

Submission

2016 National Research Infrastructure Roadmap Capability Issues Paper

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Questions

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

In the biodiversity science space, there is a complex structure of national infrastructure comprising a mix of Commonwealth and State agencies and funding models. For example, the national biodiversity collection in Australia – the aggregate of all museum and herbarium collections and amounting to >50M biodiversity specimens – is distributed across Commonwealth-funded and State-funded research institutions. Despite this largely historical federated structure, it acts in effect as a single national collection (and hence critical infrastructure for understanding Australia’s biodiversity), particularly given the work commenced >20 years ago to bring the collections together into a single virtual collection, work that has culminated in and is being extended by the NCRIS Atlas of Living Australia capability. A governance model that does not take into account this federated structure will be inadequate.

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

Yes. In the biodiversity research community there is a long history of international collaborations, including both international access to Australian resources, and Australian access to international resources. This is critical to the effectiveness of the discipline.

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

In the biodiversity space, soft infrastructure (the workforce and their skills) is as important or more important than hard infrastructure

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

“A key issue identified across the capability areas is that the demand for highly skilled technical and research staff has not been met by the supply”. In the biodiversity science space, the opposite is true – there is a demand-side problem (lack of career opportunities) rather than a supply-side problem

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

Historically, knowledge of biodiversity and addition of important specimens to the national biodiversity collection have come from a range of sources including industry consultants. This represents an important opportunity and value-add on government-funded initiatives. This co-investment could be optimised through appropriate standards-setting and accreditation programs run by the institutions (museums and herbaria) to ensure that best practice is met. This also has significant flow-on benefits for e.g. conservation planning and industry approvals processes.

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

Australia is close to global best-practice already in this space, and would be world-leading with enhanced capability and funding

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?

The Issues Paper focuses on a number of important elements of infrastructure to support environmental science, but significantly neglects the importance of biodiversity and an understanding of biodiversity in this context. An adequate understanding of biodiversity – the plants, animals and microbes found in Australia and its territorial waters that collectively both support and threaten Australia’s economic and environmental well-being – is surely one of the most critical infrastructure needs of any nation. We need to avoid a future in decades to come where we have invested successfully in hard research infrastructure – particle colliders, nanotechnology, medical and supercomputing facilities, space programs and the like – but have allowed significant portions of our biodiversity to become extinct through acts of omission or commission (or emission in the case of climate change).

The first, framework-building step in a thorough understanding of biodiversity is the documentation of species and other taxa, the domain of taxonomy and biosystematics. These underpin (the definition of infrastructure) a raft of other disciplines ranging from ecology and agriculture to medicine and biosecurity.

While NCRIS has made significant steps in supporting this framework knowledge, particularly through the ALA acting as a big-data aggregator for biodiversity records, the core framework infrastructure – the significant collections of scientific specimens and the researchers who document them in our museums and herbaria – has been largely neglected. Further, we are in a period across the whole of the biodiversity sciences where we are drawing down on existing capital (the historical legacy of decades of core data- and specimen-collecting activities) rather than building new capital (primary observations, specimens). NCRIS can and should play a significant role in reversing this trend.

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?

As discussed above, the biodiversity sciences (particularly taxonomy and systematics) are 'Underpinning Research Infrastructure' and should be included in this section as such.

A focus on Digitisation is welcome – digitisation of the national biodiversity collection is a particularly worthwhile direction, unlocking as it does an enormous amount of existing data that has proven utility and that in sum provides the core documentation of Australia's living natural resources. National coordination and funding – taking into account the federated nature of the resource as discussed under Q2 above – would bring great benefit.

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?

The identified emerging direction and research infrastructure – particularly the need for better managed research data, enhanced data storage infrastructure, and the need for virtual laboratories and digital tools – are important for the biodiversity sciences and the focus on them is welcome.

Australia is currently world-leading in its integration of biodiversity data and, through the ALA, in its virtual biodiversity laboratories and workspaces. There are significant opportunities in this area. Researchers from around the world come to Australia to conduct ground-breaking biodiversity analyses because we have the world's best-managed data set for one of the world's most interesting continents. A focus on biodiversity infrastructure – the collections, researchers and big data that together comprise the backbone documentation of our national biodiversity – has the potential to significantly enhance this capability.