



# TEAC Research Funding Proposals Considered Harmful: ICT Research at Risk

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## ABSTRACT

As Information Technology (IT) educators, whether career academics or former practitioners, it seems exceedingly rare to find environments in which IT is understood, appropriately managed or nurtured. To expect enlightened government policy therefore is perhaps over optimistic. Yet, our Prime Minister has identified the Information & Communications Technology (ICT) sector as a priority. Therefore, it seems doubly ironic that the elitist policy now proposed for funding research in the higher education sector promises to further undermine the ability of the IT related disciplines to prosper in our higher education institutions. Rather than strengthen ICT as a priority sector, current policy directions promise to diminish higher education's contribution to ICT capability building within the nation's innovation framework. This paper reviews the proposed directions and critiques their impact for IT education within the NZ higher education sector.

**Keywords:** IT Education, IT Research, Research Policy, Innovation Policy, Research Funding, Teaching-Research Nexus, ICT Sector

## 1. INTRODUCTION

The New Zealand (NZ) Government has been reviewing higher education strategy guided by the Tertiary Education Advisory Commission (TEAC), whose task has been to "develop a strategic direction for tertiary education in New Zealand that best serves New Zealand's human capability development in the future" (TEAC, 2000). The strategic direction has been linked with the political objective of achieving the "Knowledge Society", a goal criticized by Harvey (2001) as a rallying call centred upon a Utopian vision. A key element of the strategy relates to "building research capability and creating new knowledge" (TEAC, 2000). In its fourth and final report "Shaping the Funding Framework" (TEAC, 2001), details of mechanisms for building and resourcing this research capability have been indicated. Subsequently the Government has released its draft tertiary education strategy, and at the time of writing was receiving submissions, prior to finalising policy. This paper critically assesses the proposed research strategy and policy.



The likely impact upon higher education in IT, and consequently upon IT capability development in New Zealand is reviewed, and a strategic response is proposed for the NACCQ sector.

## 2. RESEARCH FUNDING POLICY

In the basic argument of the TEAC report (TEAC, 2001), strategic concentration of research funding is seen as a strategy to achieve a degree of concentration and build a critical mass of world-class research in selected areas. Yet government has indicated little desire to provide additional funding for the tertiary education system. This concentration is to be achieved by skimming off implicit funding of the research component of undergraduate and postgraduate teaching, for reallocation primarily to institutions supporting postgraduate research and researchers.

The policy proposal would continue to fund teaching on a per student basis using an EFTs formula as in the present approach. However research funding would be decoupled, and institutions would be separately funded to support their research related activities, thus reducing the EFT's based contributions for undergraduate and even taught components of postgraduate degree teaching. The formula for determining the research funding for each institution would be based upon a Performance Based Research Fund (PBRF) (TEAC, 2001a). This fund has three key metrics -

- <bi>Quality rating of academic staff, (50% weighted in the funding formula)
- <bi>External research income (25% weighted in the funding formula) and
- <bi>Research degree Completions - i.e. Masters and Doctoral degrees (25% weighted in the funding formula).

These metrics and their interpretations are heavily based upon rather traditional academic and scientific perceptions and measures of research activity and research training, with a strong publications and heavily postgraduate and research thesis emphasis. This decoupling of undergraduate and postgraduate research funding has in turn been based upon a superficial analysis of the linkages between teaching and research. Duncan (2002) notes the selective

misinterpretation of work by Hattie and Marsh (1996), in support of an argument that undergraduate teachers need not be "research active".

To qualify for funding from the proposed PBRF an institution would be required to develop annual Research and Research Training Management Plans (RRTMPS) and have a minimum of 50 research active staff in order to secure PBRF funding (or form collaborative entities to meet this minimum requirement)" (TEAC, 2001 p. 100). TEAC (2001a) do however suggest the option that, "a group of polytechnics with a significant research strength in a particular discipline (e.g. nursing) might combine to form a collaborative entity. Under such an arrangement, the entity in question would still need to meet the proposed threshold and prepare appropriate RRTMPS".

## 3. POLICY WEAKNESSES AND INCONSISTENCIES

### 3.1 CHAUVINISM

As a general perspective on the fourth TEAC report, I have expressed my own views in a submission to Government thus "To speak rather bluntly about the fourth TEAC report it struck me as a great leap backward to the glorious fifties, of Victorian style elitist Universities, in a chauvinist model of mini Cambridges of the South dotted in bucolic antipodean fields. Given riding instructions about doing more with the same funding, the report simply argued for privileging a worthy few, at the expense of the middle, which does not raise the overall level of societal capability, nor support the goal of delivering the so-called 'knowledge economy and society'. It may actually fail to deliver because there is no vibrant questioning, learning culture, nor broad base from which to draw the many and varied, adaptable and ingenious people required to populate this new world, and from which the few truly excellent may rise."

