UNCONFIRMED

# Australian Council of Heads of Mathematical Sciences (ACHMS)

# Meeting 1/2022

## MINUTES

The annual meeting of the Australian Council of Heads of Mathematical Sciences (ACHMS) was held at 11:00am Tuesday, 8 February 2022 by video conference. The meeting was adjourned from 12:30pm-1:00pm for lunch.

## PRESENT

**ACHMS Executive Committee**

Professor Anthony Dooley (Chair, items 1-3, 6, 9-11), Associate Professor Linda Galligan (Deputy Chair).

**University Representatives**

Associate Professor Amie Albrecht, Professor Eduardo Altmann, Professor Serena Dipierro, Professor Silvestru Sever Dragomir, Associate Professor Maureen Edwards, Associate Professor Vladimir Ejov, Associate Professor Federico Frascoli, Associate Professor Linda Galligan, Associate Professor Richard Garner, Associate Professor Volker Gebhardt, Associate Professor Tim Gould, Professor Joseph Grotowski (present for items 1-5), Dr Michael Kemp, Professor Inge Koch, Dr Maree Lake, Professor Finnur Larusson, Dr Christopher Lenard, Dr Elena Levchenko, Professor James McCoy, Professor Pablo Moscato, Dr David Ompong, Dr Steven Richardson, Professor Tony Roberts, Professor Gerd Schmalz, Dr Nargiz Sultanova, Professor Warwick Tucker, Associate Professor Julien Ugon.

**Societies, Agencies, Groups, Observers and Invited Speakers**

Professor Catherine Attard, Professor Adrian Barnett, Professor Catherine Greenhill, Dr Deborah Jackson, Associate Professor Jessica Kasza (item 4), Professor Tim Marchant (items 4,7), Dr Judy-Anne Osborn, Emeritus Professor Geoff Prince (item 8), Professor Stephan Tillmann, Professor Ole Warnaar (present for items 7-11).

**Proxies**

Professor James Brown, Professor Josef Dick, Professor Andrew Eberhard, Professor Paul Norbury, Mr Kelvin Peh, Professor Jorgen Rasmussen.

**AMSI Staff and Honoraries**

Ms Angela Coughlin, Dr Michael Evans, Ms Lisa Farrar, Ms Leanne McMahon, Ms Anna Muscara, Ms Elena Panfilova, Ms Jan Thomas (item 8), Dr Maaike Wienk.

# BUSINESS

## 1. Welcome

The Chair welcomed those in attendance at the meeting and acknowledged the traditional owners of the many lands on which the attendees were located, and paid respects to the Elders past, present and emerging of all indigenous nations.

### 1.1 Apologies and Proxies

Apologies were received from Dr Simon Barry, Professor Howard Bondell, Associate Professor Adam Butt, Professor Adelle Coster, Mr Nathan Ford, Professor Rob Hyndman, Professor Steven Langford, Professor Ryan Loxton, Professor Asha Rao, Associate Professor David Ridout, Ms Misha Schubert, Professor Craig Simmons, Professor Alan Welsh, Professor David Wood, Professor Brian Yates.

Professor James Brown, Professor Josef Dick, Professor Andrew Eberhard, Professor Paul Norbury, Mr Kelvin Peh, Professor Jorgen Rasmussen attended as proxies.

### 1.2 Introduction of New Representatives

The Chair welcomed the new representatives to the meeting and invited them to introduce themselves.

### 1.3 Agenda Changes

Nil.

