Australian Academy of Science

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SUBMISSION TO PRODUCTIVITY COMMISSION REVIEW OF PUBLICLY FUNDED RESEARCH JULY 2006

i. At its meeting on 29 June 2006 the Council of the Australian Academy of Science concluded that from its perspective as the peak scientific body in Australia the following points warranted special emphasis.

ii. Immediate and tangible economic benefits should not be the only focus of what constitutes 'productivity' in research. Productivity involves our ability, as a country, to produce high quality research outputs and retain a highly skilled and innovative workforce. This enables us to interact in a timely way with colleagues in other countries to take advantage of international advances. This type of nimbleness of response is a hallmark of Australian science; and as a principle it must be preserved in order to provide the nation with a broad portfolio of options. This also provides Australia with the tools necessary for rapid response to environmental, climatic, geological and medical challenges.

iii. Scientific research discoveries provide the 'future options' for societies everywhere in the world and with its regional isolation, this is especially important for Australia.

iv. Data from Access Economics and Research Australia can be used to underscore the above two points. In addition, the notion that "a healthy society is a productive one" (even from a dry economic perspective), can be a strong argument for further development of funding for medical research. For instance, a recent analysis by Access Economics stated that, for every dollar spent on medical research in Australia, there was a seven-fold multiplier effect. Even if it were to be argued that this figure is exaggerated, the multiplier effect is still large. With the growth of "small molecule/high value" technologies, and our improving record in biotechnology, this effect should continue.

v. The World Bank has pointed out that sustainable economic progress depends on good community health more than on any other single feature of a society. So if we hope to maintain our excellent health care system we have to participate in research, technology and innovation in this sector.

vi. Scientific discoveries constitute 'tradeable' intellectual property. The significance and advantage to Australia of this trade in ideas needs to be more widely recognised and developed at all levels. International collaboration involves mutual exchange of ideas, so unless Australia produces new knowledge it cannot engage in these exchanges on equal terms. Advantages stem not just from the ideas and intellectual property that we access, but from the capacity of Australia's outputs to provide the country with recognition and credibility in the global research community and markets.

vii. There is the notion … "Why not, in future, import everything Australian society needs by way of new technical developments?" The answer is that having local expertise affords rapid

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adaptability to crises. National security alone should dictate a reasonable level of technological and scientific independence. Australia needs to have at least a minimum level of internal know-how to ensure that it can respond reliably and effectively to any situation that might arise, to support its essential services and infrastructure, and to provide a reliable base for industry and business to thrive into the future.

viii. A short term focus on research productivity ignores the crucial importance of interaction between established scientists and the young scientists of the future, 'the intergenerational agenda'. Early career researchers are an enormous resource for Australia; they seek and should be able to access international research experience and interactions in the development of their careers. However, unless Australia provides the highest quality resources and encourages excellent research outputs in the longer term (intellectual, funding and infrastructure) early career researchers will not return and hence will not be able to contribute to Australia's future.

The careers of many young researchers in Australia are in a 'holding pattern'. Some are in their second or third postdoctoral fellowship with low salaries, low status, limited job security and uncertain prospects. This is frustrating for them, but it's also a national concern. This could be resolved in part by increasing the number of Queen Elizabeth II Fellowships and C.J. Martin Biomedical Fellowships. Australian Research Council QEIIs encourage research in Australia by postdoctoral graduates of exceptional promise and proven capacity for original work. The purpose of the C.J. Martin Fellowships is to provide a vehicle for full-time training overseas and then in Australia.

Particular attention should also be directed towards the physical sciences, especially education in high schools. There is presently a decline in these fields of study. A trend that was first observed in Western Australia and is now emerging in Queensland and other states. There must be a brisk move towards stemming this tide in the decline of education in this area.

The "inter-generational agenda" is an important idea. It came from Treasury originally and appears to have been lost as the country experiences the current mining boom. However, we don't have enough younger workers; we need people to remain in the labour force longer; we need to increase flexibility and the capacity for re-training. All of these issues are a part of the innovative society that we would like to see develop.

ix. The resources industry and its current 'boom' in Australia provide an opportunity that is likely to be short-lived with respect to delivering ongoing and sufficient funding towards adding sufficient value to products and generating more efficient processes. We are in an exceptional period of economic prosperity largely because of the value of our primary products, in particular iron ore, coal, uranium, gold, other minerals and agriculture.

