RESEARCH TRAINING SYSTEM REVIEW

Submission to the ACOLA Expert Working Group
August 2015

INTRODUCTION

The Australian Mathematical Sciences Institute (AMSI) and its members welcome this ACOLA review and the opportunity to make a submission concerning the research training environment.

The mathematical sciences in Australia have a proud record of training HDR graduates. The Australian PhD in mathematics and statistics has a strong international reputation, evidenced in part by the success of our expatriates who have begun their stellar careers with an Australian PhD.

Through the creation of AMSI we have, since 2003, put in place national research training infrastructure which is the envy of many and which services university departments both large and small. As a progressive discipline we look forward to continuous improvement in the quality of the HDR experience and in the agility of our students as they take up careers in academia, government agencies and the private sector. For our part we are working on the formation of a national graduate school to provision advanced coursework and a distributed national research centre to strengthen our mathematical capacity. It is our strong view that change must be built on the success of our current system and that considerable gains can be made by regulatory reform of candidature and scholarship systems. This reform will maintain the international competitiveness of our degrees and improve the impact of our graduates across the economy and the broader community.

AMSI gives its strongest possible support to the Chief Scientist, Professor Ian Chubb, in his aspiration for a national STEM plan and to this government in its efforts to realise this vision. Research and research training are part of that plan. It is our firm belief that any changes to the research training environment in Australia must be an integral part of this national agenda. The success of a national STEM strategy hinges on the implementation of coordinated and strategic measures which are independent of the electoral cycle and so have bipartisan support. This review therefore has an unprecedented opportunity to recommend changes which will have a generational impact.

Before responding to the consultation questions we wish to identify some relevant features of our discipline and its research training.

The mathematical sciences are intrinsically international. Universities around the world are the engine of advances in theoretical and applied mathematics and statistics. These advances remain a fundamental part of the scientific and technological revolution and essential to productivity growth and innovation in the economy. For these reasons it is critical that Australia's university based mathematical sciences enterprise remains vibrant and we must continue to train academics to undertake teaching and research. Our research training system must continue to serve this purpose.

Mathematicians and statisticians are very often engaged in cross-disciplinary research in both public and private sectors. Our HDR graduates must be prepared with this in mind. The best cross-disciplinary outcomes come from the deep, discipline-based knowledge of the researchers. We must continue to train mathematical sciences graduates with this deep knowledge and so our research training system must retain the close engagement of the student and the supervisor and the comprehensive thesis of original work prepared over three to four years.

Australia has a poor record of employment of HDR graduates in the private sector and an even poorer one of research collaboration between universities and the private sector. Clearly our graduates must

be trained for wide range of careers but at the same time Australian companies have to engage more fully through their own in-house graduate programs. In our responses to the consultation questions we have identified a range of measures aimed at turning this situation around in the mathematical sciences. However, without removing obstructions on both sides progress will falter.

We're attaching the relevant AMSI policies extracted from the 2015 Policy Document (http://amsi.org.au/publications/a-vision-for-a-maths-nation/) and the AMSI Research and Higher Education Diversity Policy.

CONSULTATION QUESTIONS

Producing High Quality Researchers

1. What are the research skills and experiences needed to be an effective researcher?

This response concerns the mathematical sciences. We don't specifically deal with the domain in which the researcher operates. In general, we believe that out HDR graduates possess these skills and that the university sector facilitates the experiences listed below. Mathematical sciences academics exercise a strong duty of care in their mentoring of HDR students.
The following are critical to the effectiveness of mathematical sciences researchers:

- Mastery of the sub-discipline area sufficient for independent creativity, originality, improvisation and critical analysis
- A broad understanding of diverse parts of the whole discipline and cognate areas
- A high level of competency in mathematical rigour
- A high level of competency in problem formulation
- A commitment to "reproducible & verifiable results" (see note below) in both theoretical and applied sub-disciplines
- A clear understanding of research ethics and ethical behaviour in research
- The possession of
  - a flexible set of research tools depending on the area, such as scientific programming, statistical analysis of data, simulation methods
  - communication, networking skills – sufficient to communicate with wide set of peers in a variety of disciplines
  - Scholarly skills: technical writing, speaking at seminars / conferences, collaborative skills
  - Experience in a variety of research cultures –departmental/divisional, national, international, learned and professional societies.

Note: Reproducibility and verifiability are fundamental to the integrity of research in the mathematical sciences. For example, the results of statistical analysis of data sets and claims of relative performance of algorithms must be reproducible on any software platform and proofs of theorems must be sufficiently accessible so as to be verified by peers (unlike Fermat's famous claim in the margin!).

