AUSTRALIAN MATHEMATICAL SCIENCES INSTITUTE

Annual Report 2004

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AUSTRALIAN MATHEMATICAL SCIENCES INSTITUTE

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The Board

1 July 2003 to 12 February 2004

- Dr James E. Lewis (Parkview Group) (Chair)
- Ms Judith Downes (ANZ)
- Professor Garth Gaudry (Director)
- Professor Mark Gould (The University of Queensland)
- Professor Tony Guttmann (Deputy Director)
- Dr Tim Littlejohn (IBM/Biolateral)
- Professor Hyam Rubinstein (The University of Melbourne)
- Professor Jim Williams (The Australian National University)

12 February 2004 to 30 June 2004

- Dr James E. Lewis (Parkview Group) (Chair)
- Ms Judith Downes (ANZ)
- Professor Garth Gaudry (Director)
- Dr Tim Littlejohn (IBM/Biolateral)
- Associate Professor Geoff Prince (Deputy Director)
- Associate Professor Chris Radford (The University of New England)
- Professor Hyam Rubinstein (The University of Melbourne)
- Professor Don Taylor (The University of Sydney)

Report from the Chairman of the Board

James E. Lewis

This annual report covers the first full year of operation of the Australian Mathematical Sciences Institute (AMSI) from 1 July 2003 to 30 June 2004. A great deal has been achieved in the period. The number of full members increased to eight and two more associate members joined, making the total membership now 26 institutions.

Two major highlights during the year were:

- securing funding for the second AMSI Summer School
- successfully applying to establish the International Centre of Excellence for Education in Mathematics (ICE-EM)

The Summer School funding was provided by the Federal Government's Higher Education Innovation Program and shows their support for AMSI's activities. The Summer School was held at The University of New South Wales in January/February 2004 and attracted more than 130 students. It was an outstanding success.

The second significant success, securing support for AMSI to develop ICE-EM, was a major achievement. The Hon. Dr Brendan Nelson, Minister for Education, Science and Training, made the formal announcement about ICE-EM at the opening of the Summer School and spoke enthusiastically about its potential.

ICE-EM is already making a major contribution to AMSI's education program. The establishment of ICE-EM, and recruitment of key senior staff into ICE-EM, has greatly enhanced our ability to progress our program for teachers. It has considerably enhanced provision of honours and postgraduate courses and ensured the future of the Summer School for the next four years. An advanced course work program is planned for mid-year 2005 and will attract distinguished presenters from around the world. ICE-EM is also enabling AMSI to investigate ways to deliver courses and support research through new technologies such as Access Grid Rooms.

AMSI's scientific program has continued to flourish. The year began with involvement in the International Congress on Industrial and Applied Mathematics at the Sydney Convention Centre, 7-11 July 2003. This is a major international event and was a great fillip for Australian mathematics and a great success. Since the Congress, AMSI has sponsored a further 13 workshops and symposia in an even greater range of areas than in 2002-03. Nine further events were co-sponsored with the Centre of Excellence for Mathematics and Statistics of Complex Systems (MASCOS), an AMSI partner.

The industry program has also made progress. An Industry and Marketing Strategy Plan was completed. Dr Thomas Montague was appointed Industry and Marketing manager jointly with MASCOS and began on 21 June 2004. This appointment will greatly enhance AMSI's industry interaction and a number of potential projects have already been identified.

AMSI has been well served by its staff. AMSI's Director, Professor Garth Gaudry, has done an outstanding job of consolidating the activities of AMSI and leading the establishment of ICE-EM during the year. Professor Gaudry has assembled an excellent team, including Ms Jan Thomas, AMSI's Executive Officer and long serving advocate of support for mathematics education. Dr Nancy Lane will begin as Manager and Interim Director of ICE-EM in August 2004 and a Schools Project Manager position is in the process of being filled. Another important contributor has been Associate Professor Geoff Prince, who accepted the invitation to become Deputy Director of AMSI on a part time basis and has been of great assistance.

Full Members and Associate Members are represented on the Board by a nomination from the two membership constituencies. These Board members serve for a year. The initial Board was well served by Professor Jim Williams of The Australian National University and Professor Mark Gould of The University of Queensland as full member and associate member representatives respectively. In February 2004, Professor Don Taylor of The University of Sydney replaced Professor Jim Williams as representative of the full members and Associate Professor Chris Radford of The University of New England replaced Professor Mark Gould as representative of associate members. Professor Tony Guttmann continues to attend Board meetings as Director of MASCOS. The Chairs of the three AMSI Advisory Committees also attend Board meetings. A welcome business perspective is provided by our external Board members, Ms Judith Downes of the ANZ and Dr Tim Littlejohn of IBM Global Services. The Board has been energetic and supportive of AMSI's operations and initiatives and I thank all 2003 and 2004 members for their contribution.

The Advisory Committees ably assist the Board. I acknowledge their contribution and especially that of the committee Chairs: Professor Peter Hall (Scientific), Dr Bob Watts (Industry) and Professor Peter Taylor (Education).

Finally, AMSI would not exist without the ongoing support of its member institutions. Despite the difficult financial circumstances most universities are facing, membership has continued to be supportive and new institutions have joined. This commitment is heartening.

AMSI is in a sound position for 2004-05. The Board and staff are working hard to improve support of mathematics in Australia in tangible ways. We also actively seek to consolidate the organisation as an effective focus for engaging with government and industry to support mathematics in the future. I appreciate the widespread support AMSI has received from members, staff and the Board and I look forward to the continued success of AMSI and ICE-EM in the year ahead.

