

Submission

2016 National Research Infrastructure Roadmap Capability Issues Paper

Name	Prof. Keith Nugent
Title/role	Deputy Vice-Chancellor (Research)
Organisation	La Trobe University

Question 1: Are there other capability areas that should be considered?

Question 2: Are these governance characteristics appropriate and are there other factors that should be considered for optimal governance for national research infrastructure.

- The proposed governance characteristics are appropriate. In addition, transparency is an important aspect to ensure the perception of equity and there should also be a level of consistency across the capability areas with respect to governance.

Question 3: Should national research infrastructure investment assist with access to international facilities?

- Australia needs to be part of more international collaborations and have supported access to large international infrastructure. Where the infrastructure is large, expensive or unable to be replicated locally, access to international facilities will eliminate the cost associated with replicating it in Australia, leverage our available funding, create synergy and lead to greater opportunities for collaboration.
- To help reduce the barriers to international facility access, it would also be beneficial to have a team within the Government which has the function of coordinating access to international facilities, including establishing processes and formalising agreements to access the facilities.

Question 4: What are the conditions or scenarios where access to international facilities should be prioritised over developing national facilities?

- Access to international facilities should be prioritised over developing national facilities where
 - the discipline is small internationally or there is lack of a critical mass of users in Australia and the infrastructure is unable to be replicated locally
 - the cost of developing the facility locally is greater than cost of accessing an international facility over a specified period of time and where there is agreement for collaborative research access
 - the time taken to develop expertise in the facility outweighs the benefits of developing national facilities, particularly if expertise for the facility is highly specialised and difficult to acquire
 - being part of an international collaboration has a synergistic effect and provides the opportunity for greater research outcomes

Question 5: Should research workforce skills be considered a research infrastructure issue?

- Research workforce skills are definitely a research infrastructure issue. The effectiveness of National Research Infrastructure is reliant on a workforce capable of undertaking research and using research data and technology. Having staff with expertise will ensure that the outcomes generated will be maximised, enable innovation, add value to the research and enhance the development of the technologies. It will also enable the creation of jobs and the development of a highly skilled workforce locally.

Question 6: How can national research infrastructure assist in training and skills development?

- National infrastructure can assist in training and skills development by providing local access to cutting-edge technologies and enabling the development of expertise to sustain employment within the local industry. The development of expertise within Australia creates a skilled workforce locally and reduces the delays associated with importing expertise from overseas.

Question 7: What responsibility should research institutions have in supporting the development of infrastructure ready researchers and technical specialists?

- As research institutions are the main consumers of research infrastructure, it makes sense that they have a significant role in training researchers and developing the expertise to operate it. It also aligns with their research objectives by enabling them to magnify the level of innovation and research outcomes from the technology while increasing the employability of their graduates.
- The breadth of knowledge required by researchers and technical specialists increasingly extends beyond the specific science and operation of technology to include digital literacy and eResearch and business skills. It is important that our science post-graduate students have the opportunity to develop a broad knowledge base and skills to remain internationally competitive.
- The career development of specialist staff associated with the facilities is also a critical issue, as it will drive innovation and new ideas to keep Australia at the forefront of research and the related technology.

Question 8: What principles should be applied for access to national research infrastructure, and are there situations when these should not apply?

- The merit-based access with or without partial cost recovery for public sector research is an appropriate model that has served the research community well. Partial cost recovery may be appropriate for services that value add or are for the purposes of a commercial outcome. Clear guidelines will need to be in place to ensure equity.
- Full cost recovery for the private sector, particularly where profits are being generated, is also appropriate as they are still able to access the technology to innovate, but are not being subsidised when they have the capacity to pay. The R&D tax incentive and other schemes are available to industry to reduce their R&D costs.
- There needs to be transparency and some level of consistency across the technologies while still allowing for flexibility for each facility.

Question 9: What should the criteria and funding arrangements for defunding or decommissioning look like?

- Defunding and decommissioning could be considered when a combination of the following occurs: usage drops to a predetermined level, the expected research outcomes are no longer being generated and the technology is superseded by new technology.
- It is important that the decision-making process is transparent, sufficient notice is given, transitional arrangements are put in place and consideration be given to retraining or redeployment of staff.
- Where the technology is superseded, upgrading or replacing the existing with new technology may be appropriate.

Question 10: What financing models should the Government consider to support investment in national research infrastructure?

- A co-investment model whereby stakeholders with an interest in the technology financially contribute is one way to ensure research outcomes. Stakeholders then have a vested interest in the success of the facility and are more willing to support its ongoing costs if there is a return on their investment. It may be expected that privileges are afforded to foundation contributors in the form of priority access, but access should also be non-exclusive.
- Flexibility in funding is required to ensure agility so that new capability areas and technologies can be catered for over the life cycle of the Roadmap.
- Capital funding needs to be available to ensure that existing equipment can be upgraded, renewed or replaced and new investments made as technology advances. It is equally important that this is balanced with sufficient operational funding to ensure that research outcomes can be maximised through the employment of adequate technical and research expertise, and with a long-term view.

