

CHASS submission

Productivity Commission study on science and innovation

1. A central question of relevance

“The focus is thus on the physical and biological sciences, including engineering, with the social sciences (and the arts and humanities) excluded except to the extent they are relevant to innovation.”¹

We would argue that the humanities, arts and social sciences are highly relevant to innovation. The HASS sector contributes in a number of ways: not just as a supporting act to science; but also as an equal partner with science, technology, engineering and medicine in collaborative projects; and in the new post smoke-stack era of industry, as innovators in their own right. A study aiming to “cover all key elements in the innovation system” should explicitly recognise the HASS contribution.

Australia’s economy, environment and social structure benefit as much from developing better ways of managing, as from new technologies. Issues with major economic implications (such as water usage, the health and welfare of indigenous communities, and obesity) cannot be solved by science alone, but depend equally on changing behaviours and attitudes. The battle against cyber crime will be led by the HASS sector, through the work of philosophers based in universities.

Innovation relies on skills emanating from the HASS sector working in combination with scientific invention: the establishment and maintenance of networks and relationships and on communication, training and the transfer of skills and knowledge.

Daniel Pink in his new book [A Whole New Mind](#) goes further:

The last few decades have belonged to a certain kind of person with a certain kind of mind – computer programmers who could crank code, lawyers who could craft contracts, MBAs who could crunch numbers. But the keys to the kingdom are changing hands. The future belongs to a very different kind of person with a very different kind of mind – creators and empathizers, pattern recognizers and meaning makers. These people – artists, inventors, designers, storytellers, caregivers, consolers, big picture thinkers – will now reap society’s richest rewards and share its greatest joys.²

He argues that the skills of the previous era are necessary but no longer sufficient, and success in adopting a new way of thinking “increasingly will determine who

¹ Public Support for Science and Innovation, Productivity Commission Issues Paper, April 2006 p5

² Pink, Daniel [A Whole New Mind](#) Riverhead 2005 Introduction

flourishes and who flounders.”³ In Pink’s new world, the humanities, arts and social sciences (HASS) are crucial to innovation.

2. About CHASS

CHASS is a recently formed advocacy body, representing the interests of people working in the humanities, arts and social sciences. Many of these people are involved in research and education at the tertiary level. Our principle interests are in policy advice and strengthening the networks of people working in our sector and cross sectorally.

To this end we have produced a series of policy reports: Commercialisation of research activities in the humanities, arts and social sciences in Australia; Measures of quality and impact of publicly funded research in the humanities, arts and social sciences; and a third paper on collaborations between the humanities, arts and social sciences, and science, technology, engineering and medicine to be published in September.

We also run events for people in our sector: for the directors of university-based research centres; for early-career researchers from all disciplines; and for Federal Parliamentarians to discuss policy issues with academics.

CHASS has 149 Member organizations, including the Academy of the Humanities and the Academy of Social Sciences in Australia. A full list of Members and a snapshot of our recent activities is on our web site: www.chass.org.au

3. The HASS sector

The humanities, arts and social sciences encompass a wide range of disciplines. Many of the professions, such as law, business, and education, form part of the sector.

In Australia, most of the professional training and development, scholarship and research in these fields is carried out in universities. In 2004 – the most recent year for which full data is available – there were more than 620,000 students enrolled in HASS fields⁴ at Australian higher education institutions, compared to 350,000 students in science, technology, engineering and medicine (STEM) fields⁵. Enrolments in *Management and Commerce* courses make up the single biggest sub-group: almost 270,000 students, or 28.3% of all students.

Even if withdrawals, transfers, and combined degrees are taken into account, it is already clear from these figures that the HASS sector is responsible for a significant proportion of Australia’s current and future knowledge workforce.

³ Ibid.

⁴ DEST classifications: *Education; Management and Commerce; Society and Culture*; and *Creative Arts*.

⁵ DEST classifications: *Information Technology; Engineering and Related Technologies; Architecture and Building; Agriculture, Environmental and Related Studies*; and *Health*. Note that DEST also collect and provide data on *Food, Hospitality and Personal Services* and *Mixed Field Programmes*. The relevant figures are not included here.

