

2016 National Research Infrastructure Roadmap Capability Issues Paper

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INTRODUCTION

The Queensland Museum (QM) congratulates the authors of the *National Research Infrastructure Capability Issues Paper* on the breadth of the capability areas encompassed by the paper.

QM is particularly supportive of the continuing acknowledgement of cultural and scientific collections as nationally significant research infrastructure and the extent to which the paper includes and integrates humanities, arts and social science research into infrastructure determinations. In addition, as contributors and users of existing National Research Infrastructure, we are very keen to see continued support of National Infrastructure such as the Atlas of Living Australia. Without such National Infrastructure, it would not be possible to ensure that our collections and research-generated knowledge would be discoverable or accessible nationally and internationally.

QM

Queensland Museum is a Statutory Body of the Queensland Government legislated by the Queensland Museum Act 1970. QM holds over 14 million natural science and geoscience specimens and cultural, technological and heritage objects which form part of the wider distributed national collection (comprising more than 50 million specimens and objects).

QM contributes to the national research effort in the following key ways:

- Generation of ground-breaking research in a wide range of fields, through research partnerships with universities and in collaboration with the private sector and
- Both QM research and broader national and international research in natural history, cultural heritage, humanities and social sciences fields is informed by vast and deep museum collections which traverse all subject areas and media.

QM would like to note that the collections held by museums in Australia provide a rich resource for evidence-based research of national and international significance **in all fields of knowledge**. Utilisation of this data across disciplines provides an opportunity for innovation and new approaches.

EXECUTIVE SUMMARY

Overall, QM:

- Endorses the continued support and enhancement of the Atlas of Living Australia (ALA). The ALA provides truly a world-leading access platform and tools to Australia's biodiversity data (both object-based and observational data). Globally, the ALA is recognised as leading research infrastructure.
- Supports international linkages through nationally coordinated membership of key international initiatives such as GBIF, Scientific Collections International (SciColl) and CBOL. In addition, Australian access to international infrastructure such as CERN is critical to our scientific and cultural heritage materials research. With a new HASS digital access capability (see below) this would also create the opportunity to link into international HASS platforms and initiatives such as Europeana.
- Supports the development of a new/enhanced digital access capability to the HASS collections. This needs to be two-fold:
 - A national Digitisation capability – technology and expertise to deliver mobile high volume and/or high resolution digitization.
 - A digital access and discoverability platform suitable for the HASS collections. We would suggest that this may be an opportunity to expand/build upon the ALA platform, perhaps bringing this together with other existing (currently non-national) platforms such as TROVE, to create integrated data harvesting and sharing, with tools specifically designed to ensure that national and international researchers have visibility of, and access to, the distributed national collections and the knowledge associated with them.

Crucial to this will be ensuring international interoperability so that Australian data can be meshed with internationally held data, for research outcomes. (For historical reasons, a significant quantum of Australia's cultural heritage is held in international collections. Currently, there is no mechanism for Australian or international researchers to link this data). The ability to link data on a global scale could result in a paradigm shift in HASS sector research capability, and allow links to be made to international initiatives such as Europeana. (Further detail on this suggested capability can be found on p7 below.)

We believe that a digital capability of this sort could be a significant opportunity to leverage co-funding – particularly State funding (as occurred with the National investment in the ALA).

QM has chosen to comment on the following questions and capability areas:

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

We suggest membership of, and participation in, key international initiatives should be centrally coordinated and funded through the National research Infrastructure. Of particular relevance to Museums collections, membership of GBIF, SciColl and CBol is critical in both ensuring that Australia has access to, and interoperability with, linked global data and in ensuring that Australian data is discoverable and accessible to international researchers.

Existing global links are strong within the biodiversity, genomics and geosciences fields. However, a significant opportunity exists to link into global data networks and open cloud data for the HASS collections. Much of Australia's cultural heritage is still held in overseas institutions (for historical reasons). There is currently a complete disconnect between the fragmented HASS collections data held in Australian Institutions and the data and collections held internationally (e.g. Europeana).

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

Skills should most definitely form an integral part of National research Infrastructure. From software engineers to expertise in species discovery, core skills must be maintained and grown to support the very best return on investment in research infrastructure.

ENVIRONMENT AND NATURAL RESOURCE MANAGEMENT

Museum natural science collections provide a series through time and space which are vital to understanding the changing dynamics of our continent and the vast challenges it faces now and in the future. The series allows base line studies of change and covers the ongoing collection of material, through fieldwork and acquisition, for research supporting state and national priorities.

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 important role of the biological collections held in museums, herbaria, universities, the CSIRO and other Government departments in providing essential research infrastructure has already been identified in earlier iterations of the Roadmap and, subsequently, through the NCRIS funding of the online Atlas of Living Australia (ALA). QM strongly supports the continued funding and enhancement of the ALA and its associated tools.