Question 11: When should capabilities be expected to address standard and accreditation requirements?

- The quality, reliability and integrity of data generated in national facilities is paramount and hence standards and accreditation are important. Processes leading to accreditation could be put in place as part of the initial funding for a facility. Where a new facility is being constructed, accreditation would be considered as part of the design phase. Where an existing facility is being upgraded or refunded, a process leading to accreditation within a reasonable time frame could be implemented as a condition of funding. The costs associated with accreditation should be part of the funding provided.

Question 12: Are there international or global models that represent best practice for national research infrastructure that could be considered?

Question 13: In considering whole of life investment including decommissioning or defunding for national research infrastructure are there examples domestic or international that should be examined?

Question 14: Are there alternative financing options, including international models that the Government could consider to support investment in national research infrastructure?

Health and Medical Sciences

Question 15: Are the identified emerging directions and research infrastructure capabilities for Health and Medical Sciences right? Are there any missing or additional needed?

- Sports science and exercise research, including sports data analytics and human performance research, should be included within the Health and Medical Science capability area. This research is relevant from both the perspectives of developing preventative measures for lifestyle diseases, such as diabetes, and, as a sporting nation, enhancing human performance. Infrastructure relevant to this research should be developed locally leading to the creation of jobs in sports science and a growing industry supporting the performance of elite sporting teams. The Manchester Institute of Health and Performance is an international example of such infrastructure.
- While the paper does refer to the expansion of the Population Health Research Network, it is important to emphasise the continued collection of 'exposure data' to understand, for example, the things that people are exposed to that affect their health and how policies impact on health. Aspects to consider include:
 - Cohort data: Linked administrative data while powerful, often lacks the depth for addressing specific issues. Australia has invested in a number of prospective studies that follow large cohorts of individuals over time. These studies are essential to understanding individual risk and resilience, the impact of (adverse and protective) exposures at different life course stages, and diversity in health trajectories. Internationally, Australia was slow to establish national cohort data collections of children and young people, and its investment in existing adult cohorts has often been sporadic. It is critical that Australia not only continues to support the cohorts that currently exist, but invests in refreshing these studies through the recruitment of new cohorts to ensure that data reflect contemporary environments and policy settings.
 - National survey data: Extended life expectancy and the rising burden of non-communicable diseases requires a focus beyond genetics, omics, and benchtop science. Infrastructure to support research into lifestyle-related health, chronic illness and disability needs to be identified as a future research infrastructure priority. Large-scale population surveys (e.g. National Nutrition Survey, National Survey of Mental Health & Wellbeing) are an important research resource for monitoring the health of the population, and for assessing the impact of changes in policy and environments.
 - Administrative data: contemporary understanding of health acknowledges the links between physical and socio-emotional health, with social and economic functioning. Better understanding of the full costs and consequences of health conditions and exposures will be facilitated by linkage to a variety of non-health data. These include environmental, education, employment and welfare and justice data.
 - With government programs, such as the NDIS and My Aged Care, there needs to be a mechanism to make the de-identified data easily accessible for research.

Question 16: Are there any international research infrastructure collaborations or emerging projects that Australia should engage in over the next ten years and beyond?

Question 17: Is there anything else that needs to be included or considered in the 2016 Roadmap for the Health and Medical Sciences capability area?

- While the paper does mention linking 'omics' datasets, it is important to emphasise that this needs to be done in a way that ensures that the different types and formats of data are compatible with the new infrastructure, systems and analysis tools. This will require broad consultation with the stakeholders.
- With the growing prevalence of 3 Tesla Magnetic Resonance Imaging scanners in hospitals there is the opportunity to continue to expand the use of these instruments to research applications. National infrastructure funding is required to employ staff who, not only have the expertise to operate the instruments, but, can also assist researchers to address a range of biological questions and help advance the technology.

Environment and Natural Resource Management

Question 18: Are the identified emerging directions and research infrastructure capabilities for Environment and Natural Resource Management right? Are there any missing or additional needed?

Question 19: Are there any international research infrastructure collaborations or emerging projects that Australia should engage in over the next ten years and beyond?

Question 20: Is there anything else that needs to be included or considered in the 2016 Roadmap for the Environment and Natural Resource Management capability area?

Advanced Physics, Chemistry, Mathematics and Materials

Question 21: Are the identified emerging directions and research infrastructure capabilities for Advanced Physics, Chemistry, Mathematics and Materials right? Are there any missing or additional needed?