Student demand for HASS courses remains high, reflecting a continuing strong interest in HASS careers – a matter beyond the scope of this submission. But this demand is not entirely matched by the distribution of staff in higher education institutions. In 2004, there were 12,855 ‘teaching only’ and ‘teaching and research’ staff in HASS fields in Australian institutions⁶. This represents less than 53% of all such staff: significantly lower than might be expected on the basis of student preference. The relatively disproportionate distribution of teaching and research staff may in part result from the fact that, historically, the number of students enrolled in higher degree by research (HDR) programs – the essential first step in almost any academic or research career – has tended to be slightly higher in STEM fields compared to HASS fields. In 2004, for example, slightly more than half (24,303 or 51.4%) of all HDR students were enrolled in STEM programs, partly due to the concentration of scholarship funding in these areas.

Without comprehensive data on graduate destinations it is difficult to be sure why the balance of HASS-STEM enrolments should change so significantly from undergraduate to higher degrees, but on the basis of numbers alone there is good cause to hypothesise that the majority of HASS students go on to pursue professional careers in their chosen fields. Relatively few go on to embark upon research or academic careers. Many who return to university to gain post-graduate qualifications are up-grading their professional qualifications in law or undertaking MBAs.

It is almost impossible to attract graduates to higher degree study in education, nursing, health sciences and social and human services due to the drop in income if they take up a postgraduate scholarship. This is compounded by Australia’s international reputation for low salaries, poor working conditions and insecurity for teachers and researchers working in universities and research organisations.

Even so, it is clear that students, teachers and researchers in HASS fields make up the majority of Australia’s higher education sector. Given the role of HASS in professional training and development, it is also clear that HASS graduates – at all levels – make up the majority of Australia’s professional workforce. HASS graduates, particularly from HDR programs, represent a major source of expertise, knowledge, and skills for all sectors of the economy, and a significant proportion of the nation’s intellectual and social capital.

Through generating educated graduates, HASS makes a major contribution to the innovation economy. Stephen Allott, Chair and co-founder of Trinamo (a UK-based management consultancy to high technology companies, particularly in Cambridge), rates this contribution highly. He believes that the UK has made “*a potentially catastrophic error by focusing on ideas as the mechanism for creating wealth. It is people who create wealth.*”⁷ He goes on to quote a UK study:

All interviewees agreed that the most effective form of technology transfer was the migration of highly skilled people from universities to business. The technical

⁶ Source: DEST data

⁷ Allott, Stephen, From Science to Growth. February 2005 (subsequently developed in the Hughes Hall lecture)

know-how that researchers carry with them can be significantly more valuable to businesses than the legal right to commercialise inventions.

In other words, it's not the ideas that constitute the mechanism for creating wealth, it's the people. This is what the Government has failed to grasp as it remains committed to what I call the "idea-centric" model.

Allot develops this theme in a lecture at Hughes Hall in Cambridge earlier this year:

Innovation occurs in the economy in a broad range of ways which vary between industries and academic disciplines but, outside pharmaceuticals, the customer is likely to be king. Trained scientists use their training to find the solutions to valuable customer problems, [and] given management and capital, their solutions can grow into businesses.

A good business / university interface can be expected to operate differently by subject within a university and differently from one university to another. Any approach, such as technology transfer, which applies the same formula across the board is, by definition, wrong. In general and outside pharmaceuticals, a good interface is built on people and particularly the relations between faculty and their former PhD students.⁸

If the best way to get industry to take up ideas developed in the university sector is by employing people from this sector, the question becomes: how can industry be encouraged to hire people with research qualifications? Allot's arguments on the importance of the people factor lend credence to a proposal CHASS has developed. In essence, it aims to encourage industry to hire recent PhD graduates by providing a Government subsidy for the first two years of their employment. The subsidy could be set at 50 per cent of the salary and on-costs, with the program initially supporting 100 graduates a year in industry. The proposal was inspired by a program of the Singapore Government. We can provide further details.

4. The context

Internationally, there is a growing interest in determining the social and economic benefits which flow from private and especially from public investment in research and experimental development (R&D). The interest in return on public investment is partially based on the notion of accountability – that the governments which distribute this funding and the researcher organisations that receive it are making good use of the taxpayers' money. But it also results from increasing awareness of the value of R&D in generating economic growth and in addressing social, environmental and cultural needs and concerns.

