

Harnessing Excellence

February 2002.

The November 2001 report of New Zealand's Tertiary Education Advisory Commission (TEAC) recommended the *establishment of a separate Fund of substantial magnitude (reflecting the importance of research-enterprise linkages in a knowledge society) for the development of **Model B Centres/Networks of Research Excellence aimed at supporting national priorities.** Access to this Fund would require leveraged funds from other sources.*

The Commission believed that two different types of centres of excellence are required. The first involves world-class research at the creation/discovery end of the spectrum irrespective of discipline, theme, extent of collaboration or nature of research outputs; the second, which is referred to as Model B, also involves world-class research but has a number of additional elements, including: lifting private sector investment in R&D, networking between researchers and users; and improving the uptake and use of research findings.

This response from the Royal Society of New Zealand expresses our views on the above proposal and considers the most effective ways to achieve its goals.

The Royal Society has considerable experience in nurturing, funding, and putting excellence to use through its stewardship of the \$28 million Marsden Fund since 1995; its Academy Council, which is devoted to excellence; its administration of the new Centres of Research Excellence (CoRE) Fund; and its awards for outstanding science and technology. The Council of the Royal Society has committed to consult and volunteer recommendations to the Tertiary Education Commission and the Government on centres/networks of excellence.

1. EXECUTIVE SUMMARY

The November 2001 report of New Zealand's Tertiary Education Advisory Commission recommended the *establishment of a separate Fund of substantial magnitude for the development of Model B Centres/Networks of Research Excellence aimed at supporting national priorities.* Access to this Fund would require leveraged funds from other sources. Model B Centres would emphasise lifting private sector investment in R&D, networking between researchers and users; and improving the uptake and use of research findings.

In the Royal Society's view, these goals do represent some of the most urgent and problematic challenges for innovation now facing the country.

Since the Royal Society prepared its advice paper last year on Centres of Excellence and Innovation, new policy instruments have entered the picture including the Foundation for Research, Science and Technology's Consortia initiative, the Venture Investment Fund (VIF), Centres of Research Excellence (CoRE), and a number of Industry New Zealand programmes. Many of these programmes occupy or overlap the same policy area as TEAC's Model B proposal, leading to a danger of confusion, redundancy and multiple application processes from too many overlapping initiatives. In particular the Foundation's consortia model offers many of the advantages sought by Model B centres. Consortia objectives map almost exactly onto Model B goals.

The Foundation's initial consortia funding, however, is a somewhat timid \$25 million for the first three years of operation. The Royal Society contends that consortia should be more actively encouraged, consortia areas of endeavour should get strong leadership from the Cabinet level, and disincentive to joining consortia, which may exist at industry level, should be removed.

We propose that new funding be found, and/or reserved in roughly equal proportions, from Vote RS&T, Vote Economic Development, and Vote Education. Funding should allow consortia to be built from best performing components across the national research and innovation system. Initial fund investment of perhaps \$10m per year from each of the three Votes could be followed by new tranches of \$5m each year until the total fund reached \$90m per year after five years (eventually to be matched or exceeded by private sector funding).

It is the Royal Society's strong belief that overarching guidance on at least some of the consortia areas should come from the Government level. In particular we would see Government's role, supported by the necessary policy advice, as naming new areas of endeavour where capabilities can be built and exploited for New Zealand's future.

2. INTRODUCTION

In April 2000, the Royal Society published an advice paper on Centres of Research Excellence in response to TEAC's proposal at that time¹ recommending the *establishment or recognition of national centres or networks of excellence within the tertiary education system, with linkages to a national strategy and the international research community*. Our response took the view that the major purpose of centres of excellence would be to enhance and exploit New Zealand's excellence in research *and innovation*. We proposed five related objectives for centres of excellence and innovation:

1. Focus intellectual effort in fields of endeavour important to New Zealand.
2. Accelerate the development and use of new knowledge, insights and results.
3. Develop teams of sufficient size and concentration to stimulate creative synergies and cross-fertilisation of ideas.
4. Bring appropriate multiple disciplines, institutions, cultural views and sectors to bear on the problem area.
5. Build human capacity by training and providing a future in New Zealand for a new generation of outstanding researchers.