James E. Lewis
Chairman

Report from the Director

Garth Gaudry

The 2003-04 year was notable for AMSI. It was our first full year of operation, though formally the second financial year and the second year of the Victorian Government's Science, Technology and Innovation grant. In almost all spheres of activity, AMSI has truly come of age.

As can be seen from the reports of the Chair of the Scientific Committee, Professor Peter Hall, and the Director of MASCOS, Professor Tony Guttmann, the program of scientific workshops and conferences is flourishing. It has a high national profile and is a mainstay of research in the mathematical sciences in this country. Some topics have broken new ground, opening up fresh vistas, especially for young researchers. Examples can be seen in the Symposium on Statistical Learning and the Summer Symposium on Bioinformatics that attracted large numbers of participants. Several popular workshops covered fundamental aspects of the mathematical sciences. This underlines the important point that effective mathematical applications grow out of strong underpinnings in core areas of our discipline.

The scientific program has developed as envisaged when AMSI was formed. It is truly national: proposals come from member institutions, the events are held in many different parts of Australia, and the diversity of subjects covered is impressive. The momentum is increasing and an excellent collection of forthcoming events has been approved. We owe a debt of gratitude to Peter Hall, who does a superb job as Chair. The distinguished mathematicians on the Scientific Advisory Committee assist us greatly with their prompt evaluations, wise advice and judgement.

The objectives of the Education Program first set by AMSI were more ambitious than could be achieved with the available funding. Consequently, a great deal of thought and energy has gone into identifying appropriate sources of extra funding. Through the Australian Government's Higher Education Innovation Program, AMSI has obtained grants of $181K in 2002-03 and $308K in 2003-04, to conduct Summer Schools for honours and postgraduate students. The second Summer School was held at The University of New South Wales for four weeks from 27 January 2004. It attracted 137 students and staff from across Australia and a wide range of institutions. I wish to thank Dr Ian Doust for his excellent work as Director of the 2004 Summer School. Ian's enthusiasm, insight into the needs of students, organisational skills and personal touch made the event a resounding success.

The highlight of 2003-04 was AMSI's success in winning a grant of $7.8M from the Australian Government to establish the International Centre of Excellence for Education in Mathematics (ICE-EM). The Minister for Education, Science and Training, the Hon. Dr Brendan Nelson announced the grant on the first day of the 2004 Summer School. Dr Nelson spoke enthusiastically about AMSI's proposal and his confidence in the impact that ICE-EM would have. Dr Nelson has been a strong supporter of the national collaboration AMSI has forged.

The successful ICE-EM funding bid was prepared over a short time and involved many late hours of work under pressure. A number of people shared the work: Tony Guttmann, Robyn Klepetko, Lindsay Bevege and Narelle Brummel. I thank them all for their contributions. However, in this particular enterprise, one person deserves special thanks and acknowledgement, Jan Thomas. Jan's strategic thinking, persistence and sheer hard work made this success a possibility, then a reality.

With ICE-EM funding confirmed, the Education Advisory Committee is guiding work on the schools materials project and the mathematical preparation of teachers. These are large projects with the potential to transform mathematics teaching in Australian schools. I am very grateful to Peter Taylor, Director of the Australian Mathematics Trust, for the superb work he is doing as Chair of the Education Advisory Committee and for his wise advice in the development of ICE-EM.

The Industry program presents a considerable challenge to us all, in as much as it takes time to establish effective links with potential industrial and commercial partners. Dr Bob Watts, Chair of the Industry Advisory Committee and immediate-past Chief Scientist of BHP Billiton, has helped AMSI a great deal in this regard. I thank him for his valuable contributions to our work. Many industry projects have considerable potential and we are pursuing them actively. Two leading companies are already involved with us, jointly with MASCOS. AMSI and MASCOS have appointed Dr Tom Montague as their Industry Marketing Manager. Tom has wide experience of industrial companies and developments in Victoria through his previous post in the Office of Science and Technology, Government of Victoria. He is undertaking a vigorous marketing and outreach program to industry and commerce, in Victoria and interstate, on behalf of AMSI and MASCOS.

The major challenge for AMSI over the next year will be to secure on-going infrastructure funding to replace the Victorian Government funding which expires on 30 June 2005. We are aware of options, which we will follow up. I am cautiously optimistic. In the meantime, the financial position of AMSI is strong. Thanks to the low rate of expenditure in the first year and the honorary work contributed by several key people, there are sufficient reserves to sustain AMSI through 2005-06.

In concluding, I would like to thank the staff of AMSI and personnel of the Department of Mathematics and Statistics of The University of Melbourne for their unstinting contributions to our success. Above all, I wish to record my gratitude to the Chairman and members of the Board and AMSI members throughout Australia for their support and for the way they have enthusiastically embraced AMSI's vision of a bright future for Australian mathematics.

Garth Gaudry
Director

Report from the Deputy Director

Geoff Prince

The AMSI Deputy Director position as defined by the Joint Venture Agreement is an honorary one, with full Board membership. I was appointed as Deputy Director in February 2004. With the agreement of my home institution, Latrobe University, I have spent one day a week working for AMSI at Barry Street, Carlton, Victoria. As Deputy Director I represent members at AMSI executive meetings. I have been closely involved in the growth of IT support for AMSI and ICE-EM, the overhaul of AMSI's website and development of careers material for ICE-EM.

I have also been coordinating development of ICE-EM's Access Grid Room (AGR) program. The program will see installation of an AGR for the use of members' mathematical sciences departments over the life of the ICE-EM grant. These grid rooms will form a national facility for delivery of undergraduate and postgraduate courses amongst member institutions, national and international collaborative research and for lectures and seminars. The program will place mathematical sciences at the forefront in this mode of e-research, with wide-ranging implications over the next five years.