2. What broader transferable qualities do HDR graduates need to develop to succeed in a wide range of career pathways? Should these skills be assessed, and if so, how?

Our response here ranges over specific qualities needed by mathematical sciences HDR graduates to more generic skills required by graduates in most disciplines. Although our undergraduate students are increasingly well-prepared with communication and teamwork skills, we would like to see greater opportunities available for our HDR students to obtain these skills at a higher level. We don't, however, believe that these skills should be formally assessed, rather that students and employers should be made aware of their efficacy, supported by evidence.

Many of the skills below are already widely acquired by the discipline's HDR graduates.

It is our firm belief that these skills should be the responsibility of both employers and universities.

Our list is

- Depth of discipline knowledge and processes – critical thinking, rigorous logic, problem solving skills. These are what makes the mathematical sciences graduate a valuable asset in a range of sectors
- Fluency in written technical communication
- General computational skills involving advanced package use and the ability to code algorithms symbolically or numerically
- The realised ability to apply their skill sets in a variety of research environments – commercial, government agency, national and international
- Research management skills – ability to plan and execute projects, at a level consistent with experience
- Effective teaching skills in a university environment (this clearly does need to be assessed!)
- Innovation and entrepreneurial experience, including but beyond short courses and obtained preferably through a mentored experience
- Teamwork/collaboration skills actively acquired in a research environment
- Critical thinking beyond the discipline confines
- The ability to spot and take opportunities, that is, intellectual agility
- Fluent communication with a non-academic audience – written and oral
- Fluent communication with peers across-discipline boundaries
- Effective written and oral communication with management of industry/companies/agencies
- Acquisition of business basics as applicable

3. What other broader capabilities should HDR graduates develop during their research training?

Our response here has two parts borrowing from the list above. The first is a list of capabilities which mathematical sciences should (and generally do) acquire during their candidature. The second is a list of capabilities which students should have the option to acquire.

Necessary capabilities acquired during candidature:

- Depth of discipline knowledge and processes – critical thinking, rigorous logic, problem solving skills. These are what makes the mathematical sciences graduate a valuable asset in a range of sectors
- Generic, high level skills:
  - Fluency in written technical communication
  - The realised ability to apply their skill sets in a variety of research environments – commercial, government agency, national and international
  - Teamwork/collaboration skills actively acquired in a research environment
  - The ability to spot and take opportunities, that is, intellectual agility
  - Fluent communication with peers across-discipline boundaries
  - Fluency with modern computational environments and internet communication tools

Desirable optional capabilities acquired through candidature:

- Research management skills – ability to plan and execute projects, at a level consistent with experience
- Effective teaching skills in a university environment
- General computational skills involving advanced package use and the ability to code algorithms symbolically or numerically
- Innovation and entrepreneurial experience, including but beyond short courses and obtained preferably through a mentored experience
- Critical thinking beyond the discipline confines
- Fluent communication with a non-academic audience – written and oral
- Effective written and oral communication with management of industry/companies/agencies
- Acquisition of business basics as applicable

Contributing to Australia's Future Prosperity and Wellbeing

4. What skills and capabilities do employers in Australia need from HDR graduates?

Australia's universities and government agencies continue to be major employers of mathematical sciences HDR graduates. The importance of this cannot be underestimated. And the decline in domestic HDR commencements[1] in mathematics, and especially statistics, is a cause for concern to universities looking for local talent, notwithstanding the international nature of the discipline. These employers are looking for the skills we identified in question 1, and in question 2 consistent with postdoctoral experience.

Many of AMSI's member universities are actively engaged with non-university employers of mathematical sciences graduates, including HDR graduates, and we have some insight into workplace requirements. This engagement is variously through Work Integrated Learning (WIL) programs, joint supervision and internships. Indeed, the ATN have an Industrial Doctoral Training Centre (IDTC) operating in the mathematical sciences. AMSI itself has a research internship program for HDR students, AMSI Intern, and an Industry Advisory Committee to the AMSI Board.

Overall it seems to us that those non-university employers who engage with mathematical sciences departments willingly communicate their requirements but also actively pursue in-house training of new graduates. On the other hand some major corporates no longer employ new, local HDR graduates but recruit internationally looking for HDR graduates with 3-5 years' experience. This is regrettable and both universities and employers need to work more closely to the benefit of our talented, young HDR graduates.