### 1.4 Minutes of the 2021 ACHMS Meeting

Minutes of the previous meeting held on Tuesday 16 February 2021 were confirmed by the ACHMS as a correct record, subject to amendments to the following items:

item 7: amendment of the last sentence of the first paragraph to "… mathematicians are not required to provide certification as part of their job, unlike engineers."

item 9: capitalization of the word "indigenous"

distribution list: amendment of the misspelled surname "Osborne" to "Osborn"

### 1.5 Action Sheet from the 2021 Meeting

The ACHMS received and noted the action list from the previous meeting. Progress updates on the following action items were received:

**1/2021(1.6):** **1/2020 (1.5)** Filling the vacant positions on the ACHMS Executive Committee was deferred until new Chair and Deputy Chair elected;

**1/2021(3):** The Chair of NCMS incorporated the feedback from the ACHMS members on the state of mathematics teaching across Australia into the Midterm Review of the Decadal Plan for Mathematical Sciences;

**1/2021(4):** Revisit the idea of creating an Examinations Working Group;

**1/2021(7):** After discussing the accreditation of mathematics degrees with the Vice-President of AustMS, further investigation of this subject was entrusted to AustMS;

**1/2021(9):** Prof. Chris Mathews, the Chair of the Aboriginal and Torres Strait Islander Mathematics Alliance, could not attend the ACHMS meeting this year. Reinvite him to speak at the next ACHMS meeting about indigenous issues in mathematics;

**1/2020(3.2):** The Chair attended all ICME meetings in 2021 on behalf of the ACHMS;

## 2. Election of Chair and Deputy Chair

After a call for nominations for Chair and Deputy Chair positions, the Chair advised that one nomination has been received for each position. Professor Finnur Larusson, from the University of Adelaide, agreed to stand for the Chair position and Dr Michael Kemp, from Charles Sturt University, for the position of Deputy Chair.

The Chair called for any further nominations. There being no other nominations, Professor Larusson and Dr Kemp were declared the new Chair and Deputy Chair of the ACHMS for the next two years.

Professor Larusson addressed the meeting by saying that ACHMS is a uniquely valuable support group for Heads of Departments/Schools for information sharing, consultation and influence in cooperation with the discipline's peak bodies such as AustMS and AMSI. In the coming years, consideration should be given to introduce more activities and contact throughout the year, between Council's annual meetings and establish a larger Executive Committee with diverse representation to coordinate the activities of the Council.

Dr Michael Kemp supported Professor Larusson's statement and stressed that this group is an opportunity for Heads of Departments/Schools to collaborate and solve problems facing the mathematical sciences community.

The Chair congratulated Professor Larusson and Dr Kemp on their appointment to these roles and thanked them for stepping up to provide leadership to this crucial group.

## 3. Report from the Chair

### 3.1 Timing of ACHMS and AMSI members meetings

The Chair and the Director, Australian Mathematical Sciences Institute (AMSI), suggested spreading out the ACHMS and AMSI Members' meetings throughout the year to optimise the use of both groups so that there is a meeting every three months to address the issues in the mathematical sciences as they arise.

Feedback from the university representatives indicated that creating nodes in the capital cities would minimise travelling and at the same time allow the partial reintroduction of the face-to-face meetings.

The Council concurred that the next meeting of the ACHMS will not take place adjacent to the AMSI Members' meeting and that the new Chair and the AMSI Director will meet to discuss an evenly spread out meeting calendar and consider having capital city nodes as an alternative for the zoom meetings so that at least people in the same states can meet in person.

### 3.2 ICME 2024

The Chair reported that the planning of the International Congress on Mathematical Education (ICME) in 2024 is advancing well, mentioning that it is only the second time that ICME has been held in the Southern Hemisphere. Moreover, the congress will coincide with the end of the Decadal Plan for the Mathematical Sciences, allowing a constructive discussion.

### 3.3 ACHMS Executive

Consideration was given to find a way to group the vacant roles on the Executive Committee, not necessarily in the established categories of applied mathematics representative, pure mathematics representative and statistics representative.

## 4. Mathematical Sciences and Data Science

The ACHMS received and noted the "Data Science Review Proposal", intended to be conducted jointly by AMSI and the Statistical Society of Australia (SSA).

The AMSI Director reported that this review was planned to commence last year but was delayed for various reasons. The need for this review is underpinned by increased employer demand for graduates in data science, the establishment of new degrees and majors in data science at Australian universities and the involvement of schools of mathematics and statistics in teaching those degrees. In addition, data science is part of the broader mathematical sciences, and the core groups such as mathematics and statistics need to be involved in the research and teaching of degrees in this rapidly

growing area. Once AMSI and SSA receive the formal approval, arrangements will be made to form a committee and appoint a chair with an international profile.