In the second half of 2004, we will hold a grid room workshop for AMSI members in Canberra to acquaint them with issues of cost, design and function. The workshop will be followed by development of ICE-EM policy for the AGR program and an AGR funding agreement between ICE-EM and recipient institutions.

The rollout of Access Grid Rooms to AMSI member institutions under the ICE-EM grant will begin in earnest in early 2005. A number of member institutions have indicated their intent to apply to ICE-EM for AGR funding in the first round, with completion dates in 2005. ICE-EM is undertaking software and hardware development to provide member institutions with advice about implementation of tools specific to the mathematical sciences. These include whiteboard technologies and sharing of applications software, as well as the provision of design and construction information. Member institutions are already discussing joint teaching projects using the technology and, with the first grid rooms installed, 2005 will see a significant increase in collaborative teaching ventures.

Report from the Chair of the Scientific Advisory Committee

The Scientific Advisory Committee approved funding for 14 meetings in 2003-04, three more than in the previous year. However, the range of fields was arguably greater than last year's. For example, in the first half of 2004, we supported activities in areas as diverse as finance, cryptography, computational biology, probability theory and geometry.

This extraordinary variety, as well as the mathematical depth of our meetings, has been a major highlight of the past year's activities. Our activities have drawn invited speakers and regular participants from across the globe. Within Australia, we have attracted mathematical scientists working right around the country, and employed by different cultures - industry, government and universities.

Indeed, this meeting of cultures has been one of the great successes of AMSI's workshops and conferences during the last year. We've had speakers from the Westpac Banking Corporation and the University of Zurich, and many places between. We've established a Visiting Lecturer program, hosted jointly with the MASCOS Centre of Excellence. The first speaker, Wayne Getz from the University of California, Berkeley, will tour the country later this year, delivering lectures on the theory and practice of epidemics, and other topics in mathematical biology.

A complete list of AMSI and AMSI/MASCOS meetings appears later in this report.

Judging by the success of the past year, and the new meetings that have been approved or are in the pipeline, next year will be even more exciting and dynamic.

Peter Hall

Report from the Chair of the Education Advisory Committee

On 27 January 2004, Dr Brendan Nelson, Minister for Education, Science and Training, announced that the International Centre of Excellence for Education in Mathematics (ICE-EM) would be managed by AMSI. ICE-EM, worth $7.8 million over four years, provides a strong foundation for AMSI's education program. The Education Advisory Committee has become, in effect, the advisory committee for the schools section of ICE-EM.

The Committee met four times in 2003-04 and started a number of projects. Activity will be accelerated with the appointment of Dr Nancy Lane who will be starting in August 2004 as Manager and Interim Director of ICE-EM. Other positions are being filled to develop materials for schools.

The largest ICE-EM project, in conjunction with the Australian Mathematics Trust, is known as the school resources project. A workshop was held at AMSI in May and involved about 20 people with experience in writing materials. Another is planned in Sydney during August 2004. The position of Schools Project Manager will be filled by September 2004. Already detail of the project is starting to emerge. It is expected that, in addition to printed materials, there will possibly be selected electronic versions.

Professor Galbraith from the University of Queensland is supervising a second project, Content Knowledge for Mathematics Teachers. This will detail the background and training considered ideal for mathematics teachers at different levels. It is intended an Australian version of material from the US will be produced. It will guide AMSI's and ICE-EM's professional development program for teachers, and assit development of pre-service and re-training programs for mathematics teachers. One workshop has been held at AMSI and two more are planned for Brisbane and Adelaide. At the workshops, smaller groups discuss particular year levels, such as Kindergarten to Year four, or Years five to eight, and focus on the mathematical knowledge teachers need at these levels.

An in-service project designed to update the mathematical knowledge of existing teachers is to begin almost immediately. Two weeklong workshops are to be held for teachers in the September 2004 break, one in Melbourne and one in Sydney. Professor Hsi-Hung Wu from the University of California, Berkely, US, will conduct the workshops. In addition the Education Advisory Committee will meet with Professor Wu and benefit from his acknowledged expertise in this area.

The Committee has looked at further projects, including the possibility of developing an interactive problem-solving program for students on the Internet.

The committee also intends to monitor statistics on the take up of mathematics study at high schools at Years 11 and 12, continuing work that had been carried out for several years by Professor John Malone of Curtin University of Technology. Dr Frank Barrington of The University of Melbourne has led this work so far, with assistance from Dr Peter Brown of The University of New South Wales.

Finally I would like to thank committe members for all their hard work throughout the year.

Peter Taylor

Report from the Chair of the Industry Advisory Committee

This year AMSI has made significant progress in efforts to facilitate uptake and use of the mathematical sciences by industry.

Highlights for the year included: completion of a Marketing Strategy Plan by McKinsey and Co; completion of an Industry Marketing Strategy and Plan report by C. Balnaves; the appointment in late June of an Industry and Marketing Manager, Dr Thomas Montague; and scoping and development of projects with the Australian Mining Industry Association (AMIRA), a major bank, a mining company and an Australian car manufacturer.

The McKinsey and Co report identified five strategic priorities to help improve the value proposition — products and services — that AMSI offers to its members and industry. The strategic priorities included raising awareness of the value of mathematics and improving the experience and capability of middle-year students, an ICE-EM focus.

Other priorities included:

- bringing mathematicians and industry together to identify industry needs and the skill base required
- attracting and developing high quality, high-profile researchers by soliciting funds to support symposia, conferences and hosting short term visits
- creating opportunities for postgraduates by promoting the benefits mathematics has to offer to individuals, industry and government

The Balnaves marketing report was more detailed in scope and content and included a SWOT analysis, commercialisation programs, opportunities and organisational issues.