### 3.2 RESEARCH DEFINITIONS VERSUS MEASURES

The TEAC report appears to take as a default definition solely the "scholarship of discovery" (Boyer, 1990) or "a scholarly investigation closest to what is meant when academics speak of research" (TEAC, 2001a) and be based heavily upon the OECD

definitions of research (OECD, 1994), or its derivatives such as the UK based Research Assessment Exercise (RAE) definition (TEAC, 2001a). However these definitions of research are viewed from an economic lens, take an excessively linear view of the research process, divorcing and privileging theory over practice and are pedagogically weak. The underlying model of education is one of undergraduate and even postgraduate information transfer, and of knowledge discovery only in the context of a research thesis. While this may be a basis upon which to create comparable national statistics, I doubt if it is a sound basis upon which to develop serious educational and research policy, recognising the particular requirements of the New Zealand environment

### **3.3 BLUE-SKY VERSUS COMMERCIAL RESEARCH**

There is a further inconsistency in the TEAC report in its desire to produce research that delivers immediate value for its stakeholders, while having measures based upon more academic and blue sky conceptions of research quality. The proposed research performance metrics will do little to address the lament of the tertiary strategy review (Maharey, 2002) that, “while universities are valued by the private sector for their abilities to generate new ideas, they are seen as lacking a commercial user-driven culture, not having the ability to see projects through to completion, and rather slow to respond to user needs”. The flaw in the proposed policy is that of confusing innovation with research, and assuming that the one necessarily follows from the other. In the case of ICT the opposite is more likely, with traditional academic performance metrics encouraging less practice-linked or collaborative research, failing to value the types of innovation that arises from such modes of research, and offering little incentive to bridge the gap.

As one example, the new Technology park at Auckland University of Technology (AUT) is an applied innovation venture, aimed at bringing ICT based products and services to market. While this reflects a stated governmental goal, the PBRF will not recognise this activity at all. AUT’s researchers would be better off researching obscure algorithms that may bear fruit in someone else’s product 10 - 20 years from now.

### **3.4 ICT SECTOR CAPABILITY BUILDING**

Of particular interest to NACCQ is the fact that our prime minister has identified ICT as a priority sector (Collins, 2002). But managing innovation is a difficult thing, and delivering working artifacts and products as opposed to concepts is a different set of skills. Ironically IT professionals possess many of these bridging skills, working as they do in a discipline which involves applied R&D, bringing concepts to fruition in working systems on a regular basis. Within the NACCQ sector many of our ICT educators come from practitioner backgrounds, and are on a path of conversion to the academic life through higher study and developing research interests. These highly valuable and seasoned practitioners, have much to offer to budding IT professionals, and are critical capability developers within the country’s innovation framework.

Morrison (2001) has noted in the Australian context that the GDP return from educating ICT students is some six times the net present value of the investment. In addition to their teaching contribution, these educators also have the ability to link to stakeholder communities and produce applied research and practical innovations. Morrison (2001) has already noted the severe pressures on ICT educators due to the rate of change and volatility of the discipline, resulting need to remain current and heavy teaching loads due to shortages of skilled staff. A funding regime which further shuts them out from research, runs the risk of undermining the ICT priority and very innovation drive that is being sought. Likewise more generally in the Polytechnic sector there is a huge amount of similar talent, with the expertise to bridge the theory practice gap. For instance, at one NACCQ “Getting Started in Research Workshop” that we conducted last year, there were three managers present from different disciplines, one a former IT professional, University sector researcher and head of the ICT department, another a former DSIR research institute manager, and another who had just won a design award and was lodging a patent in the fisheries area. The proposed funding regime will close off the option of this expertise being leveraged more effectively, as for such institutions, teaching workloads will rise to compensate, squeezing out time available for research.

The tertiary review acknowledges the need “for tertiary providers to cover a wide range of research

fields for teaching purposes” (Maharey, 2002), but also argues for “achieving critical mass in areas of real research strength.” In the extremely broad field of IT, focusing energies upon a small area of concentration, which meets the “international standing” tests of academic research, is neither likely to build a broad based national ICT capability, nor forge strong links with commercial communities. If we review the shortlisted eleven applicants for nationally supported Centers of Research Excellence (CoRE), they include no Polytechnic sector submissions, none from Auckland University of Technology, and only two with some relationship to the much-vaunted ICT sector. Firstly “the MacDiarmid Institute for Advanced Materials and Nanotechnology, conducting research into new materials and technologies such as nano-engineering, optoelectronics, superconductivity, conducting polymers, light harvesting...” Secondly “the NZ Institute of Mathematics and its Applications, conducting research into high level mathematical techniques to bioengineering, bioinformatics, medical statistics, optimisation and risk assessment to enhance decision making in complex systems” (Evans, 2002). The cynic in me says that these are applications comprehensible to the old “science club” reviewing them, but hardly a rallying platform for New Zealand’s ICT capability of the future, and unlikely to resonate hugely with private sector sponsors eager for quick results. How many NACCQ sector members would willingly join under such an umbrella if either of these were deemed to be the sole recipients of public ICT sector research funds?