In summary, and in addition to many of the skills which we identified in questions 1 and 2, employers of mathematical sciences HDRs are looking for

- Skills and experience beyond narrow discipline boundaries eg. computer skills, data base management skills, synthetic skills, non-academic experience (non-academic sectors)
- Ability to apply technical skills across a variety of contexts (academic and non-academic)
- Ability to teach the next generation of students (academic)
- Ability to undertake independent research (academic and non-academic)
- Ability to provide quality control in commercial settings through the exercise of technical and intellectual rigour (non-academic)
- Ability to communicate well at all levels, written and oral (academic and non-academic)
- Ability to provide thorough solutions with recognition of industry need for timeliness (non-academic)
- Ability to quickly learn the required skills in other areas (eg finance, business, biotech)
- A sound and effective computational ability applicable to the domain (eg mining, telecommunications, data mining)
- Overall mental and technical agility (academic and non-academic)

[1] "Discipline Profile of the Mathematical Sciences 2015, Australian Mathematical Sciences Institute, 2015. http://amsi.org.au/publications/discipline-profile-of-the-mathematical-sciences-2015/

5. What research skills and capabilities are needed to ensure Australia's research system remains internationally competitive?

In broad terms the answer is "all of the foregoing".

Nonetheless the well-known facts that the private employment of HDR graduates in Australia is very low relative to the OECD and that research collaborations between companies and universities is even lower indicate that we are already uncompetitive. In the mathematical sciences the private employment of HDR graduates is patchy with healthy rates in finance and insurance (international marketplaces) but poor rates in general business (domestic marketplaces) where internationally mathematical optimisation and data science graduates are in heavy demand.

Start-up companies in the mathematical sciences have begun to appear in Australia and the capability to go into the "maths & stats business" should be nurtured in HDR students and postdocs.

On the public sector side, Australian HDR graduates in the mathematical sciences notably miss out on the significant amounts of high level coursework available in the USA and elsewhere where candidatures are longer. This is capability disadvantage that has become more marked over the last 20 years and we believe that it has an impact on the ability of graduates to leave behind their thesis topic as researchers. Both AMSI and the ATN IDTC deliver coursework to HDR students but the discipline aspires to forming a full-blown and distributed national graduate school which would deliver the economies of scale required to provide significant high-level HDR coursework.

Because the mathematical sciences enterprise is a global one international experience and engagement are fundamental to our competitiveness. This means sending our HDR students overseas and also making Australia a compelling destination for overseas workers. The creation of a distributed, national research centre in the mathematical sciences by AMSI currently underway will significantly improve international engagement opportunities for HDR students.

6. What research skills and capabilities are needed from HDR graduates to ensure Australia is ready to meet current and future social, economic and environmental challenges?

For us the most fundamental requirement is the experience of the high quality research training available in Australia's mathematical sciences departments. This research system must be robust and healthy in order for its graduates to be effective in meeting our societal challenges.

In addition to this we have, at question 3, identified a list of important broader capabilities that our graduates should have in order to function as mathematically capable professionals across a wide range of sectors.

At this point we quote from the summary of the influential "The Mathematical Sciences in 2025" [2]which says, in part:

"But the value of the mathematical sciences to the overall science and engineering enterprise and to the nation would be heightened if the number of mathematical scientists who share the following characteristics could be increased:

• They are knowledgeable across a broad range of the discipline, beyond their own area(s) of expertise;

• They communicate well with researchers in other disciplines;

• They understand the role of the mathematical sciences in the wider world of science, engineering, medicine, defense, and business; and

• They have some experience with computation.

It is by no means necessary or even desirable for all mathematical scientists to exhibit these characteristics, but the community should work toward increasing the fraction that does."

[2] Committee on the Mathematical Sciences in 2025, National Academy of Sciences, Washington (2013)

Research Training System

7. What features of the research training system should be retained to ensure our graduates are internationally competitive?
The current research training system in the mathematical sciences has a number of high quality features which have served us well and which must be retained. These are:

- The deep involvement of the academic supervisor throughout the candidature
- The practice of writing a comprehensive thesis over a period of three to four years
- The high standards set for HDR research evidenced by the emphasis on pre-submission publication in international journals of high repute
- The Australian Postgraduate Award scheme in which students hold a portable scholarship
- The high quality local research environments in which most of our HDR students are enrolled
- The national research environment delivered by AMSI and the learned societies to almost every HDR student through the provision of major annual, residential, research training events and more than 20 national workshops and conferences annually
- The exposure of HDR students to international researchers visiting Australia and the ability to undertake research overseas during candidature

8. How should the research training system be structured to produce high quality researchers who can contribute to Australia's future prosperity and wellbeing?