Looking forward on the industry front, we are conducting an industry skills audit of member institutions to identify the capability, capacity and inclination of member staff to undertake industry projects. A portfolio of industry programs is being developed to link the skills resident in AMSI to perceived industry and community needs.

Future industry programs are likely to focus on — but are not limited to — triple bottom line risk management, supply chain optimisation, energy management and healthcare systems and technologies. We are continually developing systems to help mathematical scientists and potential industry partners interact while searching for new cooperative opportunities that work.

Our success to date has depended on the considerable help provided by the AMSI Board, the Industry committee, the cohesive nature of AMSI's institutional members, the depth of mathematical talent willing to assist with very real problems as they present themselves and the generosity of our industry partners. On behalf of the AMSI Industry Committee and myself, I would like to thank all who have contributed to our progress in linking AMSI with industry and those it serves, the members.

Robert Watts

Report from the Interim Director of the International Centre of Excellence for Education in Mathematics

Nancy Lane

INTERNATIONAL CENTRE OF EXCELLENCE FOR EDUCATION IN MATHEMATICS

The ICE-EM contract was signed on 16 June 2004 with the Department of Education, Science and Training. From the grant announcement in January 2004, AMSI staff undertook a number of activities in preparation.

The position of Interim Director was advertised, and Dr Nancy Lane was appointed. She will take up the position on 16 August 2004. A Schools Project Manager position was also advertised, with a decision expected in early August. Other staff positions filled include Multimedia Manager (part-time) and Administrative Assistant (temporary). Further positions will be filled in the next financial year.

Planning is well underway for the first advanced coursework program, the Winter School on Computation Biology, to be held from 5-9 July 2004 at The University of Queensland. It will be conducted jointly by ICE-EM and The University of Queensland's Centre for Bioinformatics and Department of Mathematics and Statistics. The School's Director is Professor Mark Gould. It is expected that lectures from the Winter School will be taped for video streaming on the ICE-EM website.

Planning has started for two more coursework programs, both to be held at The Australian National University.

- The BioInfoSummer Bioinformatics Symposium, headed by Dr Conrad Burden, will be held from 6-10 December 2004. ICE-EM will provide 30 postgraduate scholarships for students from AMSI member institutions and, following the event, will video stream the lectures on its website.
- The ICE-EM/AMSI Summer School, headed by Dr Markus Hegland, will be held between 10 January and 4 February 2005 in conjunction with the Australian Partnership for Advanced Computing and Machine Learning Summer Schools. ICE-EM will fund the Summer School, and in particular, support travel and accommodation for postgraduate students from AMSI member institutions.

An Advanced Coursework Program Committee has been established, with Professor Neil Trudinger FAA FRS as Honorary Director. This group will coordinate efforts to develop the Graduate School for doctoral level students, to be held in Brisbane, 4-22 July 2005.

AMSI members are being introduced to the concept of Access Grid Rooms, with applications for their development available in early 2005. AMSI Deputy Director, Associate Professor Geoff Prince, is coordinating this project. There are further details in his report.

Several workshops have been held to develop school mathematics projects, and others are planned. An initial writers' meeting was held on 2 May and two themes were chosen for initial work: fractions for Years six to seven and geometry for Years five to six. Dr Frank Barrington and Dr Michael Evans are leading these two projects. A second writers' meeting will be held at The University of New South Wales on 1 August 2004. It is expected this project will result in a series of textbooks covering Years five to 10, supplemented by teacher professional development workshops and website support.

Planning is underway for two teacher professional development workshops with Professor Hung-Hsi Wu, Professor of Mathematics at the University of California, Berkeley. These will be held in Sydney and Melbourne during September school holidays, and ICE-EM will offer travel and accommodation support for interstate teachers. Professor Wu is especially noted for his work with teachers in the areas of fractions and geometry.

Content Knowledge for Mathematics Teachers workshops will identify the mathematical content at various year levels that should be incorporated in courses for pre-service teachers and professional development workshops for in-service teachers. The first workshop was held in Melbourne on 19 October 2003. The next two will be held in Brisbane in August 2004 and Adelaide in November 2004. Each involves about 30 invited participants, including mathematicians, mathematics educators and teachers.

Professor Peter Galbraith of The University of Queensland will head the Content Knowledge project. Chairpersons are Barbara Clarke, Monash University (early years), Marj Horne, Australian Catholic University and Graham Meiklejohn, Queensland consultant (middle years), and Bill Pender, Sydney Grammar School (senior years). A starting point for the Australian project will be the large body of US work done in content knowledge in the past few years.

Colourful banners and brochures featuring successful graduates who use mathematics and statistics in their careers were produced and first used at The Age Careers Expo in March. They are now being used throughout Australia by AMSI member institutions for open days, careers fairs, and other events. A large ICE-EM banner has been designed for use at an exhibition booth at the International Congress on Mathematics Education, to be held in Copenhagen, Denmark on 4-11 July 2004.

The firm DesignGrant has been engaged to produce a full range of ICE-EM stationery and provide guidelines for developing the ICE-EM website. The URL www.ice-em.org.au has been reserved for this purpose. Consultant Diana Wolfe of WolfeWords has been engaged by ICE-EM to provide expert advice with respect to publicity.

Report from the Executive Officer

Jan Thomas

In 2003-2004, my priorities as Executive Officer of AMSI have been monitoring and responding to policy and political issues impacting on AMSI's interests, and working with the Director, especially on matters concerned with members. This has included assisting with the management of the Board and Members meetings.

My involvement in the 5th International Congress on Industrial and Applied Mathematics (ICIAM) that was held in Sydney, 7-11 July 2003 and the successful bid for International Centre of Excellence for Education in Mathematics (ICE-EM) were particular highlights of the year.