Subsequent Cabinet decisions set the vision as:

1. support world-class, excellent research;
2. contribute to New Zealand's development;
3. enhance New Zealand's ability to develop as a knowledge society by knowledge transfer activities, especially in research training; and
4. encourage tertiary education institutions to work collaboratively with each other and develop relationships and linkages with other research organisations, enterprises, and other end users.

This vision was to be embodied in three objectives for research that:

1. is excellent;
2. contributes to New Zealand's future development; and
3. incorporates knowledge transfer activities.

The research was to be assessed in the context of five strategic goals: innovation; economic development; social development; environmental sustainability; and fulfilling the obligations of the Treaty of Waitangi.

¹ *Shaping the Funding Framework*; Fourth Report of the Tertiary Education Advisory Commission, November 2001

In approving more detailed selection criteria, Government placed more emphasis on knowledge transfer in the training of researchers than on transferring results into innovation. The Government allocated some \$60M over four years to Centres of Research Excellence (CoRE).

The November 2001 report of New Zealand's Tertiary Education Advisory Commission refers to its original vision for these as "Model A" centres, and the report further recommended the *establishment of a separate Fund of substantial magnitude (reflecting the importance of research-enterprise linkages in a knowledge society) for the development of Model B Centres/Networks of Research Excellence aimed at supporting national priorities. Access to this Fund would require leveraged funds from other sources.*

In its report, the Commission saw a need for a greater concentration of research effort within the tertiary sector and an improvement of linkages between tertiary providers, industry and the wider community. While commending the current initiative to establish Centres of Research Excellence (CoREs), the Commission believed that two different types of policy instrument are required. The first, referred to in *Shaping the Strategy*¹ as Model A, involves creation/discovery research from all disciplines and with any level of collaboration. The second, known as Model B, has a number of additional elements such as lifting private sector investment in R&D, networking between researchers and users; and improving the uptake and use of research findings.

3. POLICY GOALS

The Government set out four goals for research, science, and technology that aim to develop human capital and enhance our knowledge of the economic, environmental, social, and health determinants of our well being. In addition, TEAC's report implies that four goals were behind their recommendations for Model B centres:

1. leveraging and lifting private sector investment in research and development
2. enhancing collaborative networking between research providers and users
3. improving the uptake and use of research findings (including commercialisation)
4. focusing upon the nation's strategic goals, in terms social development and environmental sustainability as well as economic development

In the Royal Society's view, these goals do represent some of the most urgent and problematic challenges for innovation now facing the country. They will not be easy to achieve. Innovation seems to have stalled in three areas, and New Zealand's urgent priorities are to build:

1. a private sector which values and performs research *because it sees the commercial advantage* in delivering value-added in the economic, social and environmental spheres

2. research *partnerships* that stimulate entrepreneurship in delivering goods and services in the economic, social and environmental spheres
3. reservoirs of trained and talented people, and career paths that can drive these partnerships

A number of recent reports from TEAC, the Science and Innovation Advisory Council (SIAC) and others have stressed that we must embrace innovation, life-long learning, and a Government that does not punish risk-taking. With regard to research collaboration and leverage they recommend that:

1. Firms must learn to use R&D and invest more in it. Much more business collaboration is needed with tertiary and CRI researchers.
2. Industry must build consortia and clusters, attract talented people, and use the Kiwi diaspora.
3. Research and tertiary education should support innovation; economic, social and environmental goals; and adhere to the Treaty of Waitangi.
4. Research funds should be awarded by research quality, not student numbers, to help research units reach centre of excellence status.

SIAC also noted that innovation provides New Zealand with the best opportunity to lift our economic performance, enhance our social well being, and manage our future uncertainty. They saw our main challenges as:

1. rewarding "can-do", risk taking, and success
2. educating for a knowledge economy
3. becoming a magnet nation for talent

¹*Shaping the Strategy*; Third Report of the Tertiary Education Advisory Commission, July 2001 An Innovation Framework for New Zealand; Report to the Prime Minister, August 2001

4. generating wealth from ideas and knowledge
5. excelling globally
6. networking, collaborating, and clustering
7. taking an investment-driven approach to Government

This seeming plethora of visions and goals carry some common threads, and TEAC's implied goals for Model B Centres (given above) fall generally in line with Government policies. The view that will be developed in this paper is that other and more appropriate vehicles than Models B already exist or can readily be adapted to pursue these four goals.