Provision of coursework. Australian Mathematical Sciences HDR students need access to high level discipline-specific coursework in order for our degrees to continue to be competitive with those in the US (the world's biggest maths engine). The discipline's Decadal Plan (in preparation by the AAS) is recommending the establishment of a "national graduate school" operated by AMSI for this purpose. This must not impact on the amount of time dedicated to thesis preparation so that an additional 6-12 months candidature and scholarship provision should be made. The Commonwealth should vary its "timely completion" requirements to accommodate this innovation

Thesis defence. There is, in general, no mandated thesis defence for Australian PhDs following examination. Based on international experience in the mathematical sciences we wish to see this system established here. In Europe students maintain their enrolment until the defence is completed and this allows them to undertake internships, coursework, international visits and the preparation of journal papers. This is extraordinarily valuable to their career development.

Candidature flexibility.

- Candidature duration should be extended to allow the equivalent of 6-12 months approved coursework, both discipline-based and generic skills-based.
- Candidature rules should allow students to remain enrolled during approved activities such as internships.
- Candidature rules should allow students to remain enrolled until their theses are successfully examined and defended.

International experience. Mathematical sciences HDR students find an extended period (2-3 months) spent overseas to be particularly useful. During these periods they are able to attend major conferences and workshops, study and begin international collaborations at major research locations. This experience is common in Europe and is particularly pertinent in the mathematical sciences which is heavily internationalised.

- We wish to see the option of international experience formalised in the scholarship regulations and provision.
- Opportunity for international exchange of HDR candidates should be included in future International linkage arrangements.

Industry engagement. For all the reasons given in the answers to previous questions we wish to see the national provision of research internships and industry-based HDR programs. The mathematical sciences have pioneered these programs in Australia with AMSI Intern and the ATN's Industrial Doctoral Training Centre. Both of these programs re-engage industry in the training process with modest cost and significant benefit. There are, however, two obstructions:

- The impact of industry-related research must be acknowledged at a whole-of-system level in order for HDR students and their supervisors to be involved in industry related projects for all or part of their candidature, including post-submission/pre-examination internships.

- Candidature and scholarship rules at Australian universities are not uniform and not, in general, able to accommodate these programs. *We recommend that Universities Australia and the Commonwealth urgently overhaul the regulations.*

Strategic capacity building. The mathematical sciences deliver innovation and productivity gains to the public and private sectors through the expertise of its graduates and its researchers. This is strongly evidenced in the March 2015 OCS/AAS[3] study of the economic impact of the physical and mathematical sciences in which the mathematical sciences, above all others, are pervasive and effective.

There are currently no system-wide mechanisms to build HDR capacity in key areas such as optimisation and data science. Employment demand pressures are blocked by the lack of incentives (eg recognition of impact) for academic researchers to directly engage with end users, by the lack of recognition of these transcendental capabilities across the Government's nine Science and Research Priorities and by the regulatory obstructions around candidature outlined above. And of course many Australian companies are unaware of the benefits of increasing their mathematical capacity.

The mathematical sciences community should initiate a national conversation with industry and government in order to remove these obstructions to capacity building in strategic areas in the mathematical sciences.

[3] "The Importance of Advanced Physical and Mathematical Sciences to the Australian Economy", Australian Academy of Sciences, Canberra, 2015.

9. How can entry and exit pathways to and from research training be better structured?

Exit pathways.

Australian companies need to rebuild their graduate entry programs and reverse the trend of predominant employment of HDR graduates with 3 to 5 years' experience.

Universities and government need to restructure candidature and scholarship rules as indicated at Question 8. In particular, the thesis defence system would allow students to maintain their enrolment until the defence is completed and would allow them to undertake internships, coursework, international visits and the preparation of journal papers.

Structural (ie long-term and over-arching) programs should be put in place by state and federal governments to simultaneously build both HDR graduate employment and university-industry collaboration. The experience in Germany, Canada, the United Kingdom and elsewhere should be drawn upon. It is not at all clear to us that the Growth Centres, CRCs, ITRP and Linkage schemes are sufficient for this purpose, particularly in the mathematical sciences. ARC fellowship rules should be reviewed to accommodate joint industry-university appointments and to encourage application from industry-based researchers seeking university-industry collaborations.

In such an environment HDR students will be more easily be able to access "work-readiness" courseware and experiences and be able to undertake post-submission internships. There will also be more opportunity for industry-based candidatures.