There have been a number of recent developments in Australia which reflect this international interest, most notably the Commonwealth Government's commitment to develop and implement the Research Quality Framework (RQF), to assess both the quality and – uniquely – the impact of publicly-funded research (see, for instance, the speech by Minister Julie Bishop at the Knowledge Transfer and Engagement Forum

⁸ Allott, Stephen, From Science to Growth. What exactly is the Mechanism by which Scientific Research Turns into Economic Growth? Hughes Hall Cambridge University 2006 City Lecture www.hughes.cam.ac.uk/

in Sydney on June 16 this year⁹). The Productivity Commission's current research study into the returns on public support for science and innovation in Australia, while not directly related to the RQF, is seen by many in the research community as an important part of the national discussion on research and innovation, and as having a useful contribution to make to the development of the RQF.

5. The role and impact of HASS research

Most research activity in this country is covered by the Australian Bureau of Statistics (ABS) in their regular surveys of R&D. The data is reported in a variety of formats, including a breakdown into 10 broad research fields. Most HASS activity would appear to fall under 'Other research fields', which in 2002-03 accounted for just under 10% of all expenditure but more than 20% of human resources devoted to R&D¹⁰. So in addition to their contribution to the Australian workforce, HASS fields also account for a significant proportion of national R&D activity.

Research can lead to economic and social impacts either *directly*, through the commercialisation of research outcomes, or *indirectly*, through knowledge transfer (for example by influencing public policy or professional practice). In addition, research in one field can have an impact by facilitating the up-take of knowledge, technologies, or other innovations which may in turn be the result of research in a different field – leading, potentially, to a greater economic and social impact than might have otherwise been the case.

Professor Gabrielle Bammer (National Centre for Epidemiology and Population Health, ANU; and the Hauser Center for Nonprofit Organizations, Harvard University) outlined her work in the "integration and implementation of existing knowledge":

When we confront any complex problem, we need to ask four interlinked questions:

- 1. how adequate is our knowledge for tackling this problem?*
- 2. is the best available knowledge being incorporated into policy and practice decisions?*
- 3. are good decisions being implemented?*
- 4. is there an effective process of monitoring policy and practice change, for making adjustments as required and for learning from successes and failures?*

While existing disciplines and areas of practice will have much to contribute to answering these questions, bringing those insights together remains a major challenge. This points to the need for a new cross-cutting specialisation focusing on integration and implementation of existing knowledge. To date, the development of theory and methods for integration and implementation has been piecemeal and there has been little cross-fertilisation between independent

⁹ http://www.dest.gov.au/ministers/bishop/B_Media.asp?y=2006&m=06

¹⁰ *Research and Experimental Development – All Sector Summary 2002-03* (ABS 8112.0)

*developments which tackle these issues. A new specialization, Integration and Implementation Sciences, provides an overarching coordinating mechanism, as well as a stimulus for new research.*¹¹

This coordinating role is a vital link in the innovation process; and underlines the often under-recognised contribution that HASS makes to this process.

Direct impact – Commercialisation

It is generally assumed that commercialisation of HASS research is rare, as the nature of research in these fields is perceived as not really lending itself to commercial outcomes. A recent study carried out by CHASS has, however, revealed a diverse range of commercial activities arising directly from HASS research. The report¹² recorded an extensive survey and interview process, and produced a number of interesting case studies.

The report revealed that some but by no means all commercial activity resulting from HASS research is largely service- rather than product-oriented. By far the most common form of commercial activity is consultancies, for both private and public sector clients. Other forms of commercial activity arising from HASS research include: the development of education packages; contract research; the production of publications, media outputs, and websites; the organisation or curating of exhibitions and their contents; event management; advocacy; and performances. Given that the Australian economy is now, and increasingly, service- rather than product- or commodity-based, there is strong potential for further commercialisation of HASS research.

The clients for this work included industry and business; Commonwealth and State Government departments and agencies; councils and local governments; community groups and NGOs; education and cultural institutions; media organisations; and international agencies. While the study did not attempt to make an estimate of the economic impact of this research, or even of the total level of expenditure involved, it was clear that both the research activity and the resulting impact (both economic and social) was distributed across the whole of the Australian economy.

