Submission to: Evaluation of the Knowledge and Innovation Reforms
-- Reviewing Australia's Block Research Funding Schemes

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Australia's mathematical sciences community is broadly in favour of a significant degree of competitive funding of university research. Australian mathematics still performs strongly on an international scale, although it is unfortunately waning, because of sustained government cuts. (Numbers of staff in Australian university mathematics departments have declined by between 30 and 40% over the last eight years.) The mathematical sciences are of substantial strategic importance to Australia, not least because they are pivotal to new developments in science and technology, in areas as diverse as genetics and telecommunications. [See e.g. P. Tondeur, Notices of the American Mathematical Society, volume 48 (3), March 2001, p. 293; http://www.ams.org/notices/200103/commentary.ps.]

However, the present approach to block funding of research neither rewards nor encourages true excellence, and does not adequately reflect the nation's needs for science and technology. It is important that current block funding schemes be replaced by a program which motivates quality at the highest international level, across a wide range of fields, and ensures the delivery of Australia's strategic research requirements. At the same time as advocating reforms of this type, the mathematical sciences community is mindful of the need to ensure that a significant amount of research funding be delivered to universities in block form, rather than be tied to specific grants.

Currently, block funding for research in any given university is determined largely by very crude measures of `performance,' based primarily on that institution's success in earning research funding externally (by almost any means), on the number of papers published by the university's staff, and on the number of research students who complete their degrees. Virtually all these measures are of quantity, rather than quality. Moreover, the `research funding earned' index, which drives a substantial part of block funding for research, is based on inputs to the system, rather than outputs.

Factors of these types, and also citation data, are extremely subject-dependent. Consequently, they should not be used to compare performances across different fields. However, they are often employed in just this way by university managers, because they impact so heavily on the government's funding formulae. This produces perverse decisions which work strongly against the goals which the government apparently wishes to achieve through competitive research funding.

For example, in the past the `research funding earned' index has led some managers to actively discourage the relatively inexpensive intellectual sciences, such as mathematics, regardless of quality, in favour of research activities which demand expensive items of equipment funded through grants or commercial consultancies. More generally, the position of mathematics as a generic, enabling technology does not give it adequate access to many of the research inputs (e.g. commercial research funding) from which federal funds are levered by the government's current performance indices.

Emphasis on numbers of papers published has encouraged quick and shallow contributions to the literature, and discouraged fields (such as theoretical mathematics) where the development of new technologies is usually painfully slow. Performance indices based on citation rates are likewise open to serious misuse, and the mathematics community does not support uggestions, made in some quarters, that citation data be used to distribute the government's block grant. Also, performance indices founded on numbers of

students graduated, eschewing any measure of quality, are very misleading. As the advertisement says, `It's the fish John West rejects that make John West's fish the best.'

If Australia wishes to enjoy a strong research culture in its universities, with sustained activities at a high international level, it will have to pay both the costs of quality research and the expense of adequately monitoring it. Almost inevitably, the requirement for adequate monitoring argues that Australia investigate the British Research Assessment Exercise (RAE).

The RAE is a subject-focused, nationwide assessment of performance by specialist panels of experts in discipline areas. It is based overwhelmingly on the analysis of research outputs, primarily through examination of actual publications (as distinct from counting numbers of publications). Four papers are nominated by each researcher who is up for appraisal. Postgraduate activity and research inputs do feature in the RAE. For example, in the last round, grant support was included as `evidence of esteem,' as were other aspects of international recognition. This is is quite different from the Australian approach of linking block research funding directly to dollar levels of grant income. More generally, since the RAE assessment is made by human beings, who often know the work of the people they are assessing, a great many matters are unavoidably addressed which do not contribute to the formulaic approach currently adopted in Australia.

The expense of an RAE to Australia would not be small. For a relatively small community of scientists and scholars, like our own, it may require the involvement of foreign experts, something which the British RAE managed to avoid until the most recent round. However, an Australian RAE would not have to be funded at the same level forever. British experience suggests that, after perhaps a decade of regular research assessment and funding-redistribution, the performance of the research enterprise will climb to a relatively stable plateau, at which point the scope and expense of the RAE may be reduced without significantly harming its effectiveness.

The RAE is not without its failings, and hence its critics. Some of the problems have been aired, and remedies suggested, in the Roberts Report, released to mixed reviews. Apart from the expense of the RAE, in terms of both academic staff time and actual cost, it is renowned for encouraging its own perversities on the part of university research managers. For example, in the UK, highly performing staff are not infrequently hired just in time for inclusion in the next RAE, occasionally for short periods which conclude, coincidentally, at about the same time as the assessment. Another failing of the RAE is that it has significant difficulty addressing cross-disciplinary research, which often falls between two or more of the disciplinary areas on which the RAE focuses only individually. Grade inflation in the RAE is a substantial current concern. However, a modified form of the RAE is worthy of consideration by the Department of Education, Science & Training (DEST).

A major advantage of a rigorous, interpretable approach to research assessment, and hence (perhaps) of an RAE-type scheme, would be its ability to inform both the public and the parliament of the true level of research performance in our universities. The fact that this is not presently possible does a great disservice to the nation's higher education system, and contributes mightily to the conflict between our universities and the governments which both need and fund them.

In closing, I must mention one aspect of Australian research funding, by both block grants and other means, which significantly impedes the mathematical sciences in this country. Largely without exception, DEST adopts a one-size-fits-all approach to supporting university research. It uses the same formulae to fund research in most fields of science and scholarship, regardless of their special needs. As I have noted, this has already harmed the intellectual sciences (especially mathematics) in important ways. In the area of mathematics it has made it impossible for

Australia to develop a nationally funded, broadly based, mathematical sciences research centre. The fledgling Australian Mathematical Sciences Institute (AMSI), based in Melbourne, is presently supported largely by block research funding flowing to individual mathematics departments across the country. Those departments pay an annual fee, ranging from $10,000 to $50,000, to be affiliated with AMSI. However, AMSI's livelihood is precarious at best; realistically, it is threatened by continual university department budget cuts, flowing from the current Enterprise Bargaining round and other contingencies. To find out more about Australia's need for a properly funded mathematics research centre, and about the consequences to Australia of not having one, I refer the Review committee to the website,

http://wwwmaths.anu.edu.au/other/ncms/institutes.html

Thank you for this opportunity to make a submission to the Review of Australia's Block Research Funding Schemes.