Question 22: Are there any international research infrastructure collaborations or emerging projects that Australia should engage in over the next ten years and beyond?

- The International Synchrotron Access Program enables Australian researchers to access overseas synchrotron-related facilities. It is important that this program be continued as it has augmented Australia's research capabilities and enabled the development of expertise in emerging techniques and methodologies that can be applied in Australia.

Question 23: Is there anything else that needs to be included or considered in the 2016 Roadmap for the Advanced Physics, Chemistry, Mathematics and Materials capability area?

- While investment in the Australian Synchrotron has been mentioned in the paper, it is important to emphasise that further investment is required over the next 10 years to (a), maximise the number of beamlines in operation, as currently only 10 of the 38 are built and these are substantially over-subscribed, and (b) to upgrade it to remain internationally competitive.

Understanding Cultures and Communities

Question 24: Are the identified emerging directions and research infrastructure capabilities for Understanding Cultures and Communities right? Are there any missing or additional needed?

- The 'living laboratory' is an emerging concept that, while relevant to the other capability areas, could be considered for inclusion in the Understanding Cultures and Communities. The living lab is a collaborative innovation model based on user-experience to test new methodologies, technologies and environments in a real life context, which can accelerate translation to market.
- Linked administrative data sources are a resource that should be considered in this capability area. These are as important to the social, behavioural and economic fields of research as they are to the health and medical sciences, and are particularly important for understanding the impact of policy and changes in services, systems and social environments.
- National Data Collections: In addition to administrative data, the Australian government funds a number of national data collections that are essential for supporting research into cultures and communities, including the Census, a range of other ABS collections and HILDA. Considering these as part of Australia's national research infrastructure would be helpful for ensuring ongoing commitment, the identification of gaps or duplications, and consideration for inclusion in data linkage.

Question 25: Are there any international research infrastructure collaborations or emerging projects that Australia should engage in over the next ten years and beyond?

Question 26: Is there anything else that needs to be included or considered in the 2016 Roadmap for the Understanding Cultures and Communities capability area?

- Infrastructure alone is not enough in the Understanding Cultures and Communities area. To be effective, infrastructure should be supported by measures to build expertise in the research community to maximise their effective use because many researchers are not sufficiently technically skilled.
- The paper highlights the important role of cultural and data institutions for researchers and the need to enable the collection and curation of archival material and datasets of relevance to the capability area. However, in the 2016 federal budget, there were reported to be funding cuts related to the government's efficiency dividend for Australian cultural institutions such as museums, libraries and archives. It is important that the fiscal policies of the Government, with respect to the funding of significant national institutions related to this capability area, are aligned with, and considered as part of, the 2016 National Research Infrastructure Roadmap.

National Security

Question 27: Are the identified emerging directions and research infrastructure capabilities for National Security right? Are there any missing or additional needed?

Question 28: Are there any international research infrastructure collaborations or emerging projects that Australia should engage in over the next ten years and beyond?

Question 29: Is there anything else that needs to be included or considered in the 2016 Roadmap for the National Security capability area?

Underpinning Research Infrastructure

Question 30: Are the identified emerging directions and research infrastructure capabilities for Underpinning Research Infrastructure right? Are there any missing or additional needed?

Question 31: Are there any international research infrastructure collaborations or emerging projects that Australia should engage in over the next ten years and beyond?

Question 32: Is there anything else that needs to be included or considered in the 2016 Roadmap for the Underpinning Research Infrastructure capability area?

- Expanding access to and coverage of AREN is important. This goes beyond connections to traditional physical concentrations of research activity to more general coverage. An uncompromised NBN is really what is needed to ensure data connectivity.
- A national digitisation infrastructure will need to be geographically dispersed so objects to be digitised don't need to be transported from all over Australia to a single location.

Data for Research and Discoverability

Question 33 Are the identified emerging directions and research infrastructure capabilities for Data for Research and Discoverability right? Are there any missing or additional needed?

Question 34: Are there any international research infrastructure collaborations or emerging projects that Australia should engage in over the next ten years and beyond?

Question 35: Is there anything else that needs to be included or considered in the 2016 Roadmap for the Data for Research and Discoverability capability area?

- In relation to new data storage infrastructure, it is important that a long-term view be taken by ensuring that organisations that are to host the infrastructure are sufficiently funded and equipped for the long-term. This may entail accreditation of facilities, proper documentation and the capacity to upgrade the infrastructure as it ages.
- In the design of facilities, broad consultation with stakeholders is required to ensure compatibility of the data, and its different types, with the new infrastructure and systems. This will simplify the collation, analysis and reuse of datasets to enhance research outcomes.

Other comments

If you believe that there are issues not addressed in this Issues Paper or the associated questions, please provide your comments under this heading noting the overall 20 page limit of submissions.