Submission
2016 National Research Infrastructure Roadmap
Capability Issues Paper

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This submission concerns the activity of biobanking, and endorses the discussion paper's focus upon the need for integration and consolidation of biobanking across Australia (page 16, section 5.2.4, "In addition to high quality national infrastructure to support 'omics, and the ability to **collect, store and analyse high quality clinically useful data, high quality standardised tissue collection and** banking must be addressed. A significant improvement in research effectiveness could be achieved by **integrating existing tissue biobanks into collaborative networks** linked to the research community.

There is a need to **consolidate existing efforts and create virtual networks with stable national funding**."

The respondents making this submission are members of a NSW-wide group of researchers and related stakeholders skilled in biobanking who comprise the Biobanking Stakeholder Network of the Cancer Institute NSW. The Biobanking Stakeholder Network (BSN) is a community of practice developed as part of the set Cancer Institute NSW's Translational Cancer Research Centre Program. Working collaboratively, the BSN aims to enhance efficiency and streamline biobanking efforts across NSW. We provide our responses as individual members of that Network and our views should not be taken to represent the views of the Cancer Institute NSW.

Questions

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.

a) Transparency in the discussion making process around the agreed priorities
b) Avoidance of conflict of interest.
c) Governance should incorporate flexibility and adaptability associated with the agreed priorities
d) Clear and transparent access policies
e) Cost recovery at a level that does not impede research and is competitive with similar international facilities

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

We agree that assistance to access international facilities would be an advantage to Australian biobanks. A single biobank site is usually not capable of supplying materials for large studies. Many large research studies such as genome sequencing studies and genome wide association studies require samples and data from numerous biobanks. This is especially the case for rare diseases and disease subtypes. Biobank harmonisation within disease specific collections and across diseases is becoming an international focus. Biobank harmonisation is necessary for researchers so they can access materials and data from multiple biobanks nationally and internationally to meet the large number of samples that may be required for their studies. A deficiency of high-quality, well annotated (cancer) biospecimens has been acknowledged, globally.

There have been advances in new technologies and tools that accelerate precision medicine however this advancement is entirely reliant on the availability of fully annotated and high quality samples and associated highly accurate clinical data. In the future biobanks and translational research studies will also be vital for ongoing individual patient care with adoption of precision medicine in Australia. Biobanking must adapt to serve the needs of personalized medicine and biospecimen research should be encouraged and supported at all levels from project funding to publication of results.

As the length of clinical longitudinal follow-up increases, Australian biobanks are increasingly sought after by international collaborators, yet the funding to facilitate these international collaborations is

not available. International researchers have been unwilling or unable to pay realistic cost recovery sums to support access to Australian biobanks – so Australian biobanks are either forgoing the opportunity for these collaborations, or funding them at the margins of other activities. The current scenario is not sustainable and is an impediment to Australia participating in international research. Biobank infrastructure in Australia will therefore need to continuously evolve in order to facilitate the development of new techniques and new scientific goals.

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

As a general principle NSW biobanks that form part of the NSW Biobanking Stakeholder Network do not see any value in prioritising international over national facilities. In our current operations we do not compete against, but collaborate with, large established international facilities. Rather, a national review of the funding for Australian bioresources would inform synergies between Australian resources with international impact and international facilities, with a view to capitalising on opportunities for adding value to Australian facilities able to make an international impact.

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

Yes, maintenance and exploitation of bioresources and their associated data depends on highly skilled and specialised staff. Their skills are currently not part of any established training programme, nor is their ongoing support currently possible via traditional research support mechanisms such as research grants. Biobank networks are developing rapidly worldwide, in order to combine and share resources and ensure biobanks are run to high professional standards and the importance of adequate funding, training and certification.

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

It is important that students are educated and trained across multiple disciplines to gain the required capabilities to work in research infrastructures. For example, training of students in science and medicine/pathology so graduates can learn the importance of using high-quality, fit-for-purpose biospecimens in their research, and learn best practice laboratory SOPs, to facilitate the optimal scientific research across a range of disease streams. Continuous training modules that can be updated over time, in keeping with international best practice, will also be required for Australia's biobank professionals, clinician researchers, pathologists, scientists and others engaged in biobanking.

