
CMA

CENTRE FOR MATHEMATICS AND ITS APPLICATIONS
THE AUSTRALIAN NATIONAL UNIVERSITY
CANBERRA, A.C.T. 0200, AUSTRALIA

6th December 2005

Dr Barry Hughes
Executive Director, National Strategic Review
of Mathematical Sciences Research

Dear Barry,

Thank you for this opportunity to contribute to the review. As part of my contribution, I attach: (a) a submission made to the Commonwealth Government's Crossroads review in 2002; (b) a copy of an article published in the Australian Mathematical Society *Gazette* in 2004, addressing some of the difficulties faced by mathematical sciences departments in Australian universities; and (c) a discussion paper published in the *Gazette* in 2005, treating issues connected to the Research Quality Framework (RQF) which the Commonwealth Government is contemplating introducing in Australian universities.

These documents convey my concerns about the declining state of the mathematical sciences in Australia, in respect of research. The situation today is even more challenging than it was four years ago, when the federal government sought contributions to the Crossroads review. Since 2002, several of our strongest mathematical sciences groups in universities have significantly contracted, their strengths sapped by rounds of budget cuts. At least one has come close to closure, but been pulled back from the brink. None is experiencing a turnaround in its fortunes. Employers of mathematical scientists report that their difficulties finding staff are as acute as ever, although in some instances they have given up trying.

The mathematical sciences are vitally important to Australia. They underpin our involvement in new technologies, in fields ranging from biology to engineering. They sustain the performance of our traditional industries, such as agriculture and mining. Currently, our nation's food and mineral exports are held up, and our economic growth consequently diminished, by transport bottlenecks on our railways and at our wharves — problems that could be alleviated significantly by the application of mathematical methods for operations research. Both AMSI and MASCOS can tell the Review Committee of their experiences trying to convince governments, state and federal, that mathematics can address these problems.

Our employers are scouring the world looking for the research-level mathematical scientists whom they require but cannot find in Australia. Sometimes employers spend as much money recruiting a new staffmember, from Asia, Europe or North America, as they do on his or her salary in the first year. In several areas, for instance operations research, we still have some of the skills we need to make a difference. But in other fields, such as statistics, it is hard to see recovery occurring in anything short of a generation. The point at which recovery could begin is not in sight.

In our universities, the challenges facing mathematical scientists are stark, and

have a direct bearing on the nation's ability to train research-capable mathematicians and statisticians for careers in business, industry and government. The energies of academic staff are increasingly directed away from research, as teaching loads and reporting requirements escalate, and administrative support declines. I shall devote the remainder of this letter to the problems facing our universities.

When the Review Committee visits Australian universities it will see some bright spots — mathematics departments that still have sufficient funding to support new positions, even if they find it difficult to attract the staff they need; and a few statistics groups, generally in business or finance areas, that are still well resourced. However, the Committee will find that in many instances our ability to fund, train, recruit, and retain new mathematics and statistics staff is very limited.

The average age of university mathematical scientists is steadily increasing. As Chair of AMSI's Scientific Committee, I've noted with concern that quite a few of AMSI's conferences celebrate the careers of recently retired staff, many of whom are not replaced. With a very small number of exceptions, we are not producing, or employing, the internationally-recognised leaders we need for the future. It is this facet of our difficulties — our inability to replace ourselves, even to the extent of filling existing chairs in the mathematical sciences — that is the the most deeply worrying aspect of our predicament.

The RQF has the potential to substantially reduce the diversity of research excellence in Australian universities. Yet the Australian employment environment for mathematical scientists is already virtually a closed cycle. Our geographical and scientific isolation make it hard for us to attract research-level mathematicians and statisticians from abroad. In this context, a further decline in the breadth of mathematics research excellence in Australia could constrain us to be even less internationally competitive in the future than we are today.

The only sensible solution to these problems is more funding for the mathematical sciences in Australian universities. Theoretically, greater cooperation among universities could overcome some of the problems we experience. However, the standard response of university managers to contracting budgets, and to the Commonwealth Government's policies more generally, is to be more competitive and less cooperative. The RQF would make Australian universities still more combative, and therefore (as a group) more vulnerable to the shocks that future budgetary decline would bring.

Arguably the best way to lead mathematics and statistics research towards recovery would be to provide additional funding for teaching. University teaching loads must be reduced if research is to blossom again. Specialised courses, aimed at mathematically gifted students, must be reintroduced. Without better funding for continuing research-and-teaching positions in universities, career paths for young mathematical scientists will not be created, and Australia's most mathematically able men and women will not be attracted to careers in the mathematical sciences.

Sincerely

Peter Hall