Other countries, such as Canada, Norway, Singapore and (to some extent) Ireland, have determined that it is necessary to take advantage of such periods of prosperity to create an educational, technological and research "boom" which could fuel long-lasting and sustainable economic innovation to support future options. (Canada is the best example of this approach where it has been carried out with Federal/State collaboration in a system similar to that of Australia.) Investment in education is particularly important since re-education and re-training will become the norm for countries such as Australia, which do not have a large labour force.

It is particularly important that, at a time when resources are fuelling a short-term economic boom, Australia does not fall into a position of using a short time scale perspective and discounting long term economic productivity. If we discount everything that takes more than three to five years (which tends to be the habit of governments), then education, research and technology make little difference when it is time to recapture opportunities. If however, countries project long term economic and social (health) costs over twenty years, the picture becomes quite different.

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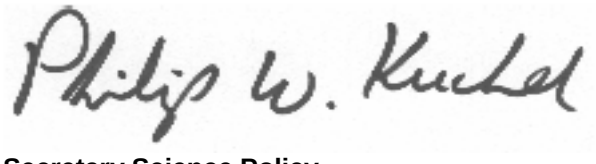
There is the concern that, if the performance of researchers is measured by short-term performance indicators, then that will drive the system to producing minor short-term results rather than major long-term results. For example, the well-known Australian success story of Radiata (bought by Cisco for $600m) had its beginnings in basic research, and would have been stifled if the R&D funding that led to it were predicated on short-term successes. So we would like to ask the Commission to address the question of how to ensure that work whose results are only apparent in the long-term gets adequately funded.

Similar issues relating to short-term versus long-term perspectives also apply when using scientific knowledge to manage agricultural productivity. A quest for high short-term productivity in agriculture can have dire long-term consequences for sustainable production and may even produce irreversible damage to the environment (e.g. salinity and eutrophication). New knowledge in agriculture, aimed at increasing yields while at the same time protecting the soil and water resources on which agriculture depends, has a long lead time before adoption. New techniques can only be accepted and implemented by farmers after testing in realistic agricultural time-frames. High changeover costs may also delay widespread adoption.

x. One of the impediments to the efficient conduct of research is a burgeoning data-gathering and progress-monitoring system. Creativity can be stifled by excessive intervention or interruption. Reporting of scientific progress is strategically important, but the frequency of sampling must not be distracting to the research itself. It is apparent that requirements to report aspects other than research outputs increasingly devolve to the researchers, limiting time available for research productivity. While nobody has any difficulty with proper levels of accountability and assessment, the cost versus benefit needs to be clearly considered. Quite frequently the most difficulty is experienced when it comes to the requirement to report (account) in minute detail. Often the detail of the collected data is unnecessary for the intended final use. A clear example here is the HERDC collection of publication data. The audit requirements used in this process are so detailed that it is almost impossible to satisfy the rigorous requirements for all publications. In the earlier rounds, error rates of less than 5 or 10% were almost impossible to achieve and required multiple internal pre-audits of the data before the final returns were formally submitted. Almost all of the errors were “technical” and trivial – clearly data that were 95% correct and contained the odd technical error would probably have satisfied the aims of the exercise but the process made the last 5% of the data checking 90% of the effort.

xi. Any system that administers research budgets needs to consider the cost-benefit of its evaluation scheme. A large fraction of the available budget should not be spent on the administration of a funding scheme. There are many examples of different ways to support an active research program. Canada for example supports a significant fraction of its research effort by funding key personnel (and their research teams) on the basis of their track record in producing good research outcomes; this is done with minimal competitive assessment of research proposals. The logic here is that supporting good research teams will produce good research and providing the teams continue to produce then they obtain continued support. This requires a system to nurture younger researchers as they enter the system, but once they are ‘at speed’, then their survival as researchers depends on their continuing research productivity.



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