4. CURRENT POLICY INSTRUMENTS

Last year the Royal Society published an overview of Government policy instruments for innovation, and the table is updated below for 2001/2.

Table 1: Government Policy Instruments for Innovation

The shaded area in the table roughly represents the policy area corresponding to TEAC's goals for Models B. However, since the Royal Society prepared its advice paper last year on Centres of Excellence and Innovation, new policy instruments have entered the picture including the Foundation for Research, Science and Technology's Consortia initiative, the Venture Investment Fund (VIF), Centres of Research Excellence (CoRE)¹, and a number of Industry New Zealand programmes. Many of these programmes occupy or overlap the same shaded policy area as TEAC's Model B proposal, leading to a danger of confusion, redundancy and multiple application processes from too many overlapping initiatives.

In particular the Foundation's consortia model offers many of the advantages sought by Models B. The Foundation lists Consortia objectives as to engage early-user involvement and commitment to research to:

1. enhance the relevance of Public Good S&T and New Economy Research Fund investment
2. improve the use and uptake of knowledge
3. enhance collaborative user-research provider networks
4. increase private sector investment
5. and thereby improve the transformation of research into wealth and wellbeing

These map almost exactly onto Model B goals. Key Features of the Consortia model are given as:

1. the Foundation contracts with single legal governance entity to manage Foundation contract and associated sub-contracts (with typically an annual turnover of \$5 million)

2. flexibility consortia cover environmental and commercial both sector and cross-sector
3. target achievement of tangible outcomes around focused objectives
4. intellectual property arrangements agreed by consortium parties before the venture begins
5. investment case include critical path milestones, review points and grow/exit strategy
6. consortia manage research priorities as circumstances change
7. consortia should include at least two "research users"
8. foundation investment for a limited life 37 years. FRST will finance up to 50%

However, initial funding (or profiling of PGST funds consortia have no new money) is seen as somewhat timid at \$25 million over the first three-year period of operation. The Royal Society's contention is that the consortia should be more actively encouraged, strong leadership on consortia areas of endeavour should be given at Cabinet level, and disincentives to joining consortia, which may exist at industry level, should be removed.

¹It is essential to recognise that the CoRE model eventually settled on by Government is not the same as the original model A proposed by TEAC. Model A advocated excellence only, while CoRE permits some of the collaborative elements proposed for Model B. Thus, CoRE occupies some of the policy space of Model B. While it does so, CoRE serves a highly valuable function of allowing and encouraging tertiary centres to take a lead in working amongst themselves and in conjunction with other players to develop critical masses of excellence.

Place on the Spectrum	Government Goals for Research and Innovation			Gaps/Opportunities
	Economic Goals	Capacity Building	Social, Health, Environmental, Govt Depts' research	
Near to Application ↓ ↓ ↓ ↓ ↓ ↓	Trade New Zealand - \$55M			<i>Encourage Foreign Direct Investment</i>
	Industry New Zealand programmes: regional funds, BizInfo etc.			<i>Tax incentives</i> <i>Help SMEs</i>
	Venture Capital (VIE \$100M capital) Seed Capital Incubators	Enterprise Scholarships - eventual \$20M	Research in Government Departments - \$95M	<i>IP use and protection</i>
	Grants for Private Sector R&D - \$10M	Maori Scholarships - \$0.6M	Health research HRC - \$38M	<i>Public/Private partnerships</i>
	Technology New Zealand - \$26M	Post Doctoral Fellowships - \$5.5M	HRC/FRST Maori research - \$4.5M	<i>Target value-added research</i>
	FRST Research for Industry - \$171M	Doctoral Scholarships - eventual - \$10M	FRST research Social - \$4.3M Health - \$1M Environmental - \$85M	<i>Long-term policy commitment</i> <i>Specialise in tertiary sector research</i>
	FRST New Economy Research Fund- \$53M	NERF		<i>Review EFTS, loans and Equipment funding</i>
Basic/ Under-pinning		RSNZ Teacher Fellowships - \$3.75M		<i>Develop Human Capital. Rationalise teaching</i>
		Science and Innovation Advisory Council - \$1.3M		
		RSNZ Centres of Research Excellence - average \$12M EFTS-funded research in Universities - \$144M ¹		<i>Develop New Zealand's capacity to absorb overseas research</i>
	Public-Good-orientated Non-Specific Output Funding (NSOF) - \$27M Marsden Fund - \$28M			