With more than 1700 participants, ICIAM was a real fillip for Australian mathematics. As a member of the management committee, it was wonderful to be involved in such a successful event. AMSI had a significant presence that included sponsorship of Education Day. At ICIAM, Garth Gaudry and I met twice with the head of the Division of Mathematical Sciences of the USA National Science Foundation, Bill Rundell. The meetings provided valuable insights into arrangements for mathematical institutes in other countries, management of research funding in the US, and an international perspective on the shortage of mathematical scientists. Dr Thomas Barlow, science advisor to Dr Brendan Nelson, Minister for Education, Science and Technology, attended one on these meetings.

The success of AMSI in getting funding for ICE-EM has given particular impetus to our educational programs. Minister Nelson formally announced that AMSI would manage ICE-EM at the 2004 Summer School held at The University of New South Wales. As in 2003, he spent considerable time talking to students and was complimentary about his interactions with them.

At conferences and meetings, including the International Conference on the Psychology of Mathematics Education in Hawaii and the Southern Hemisphere Symposium on Undergraduate Mathematics Teaching (DELTA) in New Zealand, I was able to promote AMSI and ICE-EM and encourage international collaboration. Late in June 2003, I represented the Australian Mathematical Society at the council meeting of the European Mathematical Society in Uppsala, Sweden. This gave invaluable contacts and information, especially in regard to policies affecting the mathematical sciences in Europe. At all events there has been considerable interest in ICE-EM and AMSI, seen as unique. In July 2004, ICE-EM will share display space with other Australian mathematics education groups at the International Congress on Mathematical Education in Copenhagen. I have arranged for the Australian Ambassador to Denmark, Matthew Peek, to visit the display.

I continue to pay particular attention to the supply of mathematics teachers. As a member of the Reference Group on Teachers and Teacher Education, I attended the final meeting of the group in July 2003 and was invited to the launch of the multi-volume final report in October 2003. To date, the review appears to have had little impact on issues concerned with mathematics teachers and teaching.

AMSI has identified that teachers' knowledge of the mathematics they are teaching is a neglected and important issue needing attention. A project was started in 2003 to define appropriate content for mathematics teachers, with a workshop in October 2003 that I organised with Peter Taylor, Chair of the Educational Advisory Committee. This initial work will now be developed as an ICE-EM project. It has potential to influence pre-service teacher education and guide professional development and retraining programs for existing teachers.

The teachers' knowledge project has implications for professionals from other fields who want to become teachers. I have been meeting with representatives from Engineers Australia, the Australian Computing Society and the Association of Professional Engineers and Managers. A retraining proposal has been drafted and provided to the Victorian and Federal governments.

In a collaborative venture with the Mathematical Association of Victoria, colourful banners and brochures were produced for a Careers Fair held at Caulfield Racecourse in March this year. These have had considerable use elsewhere since. Diana Wolfe, our communications and media expert, coordinated the project and was ably assisted by DesignGrant who did the designs and printing. AMSI sponsored Clio Cresswell—of Mathematics and Sex fame—for a featured lecture that attracted a good audience.

The most enjoyable activity this year was visiting our member institutions and potential members. The Director and I made a number of visits to member institutions and wish that there had been time for more. These visits and the Members Meetings are particularly important as they facilitate discussion between all AMSI members and are an important part of AMSI's communications. The dinner held between the AMSI meetings and Heads of Mathematical Sciences meeting in February was a very pleasant occasion and also allowed valuable time for informal networking. It is intended the dinner will be an annual event.

Two important decisions were made during the year in relation to participation of AMSI members at various meetings. The first, made in February 2004 at the annual Heads of Mathematical Sciences meeting, was that this meeting should look broadly at issues affecting mathematical sciences in the universities. To facilitate this, the list of those to be invited to Heads meetings has been extended to include the Directors of AMSI and MASCOS, presidents of professional societies, and others who have significant leadership roles.

The second came from the Board meeting in June 2004, where it was decided that there would be some reimbursement for members attending the mid-year, stand-alone Members Meeting. It was agreed that this be up to $250 for those from States adjacent to the venue, and $500 for those more distant.

One of my most pleasant experiences during the year was being part of the conference in Garth's honour held 26-27 May at The University of NSW. I was able to pay tribute to his contribution to the mathematical sciences other than to research, and especially that associated with AMSI.

On broader issues, I believe we should still be concerned with the overall declining situation of the mathematical sciences in universities. There is still little evidence that any of the many talented younger people overseas are returning, certainly not in the numbers that continue to leave. This is against a background of continued retirements that should be resulting in positions. Even more concerning is the fact that job advertisements are failing to materialise for on-going, relatively senior positions that might attract overseas applicants.

AMSI is a national collaborative venture in which I am proud to be a participant. It is beginning to address some of the major challenges in the mathematics sciences in Australia. It has the support of Federal and State governments and I believe we can address the issues that still lie ahead.

Report from the Director of MASCOS

Tony Guttmann

MASCOS has had a demanding but exhilarating growth period in the past twelve months. The Federal Minister for Science, Hon. Peter McGauran, officially opened our premises on 14 May 2004, at a well-attended function at 139 Barry Street, Carlton.

Activities with AMSI include the appointment of Dr Thomas Montague as our joint Industry/Marketing Manager. AMSI and MASCOS collaborate closely in applications areas, and one of Tom's major roles is to bring this cooperation with industry, government and other research centres into effect.

