



## ***Strategic Framework for Research Infrastructure Investment*** **Discussion paper**

The Australian Academy of Science welcomes the opportunity to comment on the National Research Infrastructure Council's Discussion Paper, *Strategic Framework for Research Infrastructure Investment*. We offer the following answers to the six questions asked in the Discussion Paper:

### **Question 1: The proposition is to undertake a roadmapping exercise every three years. Are there reasons why it should be more or less frequent?**

One of the functions of a roadmap is to provide a guide for the directions in which research investment will be facilitated and encouraged. In these terms, three years would seem an appropriate time scale when updating an existing roadmap. However, a new roadmap may require a longer time scale, of five years or more, depending on the type of infrastructure, its cost, and the scale which will determine its construction and commissioning. For instance, an initiative such as the Square Kilometre Array may require a twenty year perspective, while the equipment used for genome sequencing is changing so rapidly that three years is totally realistic.

Stefano Fontana (Science and Technology Facilities Council, UK; in *A compendium of research infrastructure roadmaps and of the international dimensions of infrastructures* at: <http://www.oecd.org/dataoecd/17/38/41996708.pdf> ) has noted that in the various international research infrastructure roadmaps selected for the compendium, the time horizon ranges from a minimum of five years (as in the Indian five year science plan) to a maximum of 20 years (as for the DoE Facilities for the Future of Science). The average is 10-15 years. On the other hand, updates of the roadmaps and/or follow-on work have a time span between two and five years.

In this case, the Academy argues that one size does not fit all situations. What is most important is that we retain flexibility, can identify new and emerging opportunities quickly, and can close down initiatives that are no longer relevant or have become outdated through technological advances.

**Question 2: Are there other prioritisation processes that should be included in the strategic framework?**

Reference ought to be made to various decadal plans and discipline reviews which the learned Academies produce. For example, the Australian Academy of Science, in conjunction with the relevant National Committees for Astronomy, produced *New Horizons: A Decadal Plan for Australian Astronomy 2006-2015* which was useful in establishing priorities in the NCRIS process. Since then, the *2010-2019 Decadal Plan for Australian Space Science – Building a National Presence in Space* (<http://www.science.org.au/natcoms/nc-space/documents/nc-space-decadal-plan.pdf>), and *An Australian Strategic Plan for Earth Observation from Space* (<http://www.science.org.au/reports/documents/EOSfinal.pdf>) and *To live within Earth's limits: An Australian plan to develop a science of the whole Earth system* (<http://www.science.org.au/natcoms/nc-ess/documents/ess-report2010.pdf>) have been developed with the relevant National Committees for Science. All emphasise the operational needs of their discipline areas.

One of the strengths of the National Committees' process was the high level of consultation with their respective scientific communities. This most critical issue is not addressed by the present system – it is essential to achieve wide discussion and agreement of priorities. It would be very helpful if each strategic framework were launched in a consultative manner, perhaps as a two-stage process where the outline is agreed as a first step, but with details to be filled in following discussion with all of those involved (not only experts as defined narrowly, but also those who might be impacted more widely by the decisions).

A further aspect of such nuanced discussion and debate would be to facilitate bipartisan and cross-bench awareness, understanding and agreement on policy. One conclusion that can be drawn from the ERA data announced by the Minister in January is that fields that obtained consistent government support over many years (such as basic biomedical research, astronomy and physics research) achieved much better rankings than fields where support was not sustained over time.

**Question 3: Should Australian Government investment in research infrastructure at the national and landmark scale favour collaboration in establishment and operation of infrastructure or research collaboration, or both?**

The Academy accepts, for the reasons noted in the Discussion Paper, that collaboration is a key driver of innovation. It stands to reason, therefore, that all the effort that is devoted to establishing and operating a resource that is a national investment should also be reflected in research collaborations. Major pieces of research infrastructure are too expensive and too important to be managed for only some of those who could make use of them. Infrastructure investment must be put to optimum use. Hence, the Academy would favour a collaborative approach in the establishment and operation of the

infrastructure, as well as in the research utilising the infrastructure. We note, however, that Australia is a big country and access can be costly in terms of time, money and greenhouse gas emissions. Depending on the cost, capacity and need for the specific infrastructure, therefore, a particular facility may need to be replicated at different locations.