The SSA President emphasised that although computer science has successfully established itself as the home of data science degrees, it is statistics that drives science in data science. Hence it is crucial to ensure that statistics, and mathematical sciences more broadly, are appropriately embedded in data science degrees in Australia.

The AMSI Director added that the proposed review would evaluate the feasibility of an inclusive model, where courses are delivered cooperative between statistics, computer science, and business.

The ACHMS discussed the importance of collaboration between statistical society and computer society in creating accreditation pathways for data science degrees. It was suggested that this group meets more often, potentially in a less formal format, to share their universities' experience in data science, the pros and cons, to give others a broad basis to work from.

The ACHMS were invited to email suggestions of the potential chairs of this committee to the AMSI Director or the SSA President.

## 5. Effective engagement with industry, commerce and government – the AMSI experience

The ACHMS received a verbal report from the AMSI Chief Operating Officer about the industry and mathematical sciences engagement. Recently AMSI prepared a grant proposal titled “AMSI Innovate” that identified a significant gap between the high quality of research in the mathematical sciences and the discipline’s low level of industry engagement. This gap is an opportunity for AMSI to support its member universities via both Australian Postgraduate Research Intern (APR.Intern) program and other initiatives. There has been a strong emphasis on connecting postgraduate Honours, Masters and PhD students with industry through short-term internships. However, feedback from the industry and universities indicated that the significant cohort of undergraduate mathematical sciences students who don’t continue with the postgraduate research also needs to be informed about the industry opportunities available to them and AMSI’s APR.Intern program holds vast expertise, skills, and experience to promote this connection between industry and higher education.

The ACHMS discussed other ways of engaging with industry, such as work-integrated learning; university staff training for effective communication with industry; consulting initiatives similar to what MASCOS (Centre of Excellence for Mathematics and Statistics of Complex Systems) and Smith Institute do. In addition, it was suggested to link Math in Industry Study Group (MISG) workshops with other similar initiatives to create an overarching strategy in this space.

## 6. Impact of New Funding Model

The Chair reminded that last year ACHMS discussed the introduction of the Job Ready Program (JRP) and the new government funding model for mathematical sciences,

which aimed to increase the number of graduates in mathematics by reducing the university fees for students. As the government has not increased its contribution, the university administrators were expected to allocate fewer places to mathematical degrees. The university representatives were invited to communicate their experience and whether these changes impacted their universities. Feedback from member reps suggested it is difficult to estimate whether these changes affected their universities as they are overshadowed by the COVID pandemic and low international students' number. However, some universities have adjusted their funding model to compensate for the effect of the JRP.

**7. University mathematics post COVID**

The AMSI Director introduced the item by presenting the mathematical sciences staff data collected by AMSI from 2011 to 2018, mentioning that it did not include the COVID related staff reductions seen in the past couple of years. From 2011 to 2018, staff numbers generally increased in schools of mathematical sciences, the Group of Eight (Go8) was up about 30%, the ATN up about 25% and the rest of the sector was steady. These numbers were driven by the advantages of having inner-city campuses that most of the Go8 and ATN have and a large number of international students during those years. The proportion of the female academic staff overall constituted 20%, levels B/C in those years increased from 25% to 28%, and more senior D/E positions increased from 12% to 14%. The academic staff profile was the following: 60% of the sector held a traditional research-teaching role, 30% research-only, and 10% teaching-only, which shows an increase in specialisation over time, if compared to the previous ten years.