QM would also suggest that museum geological and paleontological collections will also be critical inputs to this capability as they have the capacity to assist in research seeking to understand past climate patterns and the current use of earth resources. Investment in digital infrastructure is needed to improve access to these important collections and their linkage with existing data.

QM has a range of facilities which utilise collections to foster research in-house and with external groups. These include the [Queensland Centre for Biodiversity](#) (QCB) at the Queensland Museum which uses research on the natural history collections for applied topics. This includes the emerging DNA and chemical technologies (biodiscovery) that contribute to advancements in human and veterinary medicine; environmental assessment and monitoring; genetic diagnostics and other fields

QM supports the further integration and coordination of existing museum facilities in plant and animal biological sciences into wider research activities in order to address key issues raised under this capability.

QM agrees that support is needed to continue building on existing taxonomy capability to ensure that National research Infrastructure such as the Atlas of Living Australia continues to hold the global lead in biodiversity data discoverability and accessibility.

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

GBIF, SciColl, CBOL, Europeana, CERN

UNDERSTANDING CULTURES AND COMMUNITIES

QM is strongly supportive of the recognition of cultural collections in Australia as a highly significant form of research infrastructure in their own right. QM also agrees strongly with the designation of online discoverability of these collections as a key action associated with the cultures and communities capability.

We would like to emphasise the following:

- the importance of utilising the vast research resource available in Australian public collections in which the Government, at both Federal and State levels, has made significant, long-term investment;
- the importance of museum collections as significant research infrastructure which in turn provides the basis for ongoing, unique research by museum research staff and other academic researchers;
- that the history, heritage, cultural and humanities collections held in museums and other collections holds information which informs and fosters research not only in the humanities, arts and social sciences but across a wide range of disciplines;
- the collections are particularly vital in relation to Indigenous cultural studies and for historical and social science studies which focus on national identity, adaptability and change. They also have the capacity to generate novel research solutions to further gaps in our knowledge base, which will help map Australia's ancient genetic history;
- that the lack of consistent cultural mapping for Indigenous Australia, including both urban and rural areas, means that the remains of the oldest continuous culture in the world are at risk, as is our potential to learn from 50,000 years of land management and climate change;
- the humanities, arts and social sciences can provide critical input not only to immediately recognisable social and cultural issues but across the sciences to encourage new thinking about the conceptualisation of problems and the implementation of workable solutions. They also contribute to the development of solutions for contemporary challenges in areas such health, education, sustainability and tolerance; and
- the analysis of material culture/moveable objects can reveal much additional context about history and diverse cultural groups that may otherwise not be detected through the more traditional approaches to inquiry (ie in history correspondence, oral histories and archives).
- The current lack of ability to connect to the cultural, historical, arts and social sciences collections in Australia also prevents Australia from linking data similar data globally. Given that a significant proportion of Australia's cultural heritage is held in collections outside Australia (for historical reasons), the current lack of an integrated HASS collections data

platform results in a complete lack of ability to bring Australia's cultural heritage knowledge together.

Recent developments

Since the 2011-12 road map process, a number of events and initiatives have highlighted the need for research infrastructure which would enhance the online access and discoverability of Australia's history, humanities and arts collections:

- the enhancement of online access to natural science collections through the **Atlas of Living Australia (ALA)** which now holds over 63m records and has demonstrated its full worth having passed the 7th billion download mark. It should be noted that the success of the Atlas has been grounded in its access to secure national funding;
- the potential for this type of investment in humanities research infrastructure was seen in the pilot [Museum Metadata Exchange](#) (MME) which was initiated by Council of Australasian Museum Directors (CAMD) member museums in association with [Museums Australia](#) (MA) and the Australian National Data Service (ANDS) and has made data on close to 1,000 collections accessible to research academics through [Research Data Australia](#);
- **TROVE**, which provides a single access point for over 471 million online resources from libraries, archives and museums across Australia, has been [hailed by humanities researchers](#) for its nation-building contribution to research infrastructure development. The more than 20m unique users each year demonstrates the enormous appetite for cultural content;
- Australia's national and state/territory museums have greatly advanced access to sections of their collections utilising digital innovations, different portals and in partnership with bodies like [the Google Cultural Institute](#);
- the 2015 *National Arts and Culture Accord: Digital Technology survey*, commissioned by the [Meeting of Cultural Ministers](#), reported on the need for national, cross-domain collaboration in the collection sector to implement national digital strategies and standardise technical and skills areas in relation to online access;
- in 2016, peak organisations from the Galleries, Libraries, Archives and Museums (**GLAM peak**), including QM, and a representative from the Academy of Humanities, were successful in obtaining Catalyst funding enhancing digital access to collections. The project will:
 - prepare a draft national framework for digital access to collections;
 - endorse principles and common standards to assist small to medium institutions to prioritise digitisation and adopt best practice approaches to digital access; and
 - produce an accompanying case study-based prototype toolkit to support capacity building in the collecting sector.