**Question 4: Where in the system should the costs of access to research infrastructure for public researchers be met? How should this be implemented?**

**Question 5: How should the pricing regime for research infrastructure be structured? Should there be different models for financial contributors to the facility, merit-based researchers and industry?**

**Question 6: How should the cost of access by publicly funded researchers be funded?**

We will answer questions 4, 5 and 6 together.

To some extent, charges for the use of research infrastructure should reflect the capital cost and the recurrent cost of the facility, and charges for similar facilities internationally. All users should expect to pay something, as otherwise the facility will soon be choked by poor-quality projects. However, it would be foolish to have charges that are so high that they cannot reasonably be met by potential users, whether in the public or private sector. The charges should be kept as close to actual costs as the 'market' can bear, as a reasonable pricing structure will influence the size of the 'user base' and a large customer base drives down costs. It is unrealistic to expect full depreciation costs to be built into the user-fee structure. Rather, if the need for a piece of infrastructure continues past its use-by date, replacement infrastructure should be sought from NRIC on a competitive grant basis.

The Academy believes that good research has merit of its own, by advancing knowledge, whether that research is University-based, CSIRO/DSTO-based, or from industry. One purpose of establishing a facility, and equipping it with state-of-the-art tools, is to maintain a research capability in Australia, and to encourage other countries to collaborate with us (as in the case of the synchrotron). However, it may be necessary to prioritise users, depending on the scientific merit of the project.

In addition, the funding that will pay the charges is usually government money: in practice, one arm of government pays a further sum over that provided already by another arm of government for research infrastructure investment. This has a cost in both time and bureaucracy; it is important that if this process continues as at present, that there is contact between the government agency responsible for infrastructure funding (DIISR) and the end user (which might be funded by NHMRC, CSIRO, DSTO, or through a CRC) to facilitate rapid decisions.

A distinction also needs to be made between overhead costs, and essential infrastructure costs specific to the project funded by the grant. The former should have an institutional component, whereas the latter should be treated separately and funded as part of the grant. However, this is rarely the case at the moment, with the items required to carry out a research project all too often deleted from the grant application.

There should be parallel schemes to help with the costs of access to overseas research infrastructure. Access is often highly competitive and tightly regulated, as in the case of the Hubble Space Telescope or equipment at CERN. It is essential that a funding mechanism is in place to ensure that Australian researchers can take advantage of these opportunities. While a component of such funding could come from basic research grants through NHMRC and ARC, there should also be a separate centralised peer-reviewed international science linkages program (such as those currently administered by the Academy).

Funding for staff to run the infrastructure was provided by NCRIS. This was a welcome innovation, and the response of the research community was unanimously and strongly positive. Indeed, the evidence gathered during the evaluation of NCRIS shows that the provision of this type of funding made the investment in equipment and physical infrastructure much more valuable. In effect, the relatively small amount of money invested in human infrastructure leveraged the relatively large investment in hard infrastructure and made the latter investment genuinely effective.

However, under the Education Investment Fund (EIF) it is no longer possible to provide funding for staff to run the facilities. This seriously threatens the viability of infrastructure investment already made, and will substantially reduce the impact of any future infrastructure investments for top-quality research programs. The Academy is strongly of the view that this change, removing the ability to use EIF funds to provide staff to run a complex piece of equipment, is retrogressive and will substantially reduce the impact of each dollar that the Australian Government is investing in equipment and physical infrastructure. We strongly urge DIISR to allow NRIC to revert to the NCRIS model, where it is possible to fund the essential human infrastructure as well as the physical infrastructure.