We have appointed a number of PhD students and post-doctoral research fellows to MASCOS. Three research fellows, Ian Enting, Iwan Jensen and Robert Parviainen have been designated AMSI Research Fellows. They were selected, based on their record of research excellence and the relevance of their field to our joint interests, by the Directors of AMSI and MASCOS. Iwan Jensen works on enumeration methods, and is responsible for a number of the fastest algorithms for graph enumeration. Robert Parviainen works in percolation theory, which blends probability, physics, and application areas such as porous media studies.

Ian Enting is a Professorial Research Fellow. His work focuses on two topics related to greenhouse gas and global climate change. The first involves consistency checks on the statistical analysis applied to measurements of greenhouse gas concentrations, to deduce sources and sinks of these gases. In conjunction with CSIRO, these techniques are being further developed to tackle problems such as interpreting pollution statistics or verifying geosequestration of carbon dioxide. The second research topic addresses the systematic analysis of uncertainties in global climate change. The aim is to quantify risks associated with alternative policy options.

AMSI and MASCOS have also created fellowships to enable those scientists, not directly involved with MASCOS, to visit a MASCOS partner site for joint research with a MASCOS Chief Investigator. To date, two have been awarded - John Roberts from The University of New South Wales to work with Reinout Quispel at La Trobe University, Victoria, and Michael Stewart from The University of Sydney to work with Peter Hall at The Australian National University, Canberra. The new position of Industry Fellow will also allow individuals from industry to spend time working with MASCOS partners on industry problems where MASCOS's knowledge of particular mathematical methods might help. The first such appointee is David Shteinman, of Stamen Paper Pty Ltd, who works with the MASCOS team at The University of New South Wales.

We have also worked together supporting a conferences and workshops of interest to a broad range of participants in the mathematics community. Eight events were held and are listed later in this report. These activities, when held in Melbourne, often take place at the AMSI premises at The University of Melbourne. Similarly, MASCOS seminars, a broad series of interesting seminars in any area of complex systems, frequently take place at AMSI premises.

AMSI and MASCOS enjoy a mutually supportive relationship that benefits both organisations and the Australian mathematical sciences community.

Committee Membership

Executive Committee

- Professor Garth Gaudry (Director)
- Professor Tony Guttmann (Director, MASCOS)
- Associate Professor Geoff Prince (Deputy Director)*
- Ms Jan Thomas (Executive Officer)

* From February 2004

Education Advisory Committee

- Professor Peter Taylor (Australian Mathematics Trust) (Chair)
- Mr Bill Akhurst (Australian Mathematics Trust)
- Dr Frank Barrington (The University of Melbourne)
- Ms Elizabeth Burns (Loreto Mandeville Hall)
- Ms Teresa Dickinson (Australian Bureau of Statistics)
- Professor Peter Galbraith (The University of Queensland)
- Dr Bill Pender (Sydney Grammar School)
- Professor Cheryl Praeger (The University of Western Australia)
- Ms Jan Thomas (Australian Mathematical Society & AMSI)

Scientific Advisory Committee:

- Professor Peter Hall (The Australian National University) (Chair)
- Professor Garth Gaudry (Director, Ex Officio)
- Professor Frances Kirwan (University of Oxford)
- Professor Terry Tao (UC, Los Angeles; Clay Mathematics Institute)
- Professor Terry Speed (UC, Berkeley; Walter and Eliza Hall Institute)
- Professor Leon Simon (Stanford University)
- Professor Neil Trudinger (The Australian National University)

Industry Advisory Committee:

- Dr Robert Watts (BHP Billiton) (Chair)
- Professor Bill Appelbe (VPAC)
- Dr James E. Lewis (Parkview Group)
- Dr Tim Littlejohn (IBM/Biolateral)
- Dr Thomas Montague (AMSI/MASCOS)

Human Resources

Salaried

- Professor Garth Gaudry (Director) from 1 August 2003
- Ms Jan Thomas (Executive Officer) from 0.5 to full-time from 1 September 2003
- Dr Thomas Montage (Industry/Marketing Manager) from 21 June 2004
- Ms Kate Dumas (Executive Assistant) to 14 August 2003
- Ms Narelle Brummel (temporary) from 4 August to 24 October and 17 November to 5 December 2003
- Mr Graham Keen (Executive Assistant) from 20 October 2003
- Ms Edwena Dixon (temporary) from 8 March 2004
- Mr David Hardy (IT support) 0.4 time fraction to 20 May 2004
- Mr Cameron Mitchell (IT support) 0.4 time fraction from 17 May

Consultants

- Mr Lindsay Bevege
- Mr Charles Balnaves
- McKinsey & Company

Visitors

- Professor Kathy Horadam, RMIT University
- Dr John Schutz, La Trobe University (Bendigo campus)
- Dr Ian Enting, CSIRO
- Professor Stuart Whittington, University of Toronto

Media and Publicity

- Ms Diana Wolfe (Wolfe Words)

Key Activities

The activities listed here complement, and provide some additional information, to those already noted in earlier sections of this report.

Board meetings

Meetings of the Board were held on 7 October 2003 and 29 January (teleconference), 12 February, 15 April (teleconference) and 6 June 2004.

Table of Board attendances

	7 October	29 January	12 February	15 April	6 June	Total
James E. Lewis	Yes	Yes	Yes	Yes	Yes	5
Tim Littlejohn	Yes	No	Yes	Yes	No	3
Judith Downes	Yes	Yes	Yes	Yes	No	4
Hyam Rubinstein	Yes	Yes	Yes	Yes	Yes	5
Garth Gaudry	Yes	Yes	Yes	Yes	Yes	5
Tony Guttmann (to 12 February)	Yes	No	Yes			2
Mark Gould (to 12 February)	Yes	No	Yes			2
Jim Williams (to 12 February)	No	Yes	Yes			2
Don Taylor (from 12 February)			Proxy	Yes	Proxy	1
Chris Radford (from 12 February)			Yes	Yes	Yes	3
Geoff Prince (from 12 February)			Yes	Yes	Yes	3

Members Meetings

12 February 2004 at The University of New South Wales.
6 June 2004 at the Institute for Advanced Study, La Trobe University.