The AMSI Director invited members to discuss changes that happened post-2018, particularly the staff reductions associated with COVID related funding issues, the transition of the teaching-examination space to online mode and how to balance the convenience of online teaching with the need for human interaction and engagement. Feedback from members suggested that in an environment where online learning becomes increasingly accessible, it is essential to identify the unique offering of the universities to students. It was noted that such an offering could be a live learning community enriched by research that also teaches students how to communicate with others. Online examinations/assessment and integrity breaches present a particular challenge for some universities, and as a response, some universities are introducing oral examinations and threshold competencies. Most universities started returning to face-to-face teaching while keeping the online streaming and video recordings available to their students. In addition, it was mentioned that not all students are able to do work entirely independently with online learning and that the importance of teachers' role in curation and support of particular student cohorts should not be underestimated.

**8. Extreme shortage of secondary mathematics teachers: Out of field teaching**

Professor Geoff Prince (GP) and Ms Jan Thomas (JT) shared a presentation outlining the key findings of the "Australian Teacher Workforce Data (ATWD) National Teacher

Workforce Characteristics Report" produced by the Australian Institute for Teaching and School Leadership (AITSL) based on the 2019 data. The out-of-field teaching (OOFT) results in this report are based on a survey of 7K-8K teachers restricted to SA, NSW and NT. The following quotes from this report were noted as particularly important:

- "*Mathematics was taught by out-of-field teachers 40% of the time*." (43% amongst early career teachers)

- "*Teachers who delivered English and Science classes were the least likely to be teaching out-of-field (28% and 29% respectively)."*

- "*Out-of-field teaching occurs in high rates across all subjects, although the rates for some subject areas are higher than others. There is no subject with low rates of out-of-field teaching, which suggests that there are supply challenges across all subjects."*

This is the first public recognition by government organisations of the extent of OOFT in Australia. According to this report, the OOFT is happening across all subjects, and there are no subjects with low OOFT rates, which creates an opportunity to team up with other disciplines in confronting this issue. Regrettably, mathematics is acknowledged in the report as being the worst at 40%, and the situation is expected to aggravate because of the short supply of new teachers to replace retirement loss over the next 5 to 10 years.

The universally regarded minimum requirement to become a secondary teacher in a subject is to have pedagogy preparation and the equivalent of a quarter of your first year and a quarter of your second year studying that subject. However, the definition used in this report indicates that the minimum requirement is to have one semester of tertiary study in the teaching subject, and one or the other but not both of content knowledge and pedagogy preparation in that subject (e.g. mathematics or mathematics pedagogy).

GP advised that this problem has existed for 30 years, and this formal recognition of the severity of the problem creates an opportunity to act. However, only increasing the flow of teacher graduates is not expected to solve the problem in the medium or long term. Therefore, there is a significant need to upskill existing out-of-field teachers by giving them potentially a mandated opportunity to improve their content skills and possibly the pedagogy. There are some programs in this space around Australia, but none is at scale.

The ACHMS received recommendations from GP and JT on how best to handle the OOFT problem (for more details, see paper "8_Out of Field Teaching ACHMS Meeting 19_080222.pdf"). Australia's mathematics and statistics departments should create joint programs for out-of-field teachers. A classic example is the Biostatistics Collaboration of Australia (BCA), a consortium of Australian Universities offering an accredited national program of postgraduate courses in Biostatistics. In addition, the mathematics pipeline should be rebuilt starting from Year 12 mathematics to the tertiary sector, creating an inflow of new math teachers. Another important aspect is to develop external partnerships with key stakeholders (parents, cognate disciplines, industry groups, principals, etc.) to ensure a higher level of participation.

In conclusion, it was proposed that ACHSM and AMSI create a plan for delivering joint mathematics courses for out-of-field teachers and that AustMS, SSA and AMSI find key players who could add further breadth and depth to a national lobby group. It was noted that a steering committee would be necessary to ensure the plan's progress. JT further commented that it is essential that the courses are credible. Having a national consortium and partnering with other organisations could incline the jurisdictions to recognise the certificates and offer incentives for students for teachers.

The ACHMS endorsed the proposal and suggested liaising with other disciplines that run similar programs and cooperating with the Mathematics Education Research Group of Australasia (MERGA) in this space.