Thus a national innovation system geared around a randomly chosen elite in a few centres of excellence (and not very well funded ones at that), is not a real recipe for national success. For developing a strong ICT base this is probably just another set of barriers, in an already stretched capability-building framework.

#### **4. NACCQ AND ICT SECTOR CAPABILITIES AND POTENTIAL IMPACTS**

The net impact of the proposed research funding policy changes is that NACCQ sector institutions would receive less funding for their mostly undergraduate level degree teaching, and thus workloads would rise and research activity, related outcomes and associated outputs would inevitably drop.

One stated goal of the strategy is to contribute to the vision of bringing about a “knowledge economy and society”. From my experience as a former software developer and manager of IT professionals and now a manager of academic staff in the internationally competitive ICT discipline, the proposed research funding strategy will only exacerbate the present situation of shortage of qualified academic staff, and further reduce the narrowing pipeline through which the ICT innovators of tomorrow may squeeze.

The broader implications of the proposed change and intentions of decoupling teaching and research have not been well considered. In the culture of the Universities, with their privileging of research for international mobility and promotion, this would further disadvantage New Zealand in the international talent search. We would be seen as inhabitants of a remote island teaching in overgrown secondary schools, and academic portability could be lost. Not only would we lose on the parity of esteem basis, we would exacerbate the already serious problems of attracting and retaining quality staff caused by our general conditions and academic salary scales, which are very low by international standards.

The proposed reduction of degree level funding for those not meeting the “research active” tests will further worsen the state of ICT education in New Zealand. There is a recognised global shortage of IT professionals and ICT educators, and the academy, with its fusty traditions and priestly status hierarchies, is a hostile environment in which to retain highly marketable and qualified staff, who by tradition have tended to disdain hierarchies anyway. The proposed PBRF would value only a small percentage of NZ ICT academics - for instance, nationally in 2000 there were 17 PhD graduates in commerce/business and 23 in mathematics and information sciences (Masters, 2002). Assuming an optimistic 30% of those were in the ICT related disciplines, that would give a maximum of 14 PHD’s per year across the whole country as a base for PBRF funding.

Unlike many traditional disciplines many of the real advances in ICT are occurring in the practice field, not in the academy, so researchers often prefer to work in industry to remain current with the latest developments. The PHD and the academic research paper are not the sole arbiters of worth in this discipline. Much of the growth and development in the discipline occurs in the advancement of professional practice capabilities. Models of research

therefore need to acknowledge the importance of communities of practice (Wenger, 1998). Wenger argues that “learning involves an interaction between experience and competence”, that a “well functioning community of practice is a good context to explore radically new insights” and that communities of practice are a privileged locus for the creation of knowledge”. This is especially true of the IT community, and emphasises the vital link between theory and practice in this set of disciplines. Thus we have the same dichotomy in our discipline as government itself - we wish to encourage links with industry, be responsive to partnership and commercialization opportunities, teach programmes informed by research active staff and meet international standards of excellence. However we exist in the international research community with a value system forged by the academy and the old science club, and a set of metrics devised to suit advances in physics or chemistry, and increasingly irrelevant for ICT. We need to challenge these metrics, and point out their damaging impacts.

The Australian experience may offer some further insights. In a report for the Australian research council ARC (2000), one finding was that “changes in proportions of discretionary funding to institutions will have a disproportionate effect across different fields of research...policy measures designed to concentrate...on the basis of overall research performance may shift research training away from where most of the research action is in some fields”. The report also noted that the bulk of research (by traditional academic metrics), occurs in the established Universities (“five Universities accounted for nearly half of higher education research expenditure in 1993, and the top nine institutions were responsible for nearly 70 percent of national higher education research expenditure” (ARC, 2000). Yet “comparatively minor research institutions were found to be significant or even dominant research performers in particular fields. The report interpreted this finding as reflecting the development of research ‘niches’ by some of the newer (‘post 1987’) universities. For example, the former institutes of technology were major players in information and communications technology research” (Arc, 2000). It could be surmised that the strong industry linkages and applied focus of the teaching in such institutions would have given them an edge in the ICT research field. In New Zealand a similar picture may well be true in the ICT area where, over the last decade, the growth of computing degrees and accompanying

research activity within the NACCQ sector has developed significant new national strengths in ICT education and ICT research.

