President's column

Nalini Joshi*

I have spent the last two months at the Isaac Newton Institute for Mathematical Sciences at Cambridge University in the UK, in mathematical heaven. International centres like the Newton Institute operate six-month-long[1] research programs to bring together groups of people with similar interests, who arrive and depart at different times, whose interactions and questions constantly inject new ideas into on-going discussions. Out of such mergers grow beautiful ideas and, sometimes, breakthroughs.

For mathematics to grow, conversations about ideas and new techniques are essential. Individual conversations happen all the time, whether in your departmental corridors and tearooms, in seminars, workshops and conferences, in conversation with invited visitors, or in sabbaticals with your hosts and members of the hosting group. Shorter conversations may spark new, and sometimes very deep, ideas. Longer conversations, carried out at irregular intervals over email, Skype, and through visits, develop layers of ideas that sometimes germinate only years later. Sustained, extended conversations with people who are attracted to the same open questions as you, and whom you meet serendipitously at an extended program, lead to an unlocking of the mind.

Unfortunately, Australia has no funding mechanism that can support six-month-long research programs on different themes in the mathematical sciences. We cannot bring together a critical mass of leading mathematical scientists from Australia and overseas to interact over extended periods. We cannot support junior mathematicians for extended periods to meet and interact with leading scientists in their area. We do not have a mechanism that encourages and supports high-quality research programs that range over all areas of mathematics.

The Australian Research Council[2] recognises the necessity of some collaborative mechanisms for research. Certainly, attendance at conferences is supported. Support for individual collaborative visitors is now available for those working on specific projects. However, all of the ARC's funding is focused on individual projects and programs that involve one or at most two themes. In the last two decades, the ARC has funded several Special Research Centres and Centres of Excellence. Whilst the aims were lofty, in practice the Centres were required to focus on specific areas of research. This meant that one could not mount a program in say algebraic Lie theory in one semester and change to a program in random matrix theory in the next.

Another constraint is the way in which accountability became synonymous with commercial application. The ARC Centres of Excellence Funding Rules for 2005

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[1]They also have shorter programs in the summer months.

[2]See guidelines at http://www.arc.gov.au.

state (on page 6)[3]: 'ARC Centres of Excellence are likely to make discoveries that have the potential for development to the point of commercial application'. Successive six-month programs in the mathematical sciences are unlikely to yield direct commercial applications. Even a program on *L-functions and arithmetic*[4] may have no short-term commercialisation gains, although the application of number theory to secure communications technology is vast.

A different argument needs to be put to the ARC to show the benefit of a national institute of research in mathematical sciences. Its activities will support research in a large cross-section of areas across Australia, rather than focus support on a group of individuals. It is, in fact, an efficient way of distributing research funding for the nation's needs. It will also provide research support for junior researchers who are currently not being as well supported as our senior researchers.

The Steering Committee has been conversing on this topic. In our second meeting this year by phone, Leanne Harvey and Andrew Calder from the ARC joined us, primarily to talk about the bibliometric processes underlying the ERA. However, we also talked briefly about the necessity for a national centre in the mathematical sciences. Leanne Harvey made a very good point, that higher education research funding is done on a dual funding process: the ARC deals with project based funding, while the block funding mechanism is done through the Department of Innovation, Industry, Science and Research. So our needs fall between two stools.

There is another sobering thought here, which is that we need the support and cooperation of other sciences in Australia to achieve our aims. In England, the Higher Education Funding Council has recently selected the University of Birmingham to host the national higher education program for science, technology, engineering and mathematics (STEM) to the tune of 20M pounds. In the UK, it seems disciplines work together. High-profile scientists in Australia know that the deterioration of mathematical sciences hurts their students and want to fix this problem. One idea that has been put forward is that we form a new group together with such scientists to have a high-level dialogue on the issues of concern for all of us. My hope is that, with the agreement across the sciences, we can present our case to government for support of the kind we need.

Nalini Joshi holds a PhD and MA from Princeton University in Applied Mathematics and a BSc (Hons) from the University of Sydney. In 2002, she returned to the University of Sydney to take up the Chair of Applied Mathematics and became the first female mathematician to hold a Chair there. In 2008, she was elected a Fellow of the Australian Academy of Science. She is currently the Head of the School of Mathematics and Statistics. Her research focuses on longstanding problems concerning the asymptotic and analytic structure of solutions to non-linear inte- grable equations.

[3]On the same page, it is stated: 'Centres must foster amongst their staff an awareness of sound innovation and commercialisation practice, and will encourage entrepreneurial activity in appropriate circumstances.'

[4]This was the name of a program at the Newton Institute in 1993 at which Wiles revealed his proof of Fermat's last theorem.