The GLAM peak digital access project has seen an unparalleled level of collaboration across the collections sector. It will bring coherence to collaborations in this area, streamline further partnerships with other sectors and also build capacity amongst a range of small to medium collections across Australia.

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

QM agrees with the issues paper's acknowledgement that HASS sector research enhances our understanding of, and provides new frameworks for the analysis of humanity, and its history, ideas, cultures, languages and social structures. It also plays a particularly important part in developing interdisciplinary solutions to complex challenges such as climate change, resource management, health and welfare.

QM supports the comments made in this section on the nature of the national and state cultural collections as a key set of national research infrastructure and that access to this data is core to the 'Understanding Cultures and Communities' capability.

QM would further suggest that all disciplines, not only those from the HASS sector, would benefit from digital access to collection data. Furthermore, this data underpins and traverses all disciplines not only those relating to the HASS sector.

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?

QM strongly supports the development of a **National Cultural Heritage Digital capability** which operates in the Cultures and Communities sphere but goes beyond that to allow collections data to be researched as one entity by a wide range of disciplines; an opportunity which may well produce innovative and valuable research outcomes not yet even envisaged.

QM envisages that a National Cultural Heritage Digital Capability would be:

- free to users, as is the case with the ALA and provide seamless online access from researchers' desktops;
- able to link individuals and groups of researchers with virtual research communities nationally and internationally;
- able to refine results with filters such as date, theme, collection and location. The spatial basis in particular is currently lacking in existing models;
- capable of dealing with and providing access to 3 dimensional objects;
- set up to capture born-digital material;
- able to address digital literacy and workflow, have access to existing national facilities and federated authorisation systems, and hold tools and expertise to address concerns of integration and scalability;
- able to manage access and discoverability, data harvesting and coordination;
- informed by the current GLAMpeak project to explore available models nationally and internationally;

- enhanced by a nationally coordinated digital imaging expertise (both high-volume and high-resolution solutions). It could also include a national mobile digitisation capability; and
- accessible for the development of different apps utilising data and metadata.
- Able to leverage co-funding

QM suggests that a National Cultural Heritage Digital Capability could be combined with the Atlas of Living Australia and possibly Trove to bridge natural and HASS sector data and disciplines. This sort of combined data, hardware and expertise in a national digital capability would cut across all discipline boundaries and build upon and leverage the existing investment in the ALA.

QM also believes that funding for research infrastructure of this type should cover all aspects of research including capital costs, skilled technical support staff, operations, maintenance, training and skills development and effective governance of facilities.

Digital Repatriation (8.1.2)

QM also supports the concept of digital repatriation noting that approaches to providing access to data on communities and to community artefacts needs to proceed on a carefully determined ethical basis and to ensure that the community has the training and other digital infrastructure to allow their full access to digitally repatriated material.

A national digitisation capability could take the lead on standards and ethical protocols, which ensure that digital repatriation is culturally and technically appropriate.

Materials conservation (8.3.4)

QM agrees on the need for further identification of the gaps in material conservation and the need for a capability to ensure that information, techniques and instruments leading to best practice materials conservation are shared.

NATIONAL SECURITY

Biosecurity

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

QM makes a contribution to national security chiefly through our expertise, collections, biobanks and facilities which are utilised for biosecurity purposes (9.1.1). Particular areas of application and research relate to identification of insect pests, plant diseases, zoonoses and exotic animal diseases as well as changes in these organisms over time.

Given the known importance of this work to the environment, industry and human health, QM supports the need for the development of a virtual laboratory network to enhance research and response times in this area and further expansion of biocontainment facilities.

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?

QM has been active in digitisation efforts over recent years but has found progress in this area obstructed by the cost and resources required. QM strongly supports the identification in the Issues Papers of the need for national coordination of work to digitise collections and agrees that this process would benefit from national coordination and funding. We also believe that there is a significant opportunity for co-funding for such a capability.

In relation to digitisation, developments in this area would also benefit from capital input to purchase large scale equipment for high volume digitisation and for high-resolution 3d imaging which is mobile and accessible to a range of collections. Training and specialist expertise would be required to enable application of new technology. QM supports the development of a National Digitization Capability to support multi-disciplinary access to Australia's distributed national collection. The capability would work across all disciplines - sciences and HASS.

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