

Submission to Review of National Innovation System

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Declaration of Interest: I am the Research Director of an ARC Centre of Excellence (the Centre for Ultrahigh bandwidth devices for Optical Systems - CUDOS). I have reviewed proposals for Graduate Centres of Excellence on behalf of the German DFG (German research Foundation) . Some details on this program are available at the link: http://www.dfg.de/en/research_funding/coordinated_programmes/excellence_initiative/graduate_schools/index.html

Background: I have a PhD in Physics followed by seven years in industrial research at Bell Laboratories, during which time I co-filed 35 patents and was the leader of a team that won a national US award for an innovative product developed for high bandwidth long haul optical communications networks. I was the Foundation Research Director of CUDOS and have been in this position for six years. I am presently in the second term of a Federation Fellowship.

Disclaimer: This submission is made in a private capacity and not as a representative of the University of Sydney.

Submission:

Innovation requires the involvement of the country's Universities as both generators of novel, valuable intellectual property and as teachers and trainers of graduates whose skills and knowledge are essential to create wealth from IP. The ICT sector in particular has seen enormous wealth and national benefit created from human capital. In this submission I propose the establishment of a program to create Graduate Centres of Excellence within Universities in areas of national priority for innovation and wealth creation, specifically within the ICT sector.

The concept of Graduate Centres of Excellence is not new: a similar program has now been established in Germany while market forces have led to a *de facto* program in the US where world-renowned schools like CalTech, Stanford and Harvard are attractors of government and private support. In each case the model is as follows. Centres of research excellence in areas of perceived national benefit establish strong teaching programs at the Masters and PhD level. The quality of students is directly proportional to the quality and reputation of the teaching staff. A strong Masters program with in-depth coursework and training produces high quality graduates for industry; industry values the program and actively recruits students from it. The PhD graduates have the vision and knowledge of a field to either become research leaders, or seize the chance to create new opportunities in industry. Both the PhD and Masters students carry a strong positive impression of the Centre into industry, leading to a flow of research contracts and ultimately endowments back to the University and the Centre.

Graduate Centres of Excellence are located within one University, but would link across different Faculties. In ICT, such a Centre would link across science and engineering disciplines, a division strong in Australian universities but almost non-existent elsewhere. For example, in my field of fibre optics, collaborators in the US or

Europe would be located just as comfortably within the electrical engineering department as in physics.

Graduate Centres of Excellence could link with government and other research laboratories to provide enhanced teaching and training opportunities. Staff from these institutes could teach in the Masters programs and supervise students, while students at the Graduate Centre could access facilities of the government laboratories for their training and for their research projects.

The funding needed to establish Graduate Centres is not large, say around \$1M per Centre per year, and would pay for student PhD scholarships (four years rather than the existing three), some administrative teaching and infrastructure costs. Where possible, Centres would build on a strong existing base of research and teaching facilities. There are clear opportunities to grow Graduate Centres of Excellence from the existing strong base of 20 or so Centres of Excellence, all of which have been established in areas of national priority.