The Australian Research Council's Linkage Projects support "*research and development projects that are undertaken to acquire new knowledge and that involve risk or innovation. Linkage—Projects supports collaborative research projects between higher education researchers and industry and identifies an allocation to projects of benefit to regional and rural communities. Proposals must contain an industry contribution. The interaction with actual or potential users of research outcomes is a critical element in Linkage—Projects.*"¹³

A recent study into those Linkage projects undertaken by humanities researchers examined over 100 projects, and concluded that:

¹¹ Bammer, Professor Gabrielle, Integration and Implementation Sciences – An Outline of a New Cross-cutting Specialisation, personal correspondence, June 27 2006

¹² *Commercialisation of Research Activities in the Humanities, Arts and Social Sciences in Australia* (CHASS Occasional Paper 1)

¹³ http://www.arc.gov.au/grant_programs/linkage_projects.htm

*The Linkage Projects program has been a major driver in breaking down the divide between Humanities researchers and a wide range of partner organisations. Successful collaboration leads to new knowledge that transcends the theory/practice dichotomy. These successes combined with the significant growth potential for collaborative Humanities research demonstrates that the knowledge and expertise of the Humanities and Creative Arts has a considerable contribution to make to the national innovation system.*¹⁴

Examples of specific projects include a study of the attitudes of young male drivers (undertaken with the NRMA), and the design of a new web site to enable counselling and support for young people (with Kids Help Line). It is clear from the study that end users (industry) understand that HASS research relates directly to major issue they need to resolve.

Indirect impact – other forms of knowledge transfer

The CHASS study on commercialisation highlighted the extent of indirect impact of HASS research. Consultancies for Government departments and agencies often include the provision of policy advice, and assist with the development and implementation of that advice. When adopted, this advice can have profound and widespread social and economic impact – a fact increasingly recognised by the global focus on the return on public investment in research and development. For example, the concept of income-contingent loans has had a major effect on the provision and funding of tertiary education through the HECS scheme. The New Zealand Performance-Based Research Fund (PBRF), for example, notes that “Excellence in ... research is likely to be characterised by ... change in government policy that results in clear positive improvements in practice.”¹⁵

While this observation is made particularly in relation to business and economics research, the same is held to apply for research in other areas of the humanities, law, and social sciences, as well as health, engineering and other technical fields. The current PBRF assessment exercise will collect evidence of such impact as part of its overall evaluation of the quality of publicly-funded research in New Zealand institutions.

The value of HASS research may be in cost savings in addition to generating new industries (although new media in the UK, for instance, is about 8% of GDP and growing at 6% pa; and the entertainment industry is the biggest export of the USA). Two areas where HASS can make a considerable contribution to the wealth and well-being of the country were mentioned earlier, obesity and water. Both have a science aspect, but also rely heavily on modifying human behaviour: changing eating habits, and thinking differently about water use and re-use. Unless behavioural solutions are found, governments will be forced to take costly remedial action.

Another example is cyber crime. The nexus between IT and the humanities was recently explored at a seminar in the Netherlands, where the importance of “*the*

¹⁴ Attraction of Strangers. Partnerships in Humanities Research, Ang, Ien and Cassity, Elizabeth; The Australian Academy of the Humanities, 2004. P4

¹⁵ *Performance-Based Research Fund Guidelines 2006* (July 2005), produced by the New Zealand Tertiary Education Commission.

research ‘action’ centres around the understanding that the Humanities (especially Applied Ethics in this case) are essential to the full commercial exploitation of information technology and are also the most significant bulwark against cybercrime.”¹⁶

Closely related to this form of impact is the influence of research – in almost any field, but particularly in HASS disciplines – on professional and organisational practice. In the former case the PBRF focuses mainly on the possible impact of research on pedagogical practice at all levels of education, but the same principle applies to almost all professions: basic and applied research in engineering can lead not only to new technologies, but new and better ways of working with old ones; health research often leads to modifications to clinical practice; and research in the law, economics or commerce can produce quite significant changes in professional practice in those fields, with consequent efficiencies and savings.