One of the NHMRC Enabling Grant funded entities, the Australasian Biospecimen Network (ABN), provides proven expertise and professional development and training in sample collection and storage, well developed relationships with clinical and pathology colleagues across the public and private health sector and a cost-efficient support mechanism for clinical trial research sample collection in Australia. The track record of this model could be reviewed and expanded for other groups to assist with training and skills development.

The optional NSW biobank accreditation process currently under development includes a range of training modules on all aspects of biobanking.

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

Ideally the training of infrastructure specialists would be integrated within the curricula of national tertiary institutions. The issue of stable support for infrastructure specialists rests on the provision of ongoing funding streams to support their tenure – such funding being difficult to obtain via traditional research funding mechanisms. If a national scheme for training and career path development existed for infrastructure specialists, research institutions could participate in their ongoing training, mentoring and integration into the institutional framework utilising the relevant research infrastructure.

With adequate funding, medical research institutions provide an ideal training forum for supplying infrastructure ready researchers and technical specialists as many of the requirements are in place. Many research institutions have an established pathway for students into academic, business and commercial hubs.

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

The NHMRC mandated that access policies be developed for the biobanks established under the Enabling Grant scheme – these policies required that biobanks provide open access to all researchers with meritorious, peer reviewed, ethically approved and adequately funded research projects. These principles remain the benchmark against which new biobanks could and should calibrate their access policies.

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

Legacy planning should be an integral component of research infrastructure development, particularly bioresources that hold human samples and data. In the context of bioresources funded under the NHMRC Enabling Grant scheme, legacy planning should include (i) an agreed transition timeline so existing projects/work can be completed; (ii) a budget to cover transition activities including documentation and quality assurance of biospecimens in the event that transfer of materials to alternative custodians is to occur. An advantage of biobanking networks such as the one proposed in this submission would extend to decommissioning of biobanks: another option would be to roll defunded banks into the network for ongoing custody.

The ethical considerations of bioresource closure also require careful consideration, given that donors consent to the use of their materials and data in future research, and their perspectives regarding their donated samples should the resource close require consideration. This is particularly true if closure is accompanied by disposal of biospecimens and data: this would not be viewed favourably by donors who provided their specimens in good faith and with the expectation that their samples would be retained for contribution to future research.

If closure is not accompanied by disposal of biospecimens and data, but rather transfer of custody to another entity, the specific consent provisions and costs associated with such transfer including the establishment of specific transfer agreements where applicable, require consideration.

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

The authors of this submission suggest that the funding model proposed by the NHREC writing group auspiced by the NHMRC in 2011 be adopted. By way of background, the NHMRC recognised the importance of biobanks to national and international collaborative research and issued an *Information Paper on Biobanks* in 2010. In May 2011, the NHMRC convened a Workshop involving a number of national cancer biobanks to consider the possibility of establishing a national network of cancer biobanks.

A Writing Group was set up, which prepared an application to the NHMRC for an AUSTRALIAN CANCER BIOBANK NETWORK (ACBN), after seeking comment and input from 28 other investigators involved in biobanking about the proposal.

The ACBN was proposed to be a federation of cancer biobanks, in a "Distributed Hub and Spoke' model using central, cost effective and contemporary, electronic web-based access for on-line application and distribution. It was also envisaged that the ACBN would be developed cooperatively within other, non-cancer national biobanking initiatives. The ACBN envisaged being able to operate within and integrate with any broader national biobanking initiative. A national biobank model also could encompass biobanks in other areas such as microbes and plants.

Adapting the funding model developed for the 2011 Writing Group submission (see Attachment), several principles are relevant:

- Funds need to be available to set up a central Hub, governance and management structures and to build a national biobanking network – and synergies in building such a national network can be found with existing biobanks across Australia.
- A one-off investment would be required to establish a national biobanking network, recognising that such national activities are new costs that are aimed at building a facility of national significance based on existing biobanks across Australia. In addition, an annual budget to support the national network needs to be provided in the first few years.
- A national biobanking network would cover a wide spectrum of tumour types and study designs, but would be phased to match available funds. Some common tumour types, such as colorectal and lung cancer, are likely to require individual focused banking activities in their own right. The infrastructure of existing biobanks, including biobank liaison officers, laboratory technicians and research nurses at major clinical centres, and expertise in managing sample accrual and processing, can be applied to streams not yet covered in many instances, as this is has already occurred through a number