THE MATHEMATICAL SCIENCES IN AUSTRALIA: A VISION FOR 2025
Decadal plan for Mathematical Sciences (2016–2025)

Annual report: year 1 (2016–17)

The Decadal Plan for the Mathematical Sciences was launched on 17 March 2016. Notable on the day was the address of the Minister for Education and Training, Senator Simon Birmingham. In particular, Senator Birmingham commended the plan for its recommendation to reintroduce a minimum of year 12 intermediate mathematics as a prerequisite for participation in bachelor programs, in science and engineering[1].

Relevant too are extracts from media releases and editorials by some of the professional bodies in the mathematical sciences. Thus, from the Statistical Society of Australia (SSA): 'The plan … makes a dozen key recommendations including increasing professional development for out-of-field maths teachers and a new national mathematics research centre to link industry and research. It also highlights an urgent need to address the low participation of women and rural Australians in the mathematical sciences'[2]. From the Australian Mathematical Society (AustMS): 'The plan is accompanied by an ongoing commitment to work collaboratively with universities, school authorities and the Australian Government to deliver the shared vision. The participation of the mathematical sciences community will be needed to implement the plan's recommendations.'[3] And from the Australian Association of Mathematical Teachers (AAMT): 'Many primary teachers express reservations about their teaching of mathematics that are similar to the concerns about out-of-field teachers in secondary schools.'[4]

The first meeting of the National Committee for Mathematical Sciences (NCMS) after the launch of the decadal plan was on 3 June 2017. Coincidentally, on this same date Louise Ryan at the University of Technology Sydney was holding the event *STEMS: putting statistics into STEM in the Age of Data*. This also feeds into the decadal plan, in the sense that the meeting was to focus on the advancement of statistics education in Australia at all levels, and how this ties in with the needs of a securing Australia's future. At the meeting, attention was focused on the decadal plan's three key priorities:

(1) To provide professional development for existing out-of-field teachers of mathematics, and to enhance the recruitment and retention of properly qualified staff;
(2) To plan for a staged reintroduction of at least Year 12 intermediate mathematics subjects as prerequisites for all bachelors programs in science, engineering and commerce;
(3) To source seed funding for a new national research centre in the mathematical sciences.

The meeting benefitted from the counsel of the Academy's Director Science Policy and Projects, who delivered a presentation on the key points for advocacy. It was clear that these points, the first two of which read 'clear message and concept of what you're asking for and who you're asking to do it'

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[1] https://www.senatorbirmingham.com.au/speech-address-to-the-launch-of-the-academy-of-sciences-decadel-plan-for-mathematical-sciences/
[2] http://www.statsoc.org.au/general/5007/
[3] http://www.austms.org.au/tiki-read_article.php?articleId=338
[4] http://www.aamt.edu.au/content/download/37291/532706/file/hcf16_2.pdf

and 'clear idea of why something needs to happen and what the benefits will be', are all important come priority (3). In relation to priority (3), Minister Birmingham casted it as 'increasing the linkages with industry'[5].

On 31 March 2016, exactly two weeks after the launch of the decadal plan, AMSI Director Professor Geoff Prince organised an afternoon and accompanying dinner in honour of the immediate past Chief Scientist, Professor Ian Chubb. During this occasion, counsel was sought on the best strategy for priority (2). There are a remarkable number of stakeholders: Australian universities; Universities Australia; the Group of Eight; the Australian Technology Network of Universities; Innovative Research Universities; the Regional Universities Network; the Deans of Science, Engineering and Commerce; Education Council of the Council of Australian Governments; the Office of the Chief Scientist; the Australian Academy of Science; and the Academy of Technology and Engineering. Similarly to Minister commending prioirty (2) in his address, both the past and present Chief Scientists indicated support for this recommendation.

The recommendations of the decadal plan are summarised as three points under four headings:

  I.   Giving all Australian school children access to outstanding mathematics teachers
  II.   Guaranteeing high standards of mathematical sciences teaching at Australian tertiary institutions
  III. Achieving both local and global impact for Australian research in the mathematical sciences
  IV.   Ensuring that Australian society is capturing the benefits of new mathematics-based technologies

Progress can be identified on a number of the points:

2.1: Australian universities should immediately plan for the staged reintroduction of at least Year 12 intermediate mathematics subjects as prerequisites for all bachelors programs in science, engineering and commerce.

The University of Melbourne has maintained mathematics prerequisites. For example, entry to BSc requires a study score of at least 25 in Mathematical Methods (CAS) or Specialist Mathematics. The same minimum standard is required for the Bachelor of Commerce.

From 2019, the University of Sydney is requiring a prerequisite of Band 4 in the NSW Higher School Certificate (HSC) Mathematics (not Mathematics General) for entry into a range of courses, including economics, commerce, computing, engineering and IT, medicine, psychology, pharmacy, veterinary science and science.

2.2: Subject scaling should not discourage students from choosing advanced subjects while at high school, and mathematical awareness programs made available demonstrating the career choice benefits and financial and social advantages of completing advanced courses.

In April 2016, soon after the launch of the decadal plan, four WA universities-Curtin University, Murdoch University, Edith Cowan University and the University of Western Australia-agreed to give intermediate and high-level maths students a 10 per cent bonus on their maths scores from 2018.

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[5] https://www.senatorbirmingham.com.au/speech-address-to-the-launch-of-the-academy-of-sciences-decadel-plan-for-mathematical-sciences/

3.1. Australian universities should collaborate with to source seed funding for a new national research centre in mathematical sciences with the objective of enhancing connectivity with industry and strengthening international collaboration.

Through a partnership between the University of Melbourne and Monash University, a research station [MATRIX](#) was launched at the end of May 2016. This station provides a facility, meals and lodging for themed research programs in the mathematical sciences. AMSI, often in partnership with AustMS, has supported research workshops for many years.

4.1. Review and seek to address the causes of low participation in the mathematical sciences among girls and young women, and among Australians living in rural and regional areas.

4.2. Embark upon a coordinated program of promotion to ensure that parents, school students and teachers understand that studying mathematics subjects at the highest level possible increases career options.

A number of new positions in the mathematical sciences in Australian universities over the past year have specially targeted women applicants, with some being advertised for women only.

AMSI received funding from the BHP Billiton Foundation for over $20 million dollars during a five year period, for a national program [CHOOSEMATHS](#). Part of the mission of CHOOSEMATHS is to work with students, parents and teachers over five years to turn around community attitude to participation in mathematics, especially for girls and young women.

Prepared by the National Committee for Mathematical Sciences, Australian Academy of Science

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