

Submission

2016 National Research Infrastructure Roadmap Capability Issues Paper

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

Astronomical discovery is generally driven by technological changes, with some of the largest changes in the coming decade being associated with changes in optical technologies, encompassed by the relatively new field of *astrophotonics*. The Australian National Fabrication Facility (ANFF) has been a fantastic resource funded by NCRIS for this field, but is far too narrow to support astronomical instrumentation effectively. In particular, the photonic devices typically need interfaces to both fiber optic technologies, and light transported through conventional, but custom and high quality optics. The process of integrating photonic devices or fiber optics with conventional bulk optics currently involves either technology development by non-experts, greatly increasing development cycle time and lowering quality, or a complex network of international subcontractors who require significant time and relationship building in order to develop processes or new capabilities.

A much improved NCRIS capability would be one where the production and integration of precision bulk optics into assemblies including photonic technologies could be located under a single umbrella. Parts to this broader facility should be precision optical metrology, diamond turning of lenses and mirrors, Magneto-Rheological Finishing (MRF) and/or ion beam figuring, optical coating, opto-mechanical integration, as well as test facilities. Most of these facilities already exist at Australian universities, but they are often used intermittently and not collaboratively. Placing them under a single umbrella would enable much more competitive instrumentation to be built in Australia, both in terms of science output (e.g. exoplanet discovery) and awarding significant instrumentation contracts to Australia. An expanded ANFF has a pivotal role to play as a central repository for the collected knowledge of a diverse range of skills and capabilities. This corporate knowledge is often overlooked, but is critical in ensuring an agile response to emerging new technologies. A dedicated facility hosting a broad spectrum of knowledge under one (virtual?) roof sidesteps the need for protracted interaction across multiple sub-contractors. In cases where external contractors are unavoidable the NCRIS-funded umbrella organisation ensures a coherent overarching specification can be defined quickly and coherently across multiple component interactions, thus mitigating cost and schedule risks associated with rework.

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

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

- Question 4: What are the conditions or scenarios where access to international facilities should be prioritised over developing national facilities?
- Question 5: Should research workforce skills be considered a research infrastructure issue?
- Question 6: How can national research infrastructure assist in training and skills development?
- Question 7: What responsibility should research institutions have in supporting the development of infrastructure ready researchers and technical specialists?
- Question 8: What principles should be applied for access to national research infrastructure, and are there situations when these should not apply?
- Question 9: What should the criteria and funding arrangements for defunding or decommissioning look like?
- Question 10: What financing models should the Government consider to support investment in national research infrastructure?
- Question 11: When should capabilities be expected to address standard and accreditation requirements?
- 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?
- 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?

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?

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?

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?

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?

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?

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?

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.

Email completed form to:

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