5. INVESTMENT IN CONSORTIA

Government funds for research, excellence and innovation are currently associated with three Votes (Education, RS&T, and Economic Development), and ways must be found for funds under all of these Votes to work in harmony, synergy, and support for each other.

For the immediate future, the Royal Society proposes no change in Vote structure, but consortia should require complementary arrangements in other Votes. We propose that new funding be found, and/or reserved in roughly equal proportions if necessary, from Vote RS&T, Vote Economic Development, and Vote Education. The funds from these sources could remain within their Votes, and be available on first call for consortia formation. In this manner, no single partner would be required to pay for the participation of partners from other parts of the innovation system, each would receive their own assistance. Unused funds would revert to original uses in their Votes. The Royal Society also believes that the Centres of Research Excellence (CoRE) *currently* being selected should also operate on similar funding principles.

Consortia need a new set of incentives, performance expectations and rules to allow them to be established in new areas of highest potential benefit. Funding should allow consortia to be built

from best performing components across the national research and innovation system, and would encourage the creation of consortia where no suitable capability exists to date.

Arrangements must be made for the start up of the fund, for room for new consortia over time, and for the eventual exit of both for individual consortia and the fund as a whole, in the event that it should terminate. An important consideration in the development of new consortia will be to ensure the on-going development of capability within Maori and Pacific Island communities.

Initial fund investment of, say, \$10m per year from each of the three Votes, could be followed by new tranches each year of \$5m each until the total fund reached a total of \$90m per year after five years (eventually to be matched or exceeded by private sector funding). As consortia moved to sunset, funds would start to be released again for new cycles of investment. In any one year, funds would not be allocated unless applications of sufficient excellence were received.

While no typical level of funding is likely to exist for a centre, a Government input of \$90m per year might reasonably support ten centres. New Zealand criteria should encourage private sector and local government co-investment, with such contributions growing over time. A condition of Government investment should be that some substantial (and increasing) level of co-investment is found from other sources. Those consortia most successful in attracting other funding will likely present the best exit strategies, but consortia mainly engaged in "public good" environmental or social research might find that matching funds can only be found from other Government or local government sources.

6. ADMINISTRATION

It is the Royal Society's strong belief that overarching guidance on the areas in which at least some consortia should be established should come from Government level. By default, much of the policy work with regard to future research and innovation priorities has fallen to the Foundation for Research, Science and Technology. In our view this is an abrogation of Government responsibility. While an agency such as the Foundation should indeed be charged with implementing Government policy in an arm's length way, it should not be asked to carry decisions which are more properly taken at Government level, where a proper overview and synthesis of a wide spectrum of views can be taken into account. In the words of SIAC: "We [must] build a national movement for revitalising our economy, led by the Prime Minister, with widespread support from business, educators, local government, and other community leaders. The Government funds a good deal of New Zealand's total research effort, and must somehow identify priorities for this research. The Prime Minister, as the lead citizen, must drive the change."

In particular we would see Government's role, supported by the necessary policy advice, as naming new areas of endeavour where new capabilities can be built and exploited for New Zealand's future.

While the Foundation would administer the selection of consortia, it will need to conclude a purchase agreement that allows for funding from three votes. It may need to chair a small *steering body* to deal with strategic and coordination questions arising from Government direction, drawn from the ministries of Economic Development, RS&T, and Education.

The steering body would be responsible for passing on Government instructions as to fields of endeavour where consortia would be sought in each investment round. It might for instance ask FRST to announce contests for specific areas as identified by Government, and open competitions for part of the year's investment, with the onus on the applicant to show benefit to New Zealand.