Australian Government

Nuclear-based science benefiting all Australians

Review of Higher Education Discussion Paper

The Australian Nuclear Science and Technology Organisation (ANSTO) would like to take the opportunity presented by the Discussion Paper for the Review of Higher Education (HE) to highlight the role of organisations other than HE institutions that perform research and manage research facilities. They interact at a number of levels with HE institutions, at times in complex ways due to their distinct mandates and funding arrangements.

Such organisations include ANSTO and other government science and technology organisations, as well as medical research institutes. The picture painted of the Australian HE sector is incomplete without such organisations.

- In Section 1.3 of the Discussion Paper and the introduction to Chapter 3, the list of "characteristics of higher education in modern Australia" should be expanded to include cooperating with other research providers. The fourth point here concerns connecting with other education and training providers. Collaborating with organisations such as ANSTO would complement this.
- Section 2.3 refers to the need for the HE and vocational education sectors to work together. ANSTO would like to propose that this be expanded to also working with research providers and facility operators outside the HE sector.
- This same point relates to globalisation. Other research organisations have a role to play here as well, in the contribution we make to the mobility of researchers and of students. For example, we jointly supervise international students and some researchers attracted to Australia by ANSTO have moved on to HE roles.
- The discussion in Section 2.4 regarding attracting high quality international staff and students omits the key role that world-class facilities play in attracting excellent students and researchers to Australia. For example, we sought staff from around the world to develop the neutron beam instruments on our OPAL research reactor and to become instrument scientists here. Some were foreign citizens while others were Australians returning home. ANSTO also attracts postdoctoral fellows to Australia. The quality of facilities is key. Similarly, HE institutions recruiting overseas find that the quality of facilities that will be accessible is a major drawcard. In considering this factor it is relevant to note that landmark facilities such as OPAL are not generally located in HE institutions.
- In considering resources (Section 2.5), organisations such as ANSTO complement the resources of universities through joint positions, honorary appointments and the like as well as in joint supervision. Approximately one in seven of our research staff hold such roles at universities. In 2006-07 our staff supervised more than 140 postgraduates and undergraduates.
- We were pleased by the reference in Section 3.5 to publicly funded research agencies, although concerned by it seeming to be confined to the context of the teaching-research nexus. As argued above, cooperation and collaboration occurs between universities and agencies in many more ways than have been included so far.

  Among the models for such cooperation and collaboration is the Australian Institute for Nuclear Science and Technology (AINSE) which brings ANSTO, 35 Australian universities, four New Zealand universities and a NZ agency together in a body that provides travel support for access to OPAL, and travel support and access costs for ANSTO's other facilities. The Review of Closer Collaboration between Universities and Publicly Funded Research Agencies (the McGauchie report), released in 2004, and the

National Research Infrastructure Taskforce (which led to the National Collaborative Research Infrastructure Strategy) commended the AINSE model.

There are no access costs for OPAL for research that passes peer review and will be published in the public domain. This peer review process is itself another form of the interaction, as it involves ANSTO and university personnel and other eminent researchers, to ensure a broad, independent perspective.

- In Section 3.6, regarding international students, facility-based collaboration can make a strong contribution to expanding the international nature of Australian HE. ANSTO intends making OPAL a regional centre for nuclear science and technology and is extensively engaged in regional collaborations to achieve this objective and as part of maintaining Australia's strategic interests concerning nuclear science and technology. In addition, AINSE provides a model for trans-Tasman integration. (These points apply to Discussion Questions 23 and 24.)

Overall, the McGauchie report contained considerable discussion of the extensive linkages between universities and Commonwealth science and technology organisations and might well be a useful resource for the Higher Education Review panel in this regard.

The cost of research

ANSTO has been concerned that recent discussion about funding of the cost of research has been largely confined to the HE and medical research sector. ANSTO contributes resources to research led by the HE sector, for example through projects with Australian Research Council (ARC) funding where ANSTO provides partner investigators and associated usage of facilities. The contribution from agencies such as ANSTO forms part of the 'cost of research'.

ANSTO seeks such collaborations as one way to meet the objectives of its research projects. However, the ability of agencies to contribute these resources is being stretched. In the past two decades the research capacity of the agencies has been substantially reduced.

In the case of ANSTO, government funding has increased annually by amounts well short of the level of cost increases and any expansion of research has relied on new policy proposals or efficiencies in operations. The reduced investment in the recent budget and its continuance over the next three years leads to an overall decrease in funding and makes the situation even more difficult. ANSTO has limited flexibility in cutting costs because a large part of its budget is allocated to operation of its facilities, especially its research reactor. Its expenditure on research is more discretionary. The reductions in ANSTO's appropriation in the last Commonwealth Budget have meant that only 24% of appropriation is being spent on research and research staffing is being reduced from 300 to 250.

ANSTO is also closing some facilities that have been used extensively by HE institutions and it has made drastic cuts to some of its research programs, especially in material science and environmental science. Collaborations in these areas are being terminated and this means other bodies, including many university researchers, are losing access to the nuclear science and technology expertise resident in ANSTO. This restricts ANSTO's ability to contribute to major issues in air and marine pollution, understanding of water impacts in Australia and reduces materials engineering support to Australian industry.

Even when ANSTO is sponsored by others (such as Cooperative Research Centres, industry associations and national security R&D programs) it is limited by resources. This is a general issue when considering the full cost of research in science and technology organisations versus universities. Sponsored research requires ANSTO provide 'in-kind' support but that in-kind support represents a real cash cost.

In both applications of neutron and x-ray scattering and environmental research there are activities in which ANSTO would very much like to collaborate but is unable to do so due to

limited resources, since the current expectation is that to collaborate with HE institutions ANSTO needs to provide input at its cost.

So while the HE Review is understandably concerned about competitive grants only covering part of the costs of research, it is important to recognise that a portion of the remaining costs have been met by collaborators – but in the case of agencies such as ANSTO, there is a declining ability to do so. Discussion Question 28 asks about "unintended consequences in the current arrangements for HE funding". This reliance on the continued capacity of partner investigators to contribute resources is one such unintended consequence.

Young researchers

Research institutions share with HE institutions a responsibility for training young researchers. The *ANSTO Act* 1987 lists training among the Organisation's functions:

> (e)(a) To make available to other persons, on a commercial basis, the knowledge, expertise, equipment, facilities, resources and property of the Organisation by:
> (i) Providing training and management expertise…
> (j) To arrange for training, and the establishment and award of scientific research studentships and fellowships, in matters related to its activities

The Organisation's role in training takes several forms. The primary role is based on its collaborations with HE institutions and enabling HE students and academics to use its facilities, notably its research reactor and particle accelerators. ANSTO also offers postdoctoral fellowships and jointly funds research training positions. These activities are *not* funded through schemes managed by the Department of Education, Employment and Workplace Relations. Rather, ANSTO funds its research training activities through appropriation. That means that direct funding for training of young researchers at HE institutions is only part of the overall Commonwealth expenditure on them.

ANSTO shares the objective highlighted in the Discussion Paper of encouraging younger researchers. ANSTO's Strategic Directions for 2005–10 set out several ways in which the Organisation is addressing this, most notably:

- Building research teams around high profile, effective research leaders, who will also train and develop future research leaders
- Collaborating with universities and other research organisations on joint appointments
- Placing a greater emphasis on our role in training the next generation of scientists and nuclear medicine practitioners through their postgraduate and postdoctoral studies and work

In addition, ANSTO has established senior research fellowships and substantially increased the number of its postdoctoral fellowships.

Senior research fellowships are for ANSTO mid-career scientists and enable the fellows to pursue a research project that will build the Organisation's internationally competitive research capacity. The first two fellows have been appointed and ANSTO has been very pleased with the progress that they have been making. The Technical Advisory Committee that advises the Organisation's Board on its research portfolio particularly commended their work in its 2008 report.

These fellowships bear a strong resemblance to the Future Fellowships that are now being established. ANSTO is especially pleased that organisations such as ANSTO will be able to host Future Fellowships. This will increase overseas interest in these fellowships because a number of researchers would regard ANSTO as better placed to be their host than an Australian HE institution, as ANSTO has capabilities that are, in many cases, unique in the country. Moreover, because applicants must indicate that their hosts are strong in the identified area, ANSTO anticipates potentially attracting researchers from other institutions in

Australia who want to further their research in the applications of nuclear science and technology.

ANSTO views postdoctoral fellowships as an important way to propagate skills in nuclear science and engineering in the broader Australian economy and to build national and international networks. The Organisation now averages between about 35 and 50 postdoctoral fellows on its staff at any time. Its approach is founded on these being clearly recognised as fixed term positions, with an expectation that the holders move on to other organisations.

Postdoctoral fellows undertake a defined research activity within ANSTO's research portfolio, and in doing so build skills and experience that will contribute to the broader Australian economy and develop their careers as researchers. They differ from general ANSTO researchers in that they have defined supervisors and work on a defined project for the period of their contract. ANSTO has a formal process for the management of postdoctoral fellowships.

In addition to its own programs, ANSTO supports training of young researchers as part of collaborative arrangements. This can be by directly funding or co-funding postgraduate scholarships or postdoctoral fellowships. This is often in the context of projects within CRCs or supported by ARC funding. It is being expanded to projects and research programs in which we co-invest with organisations such as CSIRO. The Organisation has been pleased by the encouragement it has received in its efforts to cooperate with CSIRO and HE institutions in training young researchers.

Knowledge transfer and community engagement

Discussion Question 25 asks about definitions of knowledge transfer and community engagement. A general issue is the use of the word "knowledge", which is often distinguished in innovation and information technology literature from "information" and "data". In many cases, engagement and interaction with business and the wider community involves the transfer of *information*, and to a lesser extent *data*, as well as knowledge.

Channels for the transfer of knowledge, information and data can be classified by an organisation's relationship with the channel. Looked at in this way, forms of engagement can be grouped in five ways, as follows:

1. Open publication of advice, information and data by the organisation itself (e.g. in ANSTO's case through public tours, media relations and web-based information)
2. Provision of advice, information and data in a collaborative arrangement (e.g. workshops and seminars)
3. Publication of advice, information and data by other parties (e.g. in patents, scientific journals and conference proceedings, perhaps accessed via ANSTO's repository)
4. *Ad hoc* provision of advice, information and data to individuals and bodies (e.g. responding to questions from government and the general public, and to inquiries and reviews by government, the learned academies and the like)
5. Commercial transfer (e.g. reports, and products and services based on knowledge)

The concept of "engagement" conveys a two-way process involving ongoing communication, as distinct from institutions pushing information and knowledge outwards without a cycle of input and feedback from users. This eliminates such activities as taking tours, attending events, reading a brochure or online information or buying a defined product or service on a commercial basis. It also goes beyond seeking opinion through, for example surveys or one-off interactivity, to having some ongoing relationship. "Engagement" should be undertaken consciously, as a result of targeting, searching for partners and the like.