as having been fully expensed in the period of purchase.

Note 2 Employee entitlement monies are deducted from AMSI funds by the University of Melbourne on an accrual basis.

General note to the accounts

The financial accounts and payroll records are maintained for ICE-EM by the University of Melbourne in its role as lead agency for the JV consortium. Expenditure authorisations and income/expense allocations are the responsibility of ICE-EM personnel using UoM policies and proceedures.

Audit Statements

File Ref. 95/01170
JT /gran24
RN: 2007082
Attch.

THE UNIVERSITY OF MELBOURNE

5 September 2007

Mr Jim Lewis
Chairman of the Board
Australian Mathematical Sciences Institute
111 Barry Street
C/- The University of Melbourne
Victoria 3010

AUSTRALIAN MATHEMATICAL SCIENCES INSTITUTE

I advise that an audit has been conducted of the Financial Statement of Income and Expenditure of the Australian Mathematical Sciences Institute for the period 1 July 2006 – 30 June 2007.

AUDIT SCOPE

We have conducted an independent audit in accordance with Australian Auditing Standards of the attached Financial Statement of Income and Expenditure for the period 1 July 2006 to 30 June 2007 which specifies an amount of $1,582,964.35 of expenditure on the Program, and an amount of $610,000 of contributions by Consortium Members towards the Program ("Member Contributions"), in order to express an opinion on it for the purposes of the Agreement.

Our audit involved an examination, on a test basis, of evidence supporting the amount of expenditure incurred, including all Grant funds, and the amount of income and contributions received. This included an examination of Melbourne University's financial records and receipts, and an evaluation of the policies and procedures used to calculate the expenditure of the Program and Member Contributions. These procedures have been undertaken to form an opinion as to whether the methodology used to calculate the expenditure and Member Contributions is in accordance with the Agreement, and that the figures stated are true and fair.

This audit opinion expressed in this report has been formed on the above basis.

AUDIT OPINION

We confirm that in our opinion:

- Melbourne University has incurred $1,582,964.35 in expenditure on the Program;
- the contributions of Consortium Members to the Program are $610,000 cash (see attached schedule);

in accordance with the terms of the Agreement.

I trust this information is of assistance to you and advise that any queries can be directed to me on (03) 8344-0846.

Yours sincerely,

PJ McGrath
Director, Internal Audit

Internal Audit Office
The University of Melbourne Victoria 3010 Australia
T: +61 3 8344 0846 F: +61 3 8344 0847
E: internalaudit-queries@unimelb.edu.au

THE UNIVERSITY OF MELBOURNE

Financial Statement of Income and Expenditure for the Period 1 July 2006 - 30 June 2007

Project Title:	**STI Infrastructure Grant to Establish the Australian Mathematical Sciences Institute**
Grantor:	**State of Victoria - Department of Innovation, Industry and Regional Development**
Chief Investigator:	**Professor Phillip Broadbridge**
Our Reference:	**79949**

INCOME	
State of Victoria - Department of Innovation, Industry and Regional Development	$0.00
Consortium Member Contributions	$610,000.00
Collaboration Partner (MASCOS) Contribution	$534,409.00
Commercial Enterprise Income	$60,561.30
Other Income	$13,093.97
Total Income for the reporting period	**$1,218,064.27**
EXPENDITURE	
Personnel	$988,788.42
Materials, Supplies & Services	$440,020.21
Equipment	$10,238.65
Training	$742.50
Travel	$143,174.57
Total Expenditure for the reporting period	**$1,582,964.35**
Deficit for the reporting period	**-$364,900.08**
Carryforward Surplus from 30 June 2006	**1,658,391.56**
Surplus Balance as at 30 June 2007	**$1,293,491.48**

I certify that
a) all funds received have been expended for the purposes for which they are provided; and
b) the expenditure shown above has taken place and is correct.

Bryan Rossi
Deputy Principal & Director of Financial Operations
03-September-2007

Department of Financial Operations
The University of Melbourne Victoria 3010 Australia
Tel +61 3 8344 2988 Fax +61 3 9347 7527

unimelb.edu.au

File Ref. 95/01170
jt /gran25
RN: 2007081
Attch.

THE UNIVERSITY OF MELBOURNE

31 August 2007

Ms Fiona Buffinton
Chief Executive Officer
Australian Education International
Department of Education, Science and Training
GPO Box 9880
CANBERRA ACT 2601

Dear Fiona,

Establishment of an International Centre of Excellence for Education in Mathematics

I advise that an audit has been conducted of the financial statement for the Establishment of an International Centre of Excellence for Education in Mathematics Project for the period 1 July 2006 to 30 June 2007.

Please find enclosed the financial statement certified by the Acting Vice-Principal (Research) and the Director, Internal Audit in accordance with clauses 12.6 and 12.7 of the agreement between the Department of Education, Science and Training and the University of Melbourne.

Clause 12.6(i) of the agreement requires a statement of the balance of the bank account referred to in clause 4.1. In this regard, the University does not operate separate bank accounts for individual grants, but utilises its main bank account for the purpose of depositing and expending grant funds. The University's General Ledger structure enables the income and expenditure for each grant to be identified separately.

If there are any queries regarding this statement please contact me on (03) 8344-0846 or Fax. (03) 8344 0847.

Yours sincerely,

PJ McGrath
Director, Internal Audit

cc Professor G Gaudry
Director - ICEEM

Internal Audit Office
The University of Melbourne Victoria 3010 Australia
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Financial Statement of Income and Expenditure for the Period 1 July 2006 to 30 June 2007

Project Title:	**Establishment of an International Centre of Excellence for Education in Mathematics**
Grantor:	**Australian Government Department of Education, Science and Training**
Chief Investigator:	**Professor Garth Gaudry**
Our Reference:	**79963**

INCOME	
Department of Education, Science and Training	$1,000,000.00
Sponsorships	$54,490.77
Fees and Services	$73,329.39
Commercial Enterprise Income	$253,123.99
Professional Services	$0.00
Housing & Accomodation Services	$0.00
Total Income for the reporting period	**$1,380,944.15**
EXPENDITURE	
Personnel	$1,362,403.70
Supplies & Services	$1,102,283.10
Equipment	$11,904.29
Training	$840.91
Travel and Conference	$752,783.60
Total Expenditure for the reporting period	**$3,230,215.60**
Deficit for the reporting period	**-$1,849,271.45**
Carryforward Surplus from previous period	**$3,223,126.73**
Surplus Balance as at 30 June 2007	**$1,373,855.28**

I certify that
a) all funds received have been expended for the purposes for which the are provided; and
b) the expenditure shown above has taken place and is correct.

Dr D Cookson
A/g Vice-Principal (Research)
31-August-2007

PJ McGrath
Director, Internal Audit
31-August-2007

Acronyms

ACERA	Australian Centre of Excellence for Risk Analysis
AGR	Access Grid Room
AMSI	Australian Mathematical Sciences Institute
ANU	Australian National University
ARC	Australian Research Council
AustMS	Australian Mathematical Society
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEST	Department of Education, Science and Training
ICE-EM	International Centre of Excellence for Education in Mathematics
ISI	Institute for Scientific Information
JVA	Joint Venture Agreement
MASCOS	ARC Centre of Excellence for Mathematics and Statistics of Complex Systems
MATHEON	German DFG Research Center: Mathematics for key technologies: Modelling, simulation, and optimisation of real-world processes
MITACS	Mathematics of Information Technology and Complex Systems: a Network of Centres of Excellence for the Mathematical Sciences
PRIMA	Pacific Rim Mathematical Association
QUT	Queensland University of Technology
UNSW	University of New South Wales

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