Address to the CLIC Conference
Montreal, Monday 26 October 1998

Alliances and Networks

In their forward to the delegates' manual, Patrick Beaudin and Bernard Schiele used two key words. They used the words "alliances" and "networks". I think these are key concepts in achieving the sorts of things we all want from science and technology:

- a better environment
- creation of wealth
- creation of satisfying well-paid jobs
- solutions to the social problems that can disrupt out society

Both the initiatives I am going to describe depend very largely on these two words, alliances and networks.

First I should describe the organisation for which I work. FASTS - the Federation of Australian Scientific and Technological Societies - has a political function in Australia, as representatives of 50,000 working scientists and technologists. It also has an interest in promoting these networks. Our members, the professional and learned scientific societies, aim to alert governments to the benefits of S&T.

At times we face an uphill battle against politicians who do not understand science particularly well, or do not know the way it works, or are sceptical of the notion that money put into appropriate research is an investment rather than simply a Government outlay.

So we need networks and alliances to sell our message to government, particularly alliances with industry. We can only convince government by showing that science creates jobs and wealth, and solves problems.

The interests of FASTS fall in the following four areas:
1. Government science policy and planning
2. Education
3. Industry and business
4. University and public sector research

Further information about our policies is available on our web site.

Both Australian initiatives I want to discuss depend on alliances and networks. The first is sponsored by Government, and is designed to create consortiums to tackle problems and exploit opportunities with a research focus. The consortiums are made up of research organisations, industrial firms, Government departments and the end users of the research; and together they plan and carry out the research.

This helps overcome that classic research problem of how to translate clever ideas into commercial reality. Our scientists and technologists have plenty of bright ideas, but industry seems strangely reluctant to take them up. Governments have tried all sorts of incentive schemes and initiatives to bring together these seemingly

irreconcilable parties, but investment by industry in R&D in Australia is still at a very low level.

In a comparison of twenty-four OECD and selected Asian countries in BERD (Business Expenditure on R&D) Australia ranks sixth last, ahead of only China, Italy, India, New Zealand and Spain. This is despite all the tax incentives, the creation of funding organisations devoted to technology transfer, conferences and workshops, and rhetorical calls by politicians about the importance of investment by industry in R&D. The Australian BERD figures contrast with the figures for GERD (Government Expenditure on R&D) which place Australia in the top four or five countries when compared with the same group.

The answer Australia devised was the Cooperative Research Centres Program, which bears some similarities to Canada's Networks of Centres of Excellence. But while the Network encourages collaboration between researchers, it "does not have the strength of commitment provided by the two legal agreements that form the basis of each centre in the Australian program." [*Changing Research Culture* p7] These agreements are in the form of contracts among the partners, and between the partners and the Commonwealth.

The CRC Program was established in 1990. The aims are to:

- improve the competitiveness of Australian industry and create wealth through supporting long-term high-quality research
- improve the education of university post-graduate students
- capture the benefits of research, and strengthen the links between research and its applications by the active involvement of users in the work and management of the CRCs
- promote cooperation in research and more efficient use of resources

I want to return to discuss specifically the second point, improving the education of post-graduate students. First some general points on CRCs. Australia now has 67 CRCs, all tackling a separate problem or pursuing commercial opportunities. The names of a sample few will indicate the breadth of their interests:

- Aquaculture
- Waste Management and Pollution Control
- Biopharmaceutical Research
- Eye Research and Technology
- Vaccine Technology

CRCs are made up of consortiums of different organisations and typically have five to fifteen partners. These partners include research organisations, universities, government departments (at both a national and provincial level), and industry. Each partner has to agree to bring something to the group. Their contributions may be in cash or through contributions of equipment or research facilities.

They compete for Government funding to support their own contributions, and the competition is strong. This year 58 consortiums have lodged a formal application to become CRCs, with 30 to 32 places available. Some of these applications are from new consortiums and others from existing CRCs that are nearing the end of their seven-year life-cycles.

It is important to recognise that CRCs are almost "virtual" organisations. The central offices tend to be small, with from two to ten staff coordinating and monitoring the work of the researchers. The bulk of the research is carried out in laboratories and research sites run by the partners, and the scientists may not meet face to face very often. Almost all CRCs have "nodes" or representations in more than one state (province) in Australia, and this helps overcome a number of issues: isolation caused by large physical distances, parochial attitudes towards "ownership" of research, and duplication of research.

The Aquaculture CRC is an example. It has nodes in Brisbane and Townsville in the state of Queensland; Hobart in Tasmania; Port Stephens and Sydney in New South Wales; and Adelaide in South Australia.

Research directions are set by the Board and the Boards are elected by the partners, so the industry partners and end users are involved in determining what the scientists will do from the very start. The fact that industry helps plan the research increases the likelihood that it will be interested in developing it to a stage where the new technology can be introduced to the market, and this is a major attraction for the Program. The CRCs serve as facilitators of research.

Total Government funding in 1997-8 amounted to $A146 million, about four per cent of the total expenditure on S&T by the Australian Government. The contributions of the partners are on average about two and half times as much. This means that each of the CRCs has a total budget averaging a little over $A6 million per year, some in cash and some from "in kind" contributions from the partners.

Industry has backed up their enthusiasm with cash contributions to the research program. Over the twelve-year period 1991-2003 these are estimated to total $640 million.[1]. That averages at nearly $A1 million per CRC per year.

A review earlier this year said CRCs were bridging mechanisms which "link public sector research and higher education organisations and the users of new knowledge, from the public and private sector."[2] The Review listed participation as including over 250 companies (both Australian and international); 61 State Government agencies; 35 universities; 24 CSIRO divisions; 8 Commonwealth research agencies and so on.

Has the CRC Program worked for Australia? The consensus view is that it has. The CRC program was established by a Labor Party Government in 1990. A measure of its acceptance and support is that the new Liberal Government first reviewed the Program (by Mercer and Stocker) and then decided to maintain it almost unchanged, after industry groups in particular expressed strong enthusiasm for the way it had helped bridge the gap between research and industry.

The Mercer and Stocker Review concluded: "The CRC Programme addresses important weaknesses in the national innovation system, in particular the disincentives to collaboration among research providers and Australian businesses,

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[1] *Australia's Cooperative Research Centres Program*, Leigh Fletcher 1998

[2] Review of Greater Commercialisation and Self-funding in the Cooperative Research Centres Programme, Steering Committee: Don Mercer and John Stocker, DIST 1998

the weak links between research organisations and users, the lack of critical mass due to the institutional and geographical dispersion of Australian research and research application, the lack of mobility of personnel between government research, academia and industry, and the challenges of effective international links for a country isolated from the international centres of research and innovation."

In October 1997, the CRC Association released "*A sample of single best achievements from a cross-section of CRCs*". It was designed to influence the review process, and was described as "a succinct collection of some of the outstanding outputs of the CRC Program."

Thirty major achievements were described, in terms of who contributed to the research and how much they put in, and what the benefits are estimated to be. An example, again from the CRC Aquaculture, describes progress towards new processes to prevent marine fouling on animals, materials and structures used in aquaculture. Many of the audience would be familiar with the build-up of marine organisms (like seaweeds and algae) on nets, cages and oyster shells.

CRC Aquaculture has put a little over $2 million into the research, and estimated the value of their research and their solution to Australian industry to be $23 million. That cost-benefit ratio of 11 to 1 was more than matched by the achievements of other CRCs in their industries.

There is another benefit which may well have the greatest effect on changing the culture of Australian industry and Australian research. CRCs have an active post-graduate education training program, and about 25 per cent of the CRC Program funding is directed toward education and training activities.[3]A PhD from a CRC combines a traditional research project with additional skills in project management, intellectual property and communication. The CRCs also support their students to attend conferences, but most importantly they give students extended experience of working with industry. Graduates with a post-graduate degree through a CRC tend to have broader horizons, and to be more receptive to seeking a job in industry rather than in traditional research organisations. Nearly 2000 post-graduate students are involved in CRC research projects[4]; and the "new" graduates are expected to have a significant part in changing cultural attitudes to R&D within both industry and research organisations.

The second formal objective of the CRC Program is to stimulate a broader education and training experience, particularly in graduate programs. Broadly, the CRCs aim to educate industry-aware graduates, with a better awareness of industry needs, experience in user-orientated research, and as a result, with enhanced prospects of employment.

Their education experiences contrast with those who undertake a graduate degree through the universities. These degrees can be narrower in focus, have little extended contact with industry, and have in the past created graduates whose job expectations

[3] Mercer and Stocker, ibid
[4] Leigh Fletcher 1998, ibid

are modelled on the people who taught them - their lecturers and supervisors. Unfortunately these jobs are becoming increasingly rare in Australia.

The second initiative also depends on alliances and networks.

We hear a lot about the role of new technology in learning and information processes, and certainly people who want to succeed in the twenty-first century need to be skilled navigators of the web, among other things. But there is also room for the personal contacts that so often determine the success or failure of a project.

The establishment of an organisation called Australian Science Communicators has created a network of people interested in the public communication of science and technology, and brought together a group of people who were previously isolated within their organisations or their jobs.

Coincidentally, Canada plays a unique role in the birth of this group. ASC was formed as a result of research a colleague and I were doing for a paper to present at a conference in Montreal chaired by Bernard Schiele in 1994. Jenni Metcalfe and I were asked to describe the Australian scene in terms of PCST; and when we asked people (and organisations) what they were doing and how much they were spending, we found within their answers a deep sense of isolation.

We gathered information from a number of widely dispersed sources, including science museums, Federal Government departments, universities, the fledgling Cooperative Research Centres, CSIRO, independent editors, and media. A feature of the interviews and surveys was a common complaint of professional isolation, and wistful hopes for an organisation to link science communicators.

We called a meeting of people interested in forming a new organisation, which led six months later to the formation of the Australian Science Communicators.

The achievements of ASC

The major achievement of ASC has been to create a network and a community where none existed before. Individuals isolated within their organisation or their one-person consultancies have discovered colleagues, common interests, meetings of like-minded people, an email network which carries jobs, announcements, and vigorously-expressed points of view.

ASC has elected its fifth President, all of whom have been the most prominent figures in science media. It has established eight regional groups in the major population centres, and these groups have run activities ranging from private tours of science museums and research organisations to media training sessions for members. ASC has a newsletter and an email network linking 260 people, and has presented the "Unsung Hero" Award five times.

ASC also has a national presence. It acted as the catalyst for a new national forum on S&T, and has brought together all the major S&T groups in Australia to organise PCST activities. It has put proposals to the Minister for Science in personal meetings: and without ASC it would have been difficult to organise funding for National Science Week.

A random sampling of Members nominated the following when asked: "What has ASC done for you?

- provided leadership and coordinated major annual events that have helped to popularise science
- Networking, Networking, and raising awareness of science issues
- made me feel part of a profession rather than just someone with a fruit salad of a career.
- providing my organisation with opportunities for training in communications

I don't want to gloss over the weaknesses of ASC. The organisation has not been without its faults - before a recent change, the secretariat was weak; and regional branches fluctuated from great bursts of activity to silence. ASC suffers all the problems of organisations run by volunteers.

A measure of the impetus ASC has given PCST is that Australian had the largest national group apart from our hosts at the recent PCST meeting in Berlin. The vigour of science communication in Australia owes a lot to the existence of ASC.

Looking at the first four years in retrospect, my conclusion would be that even if ASC stopped tomorrow, its influence would linger for years. So many informal relationships have sprung up as a result of people meeting each through ASC that PCST activities would continue even if there were no central body to coordinate activities, albeit loosely. These informal relationships will continue to find solutions and methods to handle the transfer of knowledge from experts to the general public. We need flexible, informal, adaptable people-based solutions, to complement the institutional solutions.

These two Australian initiatives - the CRC Program and the Australian Science Communicators - have in their different ways helped change the S&T landscape in Australia. I would suggest, modestly, that these experiences may be of value to the delegates of these conferences.