In relation to the effect of research on organisational practices, the PBRF guidelines note that excellent research will produce “positive impacts on efficiency, growth, productivity etc”. Changes to production methods, management and operations, or even the uptake of IT are all examples of innovation in organisational practices which can result from research in all fields but, again, particularly from HASS disciplines. For a serviced-based economy such as Australia’s, this kind of research impact – as distinct from research which might lead to a new product – is particularly significant.

Facilitated impact – the best of both worlds

The issue of the “impact” of research is of particular significance to Australia, since the Commonwealth Government has undertaken to include an assessment of impact in the forthcoming RQF. Despite the work done in New Zealand and elsewhere there is not yet a widely-accepted and rigorous methodology for such an assessment, as a result of which implementation of the RQF has been deferred a number of times in the interests of developing a suitable methodology. Considerable work has already been done in Australia to tackle these complex issues, and CHASS has been actively involved. Many researchers in HASS fields have welcomed the opportunity the RQF will provide to more fully demonstrate the impact, importance and value of their work.

As part of its work on the RQF and other research policy issues, the Department of Education, Science and Training (DEST) commissioned PhillipsKPA to undertake a study of knowledge transfer resulting from publicly-funded research. The resultant report¹⁷ was released in March 2006. This report reinforces a number of important aspects of innovation generally, and of the contribution of HASS research to innovation in particular.

First, it notes that “the inter-disciplinary nature of innovation” is being increasingly recognised internationally, and suggests that:

It is in the national interest to ensure that the public investment in universities and PFRA’s leads to meaningful knowledge transfer through engagement with all

¹⁶ Shoemaker, Professor Adam. Dean of Arts, ANU, personal correspondence 27 July 2006

¹⁷ *Knowledge Transfer and Australian Universities and Publicly Funded Research Agencies*

sectors of society. This should be the case for all institutions and all disciplines, and care needs to be exercised to ensure that public policy measures encourage and facilitate a sector-wide commitment to knowledge transfer. (Our emphasis)

Second, the report also notes that while studies of and policies affecting research and innovation and their potential economic benefits have focused on science and technology,

There has been an increasing recognition ... of the role played by creativity, design and the arts, humanities and social sciences in innovation. This has been partly fuelled by the substantial growth of the creative industries sector itself and its increasing importance to GDP and export performance. However, there is also an increasing emphasis on the broader role of creativity and design in global competitive advantage and economic growth.

By introducing the important role played by creativity and design, the *Knowledge Transfer* report confirms that research across the whole spectrum of HASS disciplines can produce direct and indirect commercial and social benefits. A truly multi-disciplinary approach to innovation would provide for input from the humanities, the social sciences, and the creative arts at every stage of the research, development and commercialisation process, regardless of whether this process results in a technological or non-technological innovation.

When the multi-disciplinary nature of innovation is recognised, the potential benefit arising from HASS research must be greater than is currently acknowledged. It suggests further that when investigating the return on public investment in *innovation* there is little benefit to excluding consideration of the social sciences, arts and humanities.

6. Specific issues raised by the Productivity Commission

The issues paper produced by the Productivity Commission in relation to its study into the returns on public support for science and innovation in Australia seeks comment on more than 60 questions. This submission will limit its comments to issues of particular interest to the HASS sector which will be dealt with in the following pages.

Available material, data and analyses – Australian and international

As noted above, CHASS has undertaken a number of relevant studies. As well, we will complete and publish a DEST-funded study of collaboration between HASS and STEM researchers which at the early-draft stage has already produced pertinent information. We would welcome the opportunity to discuss its findings with the Commissioners.

In relation to data currently available, the Commission should note that information available from the ABS, DEST and other sources do not lend themselves to firm conclusions about the scope of HASS research and innovation, or indeed of the contribution of HASS research to the broader national effort. Data collected and reported by DEST, for example, do not at present show the research inputs (such as grants and other funding) and some research outputs (such as publications)

associated with particular disciplines. The data collected is limited, and it cannot be used by HASS researchers – or indeed any researcher in the higher education sector – to verify claims about the benefits and impact of their research. The RQF may address some of these issues.