A significant and growing percentage of mathematical sciences HDR students are international and Australia needs to review student visa rules so as to be able to retain these graduates into employment via the exit pathways identified above.

Entry pathways.

The innovative graduate fellow program at CSIRO should be revived and scoped for other agencies. This 2-year program was designed to give honours graduates industry experience then move them onto a co-supervised HDR program. This program was effective in the mathematical sciences, providing an entry pathway into industry focused research programs.

There is poor retention from honours into HDR programs in the mathematical sciences, especially in statistics. This is because many statistics graduates are recruited into employment out of bachelor programs. As a result there is an extreme shortage of HDR graduates in statistics and many positions are filled with overseas candidates. In situations like this there needs to be agility in the APA arrangements in order to boost HDR enrolments in target areas.

Work Integrated Learning programs at undergraduate levels are in place in some mathematical sciences departments, particularly in the ATN and these do provide pathways to industry-oriented research. In general, WIL programs should clearly identify research pathways and not simply prepare undergraduates for employment.

10. How can barriers to participation in HDR programs be overcome so that more candidates from non-traditional backgrounds, including indigenous students, undertake research training?

This is a challenging question for the mathematical sciences. We have relatively low (but highly variable) female participation and very low ATSI participation in HDR programs. Retention from honours into HDR programs for these groups is not unusually low and the main problem is the low participation rates at senior secondary and undergraduate level. There are the usual equity issues for HDR students with children and carer responsibilities. We offer the following suggestions for measures which may improve access in the mathematical sciences:

- The provision of *un-taxed* part-time HDR scholarships be made for parents and carers.
- It seems to us that many students from non-traditional backgrounds do not go to university with the intention of doing research. One solution could be to increase marketing of research careers focused on these groups at the secondary school and undergraduate levels
- Focused programs at those universities with high enrolments in non- traditional areas
- Vacation research scholarships dedicated to senior undergraduates from non-traditional areas
- Mature age living allowance honours year scholarships for students from non-traditional areas

Prepared by AMSI in consultation with its members
August 2015

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AMSI Director

Attachment:

- [Appendix: AMSI policies relevant to the ACOLA Research Training System Review submission and AMSI Research and Higher Education Diversity Policy (3 pages)]

Appendix:

AMSI policies relevant to the ACOLA Research Training System Review submission and AMSI Research and Higher Education Diversity Policy
August 2015

Australian Mathematical Sciences Institute (AMSI) publishes an annual Discipline Profile and Policy Document. The following policies are pulled from those documents as relevant to the consultation questions presented in the ACOLA Research Training System Review:

- Commercialisation programs embedded in university research training along with research internships for the STEM disciplines. (Action: deans of science and engineering, UA, AMSI Intern)

- Establishment of broad measures of impact of research which reward outcomes of commercial engagement while continuing to reward success for scholarship. (Action: ARC, UA, DoET, DoIS, Science Council, OCS, STA)

- Establish sustained dialogue with private sector employers of mathematical sciences graduates with a view to improving work–readiness of graduates and establishing research collaborations. (Action: BCA, AIG, AMSI, deans of science, DoIS, OCS, DoET)

- Provide a dedicated allocation of Australian Postgraduate Awards (APAs) in mathematics and statistics to the universities to improve retention of domestic students from honours and masters programs. Incentives for universities which provide such a dedicated allocation from their own award program. Especially important in smaller and regional universities. (Action: DoET, UA, deans of science)

- Targeted HECS-free places for honours and equivalent in mathematics and statistics to improve retention of domestic students into PhD programs. Only effective for those continuing to higher study. (Action: DoET, UA)

- Provide a stipend top-up on APAs to improve retention from honours and masters programs. This is particularly important in statistics where employment demand is severely reducing retention. (Action: DoET, UA)

- Re-weight the funding of PhDs in mathematics and statistics to match those in the physical sciences because of the heavy supervision burden. (Action: DoET, UA, deans of science)

- Set three, five, and 10-year targets for the number of girls participating in advanced mathematics subjects in secondary school, and women participating in mathematics subjects at university. (Action: DoET, state governments, UA)

- Review the Year 11 and 12 Australian Curriculum in mathematics and biology to better reflect the importance of mathematics in biological applications. (Action: ACARA)