GP stated that a meeting with AustMS, SSA and AMSI is expected to take place in the next two weeks and invited ACHMS to email him and JT any suggestions or feedback regarding the outlined proposal.

## 9. Regrowth of mathematics: opportunities for younger mathematicians

The ACHMS discussed the job opportunities for young mathematicians, considering the growing demand for graduates with mathematics and quantitative skills across the business. Severely impacted by significant academic job losses during the last two years, the sector is now welcoming an increasing number of returning international students, which is expected to regenerate the discipline. However, many universities still operate on minimal staff and have trouble hiring statistics, mathematics, and data science people. It was suggested that AustMS and other societies consider assisting young early career researchers, mathematicians and teachers with CV creation and responses to selection criteria, possibly in a workshop format.

The ACHMS completed an ad-hoc zoom poll, indicating how many continuing academic positions their departments expect to hire in the next six months. Half of the participants responded that they are not planning to hire any academics in continuing positions for that period, 25% answered that they are expecting to have only one position open, 22% said they are planning to have two continuing positions available, and 3% (one person) indicated they might be hiring five. The Chair concluded that the opportunities for young mathematical scientists this year regarding academic positions are minimal. Still, the overall picture is hard to grasp without seeing the number of fixed-term positions.

## 10. The international picture

Nil.

## 11. Wrap Up and Summary Actions

In summarising the meeting, the Chair highlighted the following key considerations:

- Appointment of the new Chair and Deputy Chair of the ACHMS; election of a winder and more diverse Executive Committee; time change of the ACHMS meeting so that it interleaves better with the AMSI Members' meeting.

- An important initiative to conduct mathematical sciences and data science review jointly by AMSI and SSA.
- Interesting discussion about how to engage with industry, commerce and government through the lens of APR.Intern program expertise.
- The actual impact of the new funding model (JRP) is overshadowed by the COVID pandemic and a low number of international students.
- Out of field teaching in mathematics is a significant issue that requires great consideration from the mathematics community.

The meeting concluded at 2:54pm.

Signed by the Chair:_____ and dated: _____

## DISTRIBUTION

***ACHMS Executive Committee***

Professor Anthony Dooley, outgoing Chair
Professor Finnur Larusson, incoming Chair
Associate Professor Linda Galligan, outgoing Deputy Chair
Dr Michael Kemp, incoming Deputy Chair

***University Representatives***

Associate Professor Amie Albrecht, University of South Australia
Professor Eduardo Altmann, University of Sydney
Dr Judith Ascione, University of Canberra
Professor Andrew Bassom, University of Tasmania
Associate Professor Shaun Belward, James Cook University
Professor Howard Bondell, The University of Melbourne
Associate Professor Adam Butt, ANU, School of Finance, Actuarial Studies & Statistics
Professor Adelle Coster, University of New South Wales
Professor Serena Dipierro, The University of Western Australia
Professor Anthony Dooley, University of Technology Sydney (outgoing)
Professor Silvestru Sever Dragomir, Victoria University
Associate Professor Maureen Edwards, University of Wollongong
Associate Professor Vladimir Ejov, Flinders University
Professor Lilia Ferrario, Australian National University, MSI
Associate Professor Federico Frascoli, Swinburne University of Technology
Associate Professor Linda Galligan, University of Southern Queensland
Associate Professor Richard Garner, Macquarie University
Associate Professor Volker Gebhardt, Western Sydney University
Associate Professor Tim Gould, Griffith University

