

University, Industry, Government and International Partnerships in Education and Research to Sustain and Develop the Engineering Profession

Engineers will continue to make critical contributions to nation building and the sustainability of corporate organisations for many generations to come. The profession of engineering is dynamic, needing to exploit the latest science and technological knowledge and management processes to solve problems, and create new ideas and products, systems and processes. Meeting the needs of increasingly complex modern societies, with their rigorous accountabilities to environmental, social and economic goals, places high demands on the engineering profession, and its educators and researchers. Partnerships within academe and between industry and government are essential to improve the attractiveness, relevance, quality and value of engineering education and research, and to assist engineers and technologists to advance their careers.

The paper first reviews a number of partnerships that have been developed recently between a large comprehensive public university, the University of South Australia and its local high schools and industry, to provide prospective students and undergraduates with better understanding of the nature of engineering, technologies and practice. The partnerships foster students' engagement in curriculum-linked activities appropriate to their stage of education. There is already evidence that these initiatives may be assisting to reverse some negative trends in undergraduate student recruitment into engineering and information technology, in Australia and elsewhere, and improvements in employment rates.

The paper also discusses the formation and operation of a number of formal partnerships that explicitly support postgraduate engineering and information technology education and research. These include: a national program to support postgraduate education for the Australian defence industries; a professional doctorate program conducted in collaboration with a major international electronics company; postgraduate manufacturing management programs in collaboration with overseas professional organisations; and multi-partner national cooperative research centres in the areas of engineering asset management, and systems and technologies for distributed enterprises.

Several of these programs and their partnerships are designed to focus on what may be called "technocratic management", including manufacturing management, project management, systems engineering, and logistics management. Practising professionals and companies need to develop leading edge skills in these areas, at least as much as they need the general business skills area offered by MBA programs, and knowledge of latest technologies. Such technocratic management programs are particularly attractive in the Asian region, where nation building is clearly visible in major infrastructure development, and in the growth of product manufacturing capacity. In the advanced industrialised economies where the economic and employment balance has shifted away from manufacturing, the areas of systems engineering, project management and logistics have increasing importance. All these areas have wide scope and are intrinsically multidisciplinary, and may be contextualised within particular industries and national settings. The paper discusses how these multidisciplinary and professionally oriented education and research program partnerships fit within the strategic directions of the university, and Australia's national development priorities.

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This paper discusses a number of activity-based pre-university and undergraduate partnerships with industry to increase the recruitment of students into engineering and their subsequent employment prospects. The formation and operation of partnerships with industry and government, and with international partners, to enhance engineers' career development and national capabilities through postgraduate education and research are also discussed.