## 5. NACCQ SECTOR STRATEGIES TO AMELIORATE IMPACTS

The main conclusions for the NACCQ sector would appear to be that we must as ever, simply “row our own boat”. For research related activity we might as well regard the government and its CoRE strategy as a generally ICT-hostile irrelevance, tightly controlled by a cosy club of old world universities and with a Royal Society perspective on research. Aiming for such funding is likely to involve wasted effort on our part unless we come in under the umbrella of one of the host Universities and its research team. If we can find joint areas of interest then fine, but if the areas of research we wish to pursue are not favoured, then we will need to find our own solutions.

Having said that, nonetheless NACCQ did put forward its own submission for the CoRE fund, as a Center for Information Technology Research (CITRUS), which proposed to link the members institutions as a research network with the ability to leverage its joint strengths by research training within the member institutions, by research and innovation partnerships with external organisations, through collaborative research projects and by operating as a virtual research network. This proposal was unsuccessful, on several grounds, including the fact it was based upon an opportunistic response and innovation capability rather than a distinct tightly defined project. However NACCQ did learn from the process. NACCQ has now increased its visibility as a sector within New Zealand’s science establishment, and received several encouraging comments from our international referees. These include: “This is a quality proposal and should be funded...The applicants have already managed to do networked IT research throughout New Zealand supported only by their dedication, skills and boundless energy. The positive results for New Zealand will be enormous if this team is provided with support that will enhance their organization and provide them time to dedicate to these projects”. “Recognizing untapped research capability and potential in the polytechnic sector is some interesting lateral thinking”. The summation by the CoRE assessment panel concludes, “The idea

of building a network of research clusters in the Polytechnic sector is an admirable one that deserves encouragement. Such a network would need to become established and develop a credible research record before it could compete for the kind of support intended to be provided by the CoRE programme". (CoRE, 2002) The next step then is to refine the CITRUS concept and look for other avenues to pursue it. These avenues might include some of the following:

- ◆ Lobbying government for a more appropriate innovation funding mechanism, which will enable such collaborative initiatives to build the nation's ICT innovation framework.
- ◆ Exploring ways of refining the center concept and creating a collaborative entity (TEAC, 2001a) to apply for PBRF funding.
- ◆ Seeking International Research Funding, by strategically sifting through the many available funding sources .
- ◆ Approaching a New Zealand based private sector organisation, or potential funding body such as a charitable foundation for significant grant funding.
- ◆ Leveraging local linkages with industry partners and soliciting several small-scale contributions may help to build up a moderate fund.
- ◆ Just create the centre anyway, without money and find ways to attract income or grants on a project, drip-feed or opportunistic basis seems like a sensible approach. Activity may create its own momentum and like the movie Field of Dreams "If we build it they will come!" We have a number of existing projects with both national and international collaborative partners, which we can continue under the centre's umbrella. Our own institutions may also contribute through their contestable research funds, if suitably framed applications can be put together.

## 6. CONCLUSION

So it is argued that government policy proposals for research funding will not achieve the desired outcomes in terms of the nations' innovation framework. In fact they threaten to undermine the potential contribution of ICT as a strategic sector in the nations' pursuit of a 'knowledge economy and society'. The proposals have been formed based upon little or no research or insight into research within the Polytechnic sector. Nor has the emerging

contribution of NACCQ sector research and teaching within a national ICT innovation framework been given consideration. A limited and superficial examination has been conducted into the linkages between teaching and research. No clear distinction has been made between funding research and encouraging innovation, in fact the assumption is made that innovation necessarily follows from funded University research based upon international metrics of academic research excellence. Excessive concentration on such metrics actually undermines the ICT innovation possibilities that arise from active partnerships with the small to medium enterprises typically found in New Zealand industry. The public good benefit from investment in ICT related higher education has not been adequately considered. Nor has the role of undergraduate research and partnerships between NACCQ sector members and local, regional and national ICT users been taken into account as mechanisms for supporting innovation and creating both knowledge and viable new products and services within the ICT sector.

In the face of such negative policy proposals NACCQ needs to embark upon some key initiatives on behalf of the sector. Firstly, it is necessary to lobby and educate ministers and officials about the unintended impacts of such policies. More importantly though, the sector needs to leverage its strengths through collaborative initiatives such as the Center for Information Technology Research, which might apply for PBRF funding, or build the credibility to compete for private sector or international sources of research funds. The challenge is ours!

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## POSTSCRIPT

Since the time of writing the first draft of this paper in March 2002, the CITRUS concept has been approved for launch by NACCQ executive, with two initial nodes being proposed: the first in Auckland hosted jointly by UNITEC and Waitakere City Council; and the second to be established at Dunedin hosted through Otago Polytechnic. Key projects are being defined and will be underway by the time of the conference. The waka is launched, kia kaha to those who row in her.

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