Likewise, ABS data on research development is focussed mainly on the traditional ‘hard’ sciences, medicine, and technology. As noted above, 10% of research expenditure by field is classified as ‘other’, yet research in physical, chemical, biological, mathematical and earth sciences each accounts for less than 10% of total expenditure. Some finer differentiation would provide a more detailed picture of the national innovation landscape. The Commissioners may wish to address this issue in their final report.

Case studies and quantitative and qualitative information

CHASS’ work to date has highlighted a number of case studies which may be of interest to the Commissioners. For example, *Commercialisation of Research Activities in the Humanities, Arts and Social Sciences in Australia* includes case studies on:

- the adoption and impact of social and public policy;
- widely-accessed online teaching resources;
- commercial consultancy services in applied historical research;
- consultancy services to regional communities in health and education;
- heritage and archaeology consultancies for government agencies and the private sector; and
- cultural activities.

The forthcoming report on collaborative research involving the HASS and STEM sectors will include case studies on:

- planning for and management of natural disasters, including bushfires;
- development of ‘text mining’ software for national security and defence applications;
- urban design;
- using arts to explore ethical issues in biological research;
- music therapy for premature babies;
- enabling game players to contribute to game development;
- human-machine interaction;
- managing World Heritage sites;
- non-drug pain management for children with burns;
- addressing community reactions to recycled water;
- Indigenous child health; and
- digital media archiving.

Each of these case studies demonstrate the strong social and economic benefits which accrue from HASS research, either directly or through input to broader research projects. The reports also provide information on the impediments to commercialisation and collaboration. CHASS would welcome the opportunity to provide more detailed information on these reports and case studies.

The consistency of impacts with objectives

Most current research funding programs have been structured so as to meet specified objectives. The evidence available indicates that the impact which result from these programs is consistent with these objectives. In recent years, however, public investment in R&D – especially in universities and the research agencies – has also been expected to serve the broad goals set out under the four National Research Priorities (NRPs). Recent suggestions that the Government may seek to have the NRPs applied less flexibly raise concerns that this may result in funding for some forms of research, and for some fields, being reduced.

The NRPs began with a working group of the Prime Minister's Science, Engineering and Innovation Council (PMSEIC) considering a number of objectives. It originally recommended the Government adopt six broad priorities, two of which were specifically intended to focus research by HASS disciplines. The Government, however, settled on four. There was, initially, some apprehension that the chosen priorities offered little scope for contributions from HASS researchers, but a broadening of the priorities and the innovation of HASS researchers in working across disciplinary boundaries has managed to counter this to some extent.

The NRPs resulted in part from a view that a middle-rank economy such as Australia could not afford to spread its investment in R&D too thinly. The former Chief Scientist, Dr Robin Batterham, was a strong advocate of this position; he likewise supported the notion that 'picking winners' was the best way to ensure effective return on this investment. Dr Thomas Barlow¹⁸ in his recent critique of Australia's innovation system¹⁹, has called this kind of thinking into question, and has instead suggested that there are more risks than benefits associated with focused investment, or inflexible priorities.

CHASS supports much of Dr Barlow's argument, and many of his conclusions. There is strong evidence that Australia's economic, social and environmental goals are best served by maintaining a broad, flexible and adaptable research base, guided by well-understood generic objectives. 'Generic' need not equate with 'meaningless': "improving public health", for example, is a generic objective, but one which expresses an important and admirable goal, and accommodates a wide range of research. Real improvement in public health requires input from sociologists, educators, psychologists, economists and others, as well as from health and medical researchers and practitioners.

Public vs private funding

Most HASS research is publicly-funded, via ARC and Australia Council (and to a lesser extent NHMRC grants); university research block funding, and a limited number of other sources. The reliance of HASS research on public funding is unlikely to change: the CHASS commercialisation survey showed that private funding for HASS research is growing, but this will almost certainly remain focused in certain fields, and on certain types of research (in the OECD taxonomy, applied rather than basic research).

¹⁸ Former science adviser to Education, Science and Training Minister Hon. Brendan Nelson.

¹⁹ *The Australian Miracle: An Innovative Nation Revisited*.