Professor Joseph Grotowski, University of Queensland
Professor Graeme Hocking, Murdoch University and ANZIAM
Professor Rob Hyndman, Monash University, Dep. of Econometrics and Business Statistics
Dr Zlatko Jovanski, Australian Defence Force Academy (UNSW Canberra)
Dr Michael Kemp, Charles Sturt University
Professor Inge Koch, The University of Western Australia
Professor Kuldeep Kumar, Bond University
Dr Maree Lake, Southern Cross University
Professor Steven Langford, University of Technology, Sydney (incoming)
Professor Finnur Larusson, The University of Adelaide
Professor Ryan Loxton, Curtin University
Dr Christopher Lenard, La Trobe University
Dr Elena Levchenko, University of Newcastle
Dr Alan McCarthy, University of Notre Dame
Professor James McCoy, University of Newcastle
Professor Pablo Moscato, University of Newcastle
Dr David Ompong, Charles Darwin University
Professor Asha Rao, RMIT University
Dr Steven Richardson, Edith Cowan University
Professor Tony Roberts, Queensland University of Technology
Professor Gerd Schmalz, University of New England
Dr Nargiz Sultanova, Federation University Australia
Dr Patrick Tobin, Australian Catholic University
Professor Warwick Tucker, Monash University
Associate Professor Julien Ugon, Deakin University
Dr Aaron Wiegand, University of the Sunshine Coast

***Societies, Agencies, Groups, Observers and Invited Speakers***

Professor Catherine Attard, Mathematics Education Research Group of Australasia (MERGA)
Professor Adrian Barnett, STA Mathematics Cluster Representative
Dr Simon Dunstall, Data61, Australian Society for Operations Research (ASOR)
Mr Allan Dougan, Australian Association of Mathematics Teachers (AAMT)
Mr Nathan Ford, Australian Mathematics Trust (AMT)
Professor Catherine Greenhill, Women in Mathematics Special Interest Group (WIMSIG)
Professor Tony Guttmann, Centre of Excellence for Mathematics & Statistics of Complex Systems (MASCOS)
Professor Graeme Hocking, Australia and NZ Industrial and Applied Mathematics (ANZIAM)
Dr Deborah Jackson, Australian Mathematical Society (AustMS) Associate Professor Jessica Kasza, Statistical Society of Australia (SSA)
Professor Tim Marchant, Australian Mathematical Sciences Institute (AMSI)
Professor Chris Matthews, Aboriginal and Torres Strait Islander Mathematics Alliance (ATSIMA)
Professor Brendan McKay, Combinatorial Mathematics Society of Australasia (CMSA)
Dr Judy-Anne Osborn, Computer-Assisted Research Mathematics and its Applications (CARMA)

Emeritus Professor Geoff Prince, FAustMS, La Trobe University
Associate Professor David Ridout, Australian and New Zealand Association of Mathematical Physics (ANZAMP)
Ms Misha Schubert, Science and Technology Australia (STA)
Professor Stephan Tillmann, University of Sydney Mathematical Research Institute (SMRI)
Professor Ole Warnaar, Australian Mathematical Society (AustMS)
Professor Alan Welsh, National Committee for the Mathematical Sciences (NCMS)
Professor Jan de Gier, Mathematical Research Institute MATRIX
Professor Brian Yates, Australian Council of Deans of Science (ACDS)

***Government Related Organisations***

Dr Simon Barry, Commonwealth Scientific and Industrial Research Organisation (CSIRO)
Dr Anders Holmberg, Australian Bureau of Statistics (ABS)
Professor Craig Simmons, Australian Research Council (ARC)

***AMSI Staff and Honoraries***

Ms Angela Coughlin, National Program Manager, Research and Higher Education
Dr Michael Evans, AMSI Honorary
Ms Lisa Farrar AMSI COO / National Program Manager, APR.Intern
Ms Leanne McMahon, AMSI Schools Outreach Office
Ms Anna Muscara, Project Coordinator, Research and Higher Education
Ms Elena Panfilova, Executive Assistant to the AMSI Director / ACHMS Admin support
Ms Jan Thomas, AMSI Honorary
Dr Maaike Wienk, Finance, Advocacy and Policy Manager

***Proxies***

Professor James Brown, University of Technology, Sydney
Professor Josef Dick, University of New South Wales
Professor Andrew Eberhard, RMIT University
Professor Paul Norbury, University of Melbourne
Mr Kelvin Peh, Science and Technology Australia STA
Professor Jorgen Rasmussen, University of Queensland

Written by E. Panfilova on 10/03/2022.