- Implement a nationwide awareness campaign to help female students, their parents, teachers and potential employers, as well as the general public, understand the value of mathematics in career choice and personal and national prosperity. The key messages are around equity of participation, innovation and prosperity for the nation (increased GDP) and accessing an untapped pool of graduates. (Action: AMSI-BHP Billiton, DoET, DoIS, ESA, state governments, research agencies, UA, teacher associations, AIG, BCA, AAS, ATSE, OCS, AustMS, SSAI)

- Directly address the shortage of teachers in secondary schools by enticing the oversupply of biology graduates into the mathematics subjects at university that will equip them with the mathematics required to teach. Since these graduates are predominantly women, some understanding of strategies for increasing participation of women will be necessary at university/ lecturer level. A second strategy is to entice existing biology teachers to up their skills with a mathematics qualification. (Action: DoET, deans of science, deans of education, UA)

- Develop a national strategy aimed at retaining and promoting women in STEM academia and identify structural impediments preventing female career progression. Use the Athena SWAN model (UK) to set national standards and undertake a nationwide audit of STEM departments measured against key statistics. Expect university STEM departments to achieve minimum standards, setting one, three, five and 10-year targets. (Action: AAS, UA, STA, AustMS (WiM), AMSI, DoET, DoIS, SSAI)

- Introduce targeted measures to increase the retention of female students from mathematical sciences undergraduate study to honours, masters and PhD — build national networks through established events and the Women in Mathematics Group. Introduce initiatives to specifically engage and support female students in the mathematical sciences - PhD scholarships, travel scholarships, access to childcare. (Action: DoET, DoIS, AAS, AustMS (WiM), AMSI, SSAI)

Full documents can be found:

2015 Discipline Profile – http://amsi.org.au/publications/discipline-profile-of-the-mathematical-sciences-2015/

2015 Policy Document - http://amsi.org.au/publications/a-vision-for-a-maths-nation/

DIVERSITY POLICY – AMSI Research and Higher Education activities and events:

AMSI Research and Higher Education Committees

AMSI actively seeks representation of underrepresented groups on the Scientific Advisory Committee, the Research and Higher Education Committee and all subcommittees.
The committees aim to achieve participation of women and under-represented groups in all AMSI Research and Higher Education programs.

AMSI Event Organising Committees

AMSI Management, Scientific Advisory Committee and Research and Higher Education Committee are proactive in seeking representation of women and other underrepresented groups on organising committees for AMSI events and sponsored events.

AMSI Speakers

AMSI Management, Scientific Advisory Committee and Research and Higher Education Committee are proactive in seeking representation of women and other underrepresented groups as AMSI funded speakers and liaise closely with local organising committees to achieve diversity among speakers.
Immediate target: 30% female speakers at AMSI events

AMSI Participants

AMSI Management, Scientific Advisory Committee and Research and Higher Education Committee are proactive in seeking representation of women and other underrepresented groups as participants in AMSI events and programs and liaise closely with local organising committees to achieve diversity among participants.

AMSI Higher Education Program Participants

Long-term objectives for AMSI Higher Education program participants:
• Male and female participants are approximately equal in number and of a high calibre.

• Significant increase in participation of high calibre persons of Aboriginal and Torres Strait Islander (ATSI) descent.
• By 2020, at least 20% of AMSI Higher Education program participants will be from low socio-economic status (SES) backgrounds.
Immediate target for AMSI Higher Education program participants:
• Male and female participation rates should reflect the current cohort of enrolled mathematical sciences undergraduate and postgraduate students.
• Participation rates of people of Aboriginal and Torres Strait Islander descent should reflect the current cohort of enrolled mathematical sciences undergraduate and postgraduate students.
• Participation rates of people from low socio-economic status backgrounds should reflect the current cohort of enrolled mathematical sciences undergraduate and postgraduate students.

AMSI Research Program Participants

AMSI actively seeks broad representation among workshop participants.
Immediate target: 30% female attendees at AMSI events.

Supporting Strategies

In addition, AMSI pursues the following strategies:
• AMSI events and programs are advertised both broadly and to targeted audiences.
• Public engagement through events such as the International Year of Mathematics of Planet Earth 2013 Public Lectures and other outreach events
• Careers Awareness through Maths Ad(d)s, interactive websites, events
• Utilising and promoting positive role models
• Build relationships with groups mentoring and engaging with disadvantaged groups
• Building relationships with academic institutions with strong minority enrolments
• The retention measures pursued through the AMSI Schools program

Evaluation

The implementation of the AMSI Research and Higher Education Diversity Policy is evaluated annually by the Research and Higher Education Committee and reported to the Board.

This policy can be found online: http://highered.amsi.org.au/diversity-policy/