Key Activities

AMSI Scientific Program

The Second National Symposium On Financial Mathematics *
Sydney, International Congress on Industrial and Applied Mathematics, 9-10 July 2003.

Conference On Differential Geometry & Differential Equations
La Trobe University, Melbourne, 14-18 July 2003.

Workshop On Universal Algebraic Techniques In Semigroup Theory And Algebraic Logic
La Trobe University, Melbourne, 29 September - 1 October 2003.

Symposium On Statistical Learning
The University of NSW, Sydney, 2-3 October 2003.

Workshop On Quantum Groups And Braid Groups
The University of Sydney, 12-14 November 2003.

Workshop On The Mathematics Of Computer Security
Deakin University, held at AMSI, Melbourne, 19-21 November 2003.

Symposium On The Mathematical Foundations Of Signal Processing
The University of Melbourne, held at AMSI, Melbourne, 1-12 December 2003.

Summer Symposium In Bioinformatics
The Australian National University, Canberra, 1-5 December 2003.

Research Symposium On Non-linear Partial Differential Equations And Their Applications
The University of New England, Armidale, 9-12 December 2003.

Workshop On Continuous Optimisation And Optimal Control With Applications
The University of Ballarat, held at AMSI, Melbourne, 15-16 December 2003.

Working Applications Of Discrete Mathematics
The University of Queensland, 14-16 January 2004.

Geometry Of Generalised Dirac Operators
The Australian National University, Canberra, 10-12 March and 14 April 2004.

Conference In Harmonic Analysis
The University of NSW, Sydney, 26-28 May 2004.

WORKSHOP ON MATHEMATICAL METHODS IN FINANCE
Monash University, held at AMSI, Melbourne, 7-11 June 2004.

* Note: This was part of an extensive involvement of AMSI in the 5th International Congress on Industrial and Applied Mathematics (ICIAM) held in Sydney, July 7-11.

AMSI/MASCOS Scientific Program

Conference In Ergodic Theory And Dynamics
University of Technology, Sydney, 7-10 July 2003.

Mathematics Research Centres - An International Perspective
Sydney, 9-11 July 2003.

Workshop On The Mathematics Of Computation And Approximation
The University of NSW, Sydney, 14-15 July 2003.

Workshop On Monte Carlo In Complex Systems
The University of Melbourne at AMSI, Melbourne, 10-14 November 2003.

Workshop On Computational Analysis On The Sphere
Vanderbilt University, Nashville, Tennessee, USA, 6-8 December 2003.

Workshop On Scientific Computation And Geometric Integration In Complex Systems
La Trobe University, Melbourne, 12 December 2003.

Workshop On Probability Approximation In Complex Systems
The University of Melbourne at AMSI, Melbourne, 12-14 January 2004.

Conference On The Cross-entropy Method: A New Approach To Rare Event Simulation And Randomised Opitmisation
The University of Queensland, Brisbane, 22 January 2004.

Workshop On Probability And Its Applications
The University of Melbourne at AMSI, Melbourne, 14 May 2004.

Education Programs

- AMSI Summer School, January/February 2004, at The University of New South Wales.
- Sponsorship of Education Day at ICIAM and professional video-taping of the presentations for editing and broader distribution, including to schools.
- Workshop on Content Knowledge for Mathematics Teachers, held at AMSI, 19 October 2003.
- Workshops on materials for schools, held at AMSI, 2 May 2004.
- The Age Careers Fair, March 2003, in partnership with the Mathematical Association of Victoria—banners and brochures designed and printed.
- Brochures distributed at Mathematics Fair, The University of Melbourne, 16 June 2004.
- Professor Garth Gaudry, Professor Peter Taylor and Ms Jan Thomas present the Anniversary Lecture at the Annual Mathematical Association of Victoria Conference, Monash University, 5 December 2003.

Industry and marketing

- Purchase of appropriate hardware for the production of materials—colour printer and equipment for video and photographic recording.
- DL card describing AMSI, designed and printed.
- Extensive data-base of Australian Biotechnology companies established and sent information on forthcoming symposia.
- Strategic plan completed by McKinsey & Company.
- Marketing plan completed by C. Balnaves.

Key Activities

Other

- Announcement of ICE-EM by Dr Brendan Nelson at The University of New South Wales, 27 January 2004
- ICE-EM contract signed, 16 June 2004.
- Official opening of MASCOS headquarters: 14 May 2004.
- Participation of Pam Owen (from Victorian STI) in ICIAM—a number of participants were interviewed and assisted with seeking employment in Australia.
- WiseNet meeting hosted at AMSI, 29 October 2003.
- ARC Network for Securing Australia meeting, arranged by Professor Lynn Batten, hosted at AMSI, 23 February 2004.
- ARC Network for Mathematics and Society meeting, arranged by Professor Phil Howlett, hosted at AMSI, 24 February 2004.
- Monthly committee meetings and lectures hosted for the Australian Society for Operations Research from February 2004.

File Ref. 95/01170
JT /gran28
RN: 2004/089
Attchs.

THE UNIVERSITY OF MELBOURNE

30 September 2004

The Minister for Innovation
Department of Innovation, Industry and Regional Development
13th Floor, 55 Collins Street
Melbourne 3000

AUSTRALIAN MATHEMATICAL SCIENCES INSTITUTE

The audit opinion is prepared for the purpose of the Grant Agreement dated 2 November 2002 ("the Agreement") between the Minister for Innovation and The University of Melbourne.

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 2003 to 30 June 2004 and letters from Professor Garth Gaudry to the Department of Innovation, Industry and Regional Development pertaining to In-kind contributions – which specify an amount of $780,947.38 of expenditure on the Program, and an amount of $503,750 of contributions by Melbourne University and 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 (both cash and in-kind) 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 $780,947.38 in expenditure on the Program;
- the contributions of Consortium Members to the Program are $480,000 cash and $23,750 in-kind (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,

P.J. McGrath

PJ McGrath
Director, Internal Audit

Internal Audit Office
The University of Melbourne Victoria 3010 Australia
Telephone: +61 3 8344 0844 Fax: +61 3 8344 0847

THE UNIVERSITY OF MELBOURNE

The University of Melbourne
Department of Mathematics and Statistics

Financial Statement of Income and Expenditure for the Period 01/07/2003 - 30/06/2004

Project Title:	**STI Infrastructure Grant to Establish the Australian Mathematical Sciences Institute**
Granting Body:	**State of Victoria - Department Of Innovation, Industry and Regional Development**
Investigator Name:	**Professor Garth Gaudry**
Our reference:	**79949 GEN**

INCOME	**$**
State of Victoria - Department Of Innovation, Industry and Regional Development	400,000.00
Consortium members contribution:	
The Universtity of Melbourne	-
Other Consortium members	480,000.00
	480,000.00
Total Income for the reporting period	**880,000.00**
EXPENDITURE	
Personnel	296,154.53
Materials and Supplies	197,323.68
Equipment	52,115.78
Training	1,690.00
Travel	233,663.39
Total Expenses for the reporting period	**780,947.38**
Unexpended Funds	**99,052.62**
Carryforward Balance as at 30/06/2003	**623,004.98**
Balance	722,057.60

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

Deputy Director Of Finance R.Lodhiya — 28-Sep-2004

AUSTRALIAN MATHEMATICAL SCIENCES INSTITUTE

September 17, 2004

Director,
Science, Technology & Innovation
Department of Innovation, Industry and Regional Development

I hereby certify that the salary split and in-kind contribution from the consortium member, The University of NSW, for the period 1st July 2003 to 31st July 2003 was for the purpose of the Australian Mathematical Sciences Institute.

GARTH GAUDRY: 20% of salary plus on-costs as Professor at UNSW (with loading) for July 2003. Estimated value 50% of 1/12 of $150K = $6,250.

I also certify that the salary split and in-kind contribution from The University of Melbourne listed below for the period 1st July 2003 to 31st January 2004 was for the purpose of the Australian Mathematical Sciences Institute.

TONY GUTTMANN: For the period July 2003 to end January 2004, the value of in-kind contribution as 50% of salary plus on-costs, equivalent to 20% of 7/12 of $150K = $17,500.

Yours sincerely,

Professor Garth Gaudry
Director - AMSI

AMSI – Australian Mathematical Sciences Institute
111 Barry Street
C/- University of Melbourne 3010

Tel: 613 8344 1772
Fax: 613 9349 4106
Website: www.amsi.org.au

Financial Statements

Statement of Financial Performance

	Year July 03 to June 04		
	Expense	**Capital**	**Total**
Income			
STI Grant	400,000		400,000
Other Income:-			
Memberships/Subscriptions	480,000		480,000
Other	0		0
Total Income	**880,000**		**880,000**
Expenditure			
Salaries & Wages - Incl oncost	296,155		296,155
Contracted & Professional Services	58,079		58,079
FBT & Other Taxes	2,195		2,195
Consumable Materials & Provisions	8,341		8,341
Student Training	1,690		1,690
Domestic Travel & Accomodation	56,452		56,452
I'national Travel & Accomodation	10,818		10,818
Student Travel & Excurursions	29,000		29,000
Seminar/Conference/Event Registration	125,082		125,082
Living Away from Home	12,312		12,312
Utilities	3,372		3,372
Entertainment	15,398		15,398
Computer Software & Services	9,654		9,654
Asset Expense Under $1000	3,036		3,036
Asset Expense $1000-$9999	14,368		14,368
General Expenses/Contingency	(4,863)		(4,863)
Advertising & Promotional Material	11,202		11,202
Internal - Overhead Expense	(2,420)		(2,420)
Internal Research - Partner Contribution	100,000		100,000
Internal - Design & Print	5,421		5,421
Internal - UCS Assets - Expense	12,068		12,068
Internal - UCS Consumables	1,995		1,995
Internal - General Operating Expense	1,909		1,909
Internal - Assets CAPITAL		9,683	9,683
Total Expenditure	**771,264**	**9,683**	**780,947**
Profit /(Loss)	**108,736**	**(9,683)**	**99,053**

Statement of Financial Position

	As at 30 June 2004
	$
Assets	
Cash	722,058
Property Plant & Equipment	
Capitalised Expenditure (Note 1.)	0
Total Assets	722,058
Liabilities	
Provision for Holiday Pay	0
Equity	
Retained Profit B/F	623,005
Profit/(Loss) for the year	99,053
Total liabilities and equity	722,058

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.

Statement of Cash Flow

	Year Ended 30 June 2004
	$
Operating Cash Flow/(Outflow)	
Income	480,000
Operating Expenses - Cash	780,947
EBIT	(300,947)
Depreciation	0
EBITDA	(300,947)
Interest	0
Taxes	0
Total Operating Cash Flow	(300,947)
Financing Cash Flow	
STI Grant	400,000
Opening Cash	623,005
Change in Cash	99,053
Closing Cash	**722,058**

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