At present, most research funding models do not take into account the limited capacity of some HASS fields to attract funding from private sources. This can compound the problem HASS researchers have in accessing funding, and become a notable issue where funding programs require a certain level of 'buy-in' from participants: if HASS researchers are unable to garner the support required from their institutions there is little chance they will be able to participate equally – or indeed at all – in the program. The contribution that HASS researchers could have made to collaborative projects is therefore lost. The Commissioners may wish to consider the effects of exclusive funding arrangements on the national innovation effort.

The ability of researchers in the HASS sector to raise funds from industry is hampered by the ineligibility of research in this sector for the R&D tax concession. This perspective of HASS research seems outdated in view of the significant role it can play in innovation: working for science, with science, or as an innovative force in its own right. It seems to be founded on a traditional notion of industry, quite out of keeping with the service nature of the Australian economy and the likely growth areas over the next 50 years.

The use of input and output measures

Much of the international and local discussion of research quality assessment has been focused on the use of input and output measures. At present in Australia, a significant proportion of public funding – block grants for universities – is determined by a mixture of input measures (research income, HDR enrolments) and output measures (research publications, HDR completions). There is almost no qualitative component to these measures.

The limited capacity for private funding of HASS research acts as something of a handicap for work in these fields, as the main research block funding programs are heavily weighted towards research income. Output measures are somewhat kinder to HASS research, although the lack of discrimination in some publicly-available data, noted above, may mean that performance-based funding mechanisms are not working as effectively as they could – for any discipline. The DEST data on student enrolments and staff numbers suggest that HASS researchers may, in fact, be making much more *efficient* use of public funding than their STEM colleagues – especially when the generally smaller size of ARC grants for HASS research is taken into account. This may be an issue requiring further examination.

Recent debate has turned to the possible use in the RQF of output measures which might provide some qualitative information on research. Publications citations are often cited as an example; and as often followed by the assertion that these are not a valid output measure for HASS research, and that over-dependence on citation data would disadvantage HASS researchers. This is largely true *at present*: rather than dismissing their validity it would be more accurate to say that citation rates are not a reliable metric for HASS research because the relevant data does not exist. Compilation of citations data has tended to focus on the sciences, and on journals in particular. It may be possible over time to generate comparable data for HASS research; data which also includes books, edited collections, and other outputs. Some early work to this end has begun, but for the time being it must be acknowledged that citation rates should be used with care for all disciplines and

especially for many professional disciplines and those focused particularly upon improving the social and economic fabric of Australian society.

Impediments and problems

A number of impediments to the commercialisation of HASS research were identified in the report *Commercialisation of research activities in the humanities, arts and social sciences in Australia*.²⁰ These include:

- A rewards system in universities that recognises only a narrow range of activities (papers and citations) but not other outputs
- A lack of resources and time in the tertiary sector to develop commercial ideas
- Exclusion of HASS research from the R&D tax concession discourages industry from engaging with researchers in these disciplines
- Funding programs that lack the flexibility and rapid response that industry requires
- Lack of training in business for HASS researchers, and also for people in the technology transfer arms of many universities
- Rigid university structures that prevent researchers responding in a more agile manner to the needs of industry: for instance, the rapid finalisation of contracts to conduct research, and flexibility in the conduct of these contracts

There are other areas for potential improvement:

- Amending research student funding based on an assumption that HASS research is cheaper to undertake STEM research. Some science-based work may require more expensive (often foreign purchased) equipment, but HASS research is people intensive - the infrastructure for much HASS research is people, and it can be expensive to hire people to collect data and to train them in high level data management and analytic techniques. Some HASS research (particularly in the humanities and arts) often requires closer and more intensive supervision. As well this has to be done on an individual basis (in contrast to a lower per capita supervision rate in science, where a team of research students may be working on a joint project).
- Finding a satisfactory way to evaluate and fund multi-disciplinary research projects. Solutions to significant issues in Australia in areas like health, terrorism and the environment are going to need input from more than one discipline for an enduring solution. For instance, an ARC panel constructed around a single discipline or narrow group of disciplines is ill-equipped to evaluate a research proposal drawing on widely-dispersed disciplines (eg music and physics) and may tend to mark such proposals down. A possible solution is for funding agencies to establish a special category for multi-

²⁰ Ibid pp 29-31

disciplinary work, so that multi-disciplinary proposals compete only with each other for funding.

- The National Research Priorities are too narrowly framed. Asia is an area of enormous importance to Australia in terms of trade and education, and yet the only reference to Asia as a priority goal under the heading “Safeguarding Australia”. The previous Minister for Education, Science and Training indicated that a review of the NRPs was to begin in 2006. To be truly effective in shaping the direction of Australian research (and generating innovation), it needs to be a better match between Australian needs and Australian expertise.

The role of governments

Below are six specific ways the Government could act to encourage innovation:

- The PhD program offered in the universities could be broadened to include more skills, perhaps drawing on programs established by the Cooperative Research Centre (CRC) Program. Governments could extend the length of the PhD scholarship, to allow training in matters such as management of IP, negotiating and managing contracts, skills in presentation and media, and writing a business plan. Researchers in both science²¹ and the HASS sectors have confessed they do not have a proper appreciation of the way industry works²².
- There is a largely unexploited capacity for people in the HASS sector to contribute more significantly to innovation in Australia. The emphasis of successive governments has been on science and technology, but there is the potential to extract a greater return from HASS. The first steps would be to change national settings. The current perception in the HASS sector is that the Government does not expect it to be innovative. The Tax Act specifically excludes HASS research from qualifying for the R&D Tax concession. Only in 2005 was the first humanities person appointed to the Prime Minister’s Science, Engineering and Innovation Council (PMSEIC). The issue of a career structure for young researchers is as acute in HASS as in STEM, yet only the latter draws Ministerial comment (see Minister’s speech 19 July 2006²³).
- Government could develop a cohesive strategy for research engagement with Europe, as New Zealand and South Africa have. The European research budget is scheduled to increase sharply, offering new opportunities for collaborative research on an international scale to countries alert to these possibilities.

²¹ Gascoigne, TH and Metcalfe, JE; Scientists Commercialising their Research, The Federation of Australian Scientific and Technological Societies (FASTS) 1999,

http://www.fast.org/Fsite/News/reports/occasionalpapers/occ_paper_two.pdf

²² *Commercialisation of Research Activities in the Humanities, Arts and Social Sciences in Australia* op.cit.

²³ Hon Julie Bishop MP, speech to the Sydney Institute, 19 July 2006:

<http://www.dest.gov.au/Ministers/Media/Bishop/2006/07/b011240706.asp>

- The COST (European Cooperation in the field of Scientific and Technical Research) program run by the European Science Foundation (ESF) aims to increase cooperation and interaction on research issues in all disciplines. It provides seed funding to enable preliminary workshops on issues and possibilities, with the expectation that proposals for full-scale funding could grow from these preliminary events. Australia can participate in COST events, but it could also develop a similar program on a national level to allow ideas to germinate.
- The best of the university-based centres for research are collaborative, well-networked, and focussed on delivering real benefits to the economy, the environment or society. They are more agile and flexible than other programs designed to encourage linkages between industry and researchers. Government could consider ways of encouraging these behaviours through a targeted funding program.
- Despite all of the talk about research that is applied to national issues and that crosses disciplinary boundaries, Australia is almost the only developed country that persists in defining “science” solely in terms of the natural sciences, and excluding the social sciences and humanities (in contrast, say, to the European Science Foundation). The Government could consider the way it defines the “sciences”, a term it often uses when talking about the broad field of “research”.

The workforce

The shortage of graduates in science and engineering is well-documented, but there are also significant shortages in education, nursing, health sciences and social and human services. There is another element to this problem: impending shortages in the tertiary sector workforce. Research by demographer Professor Graham Hugo suggests that the problem may in fact be worse than has been thought. Around a quarter of the academic workforce will retire in the next decade, and there’s a ‘lost generation’ where their replacements should be.²⁴

Levels of public support

Under the Lisbon objectives, the European Union has agreed to double its research budget. This will be almost double the percentage Australian spend on research, and indicates that Australia will slip steadily further behind leading nations. We support the arguments for increasing the national spend on R&D.

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²⁴ Professor Graham Hugo, Australian University Review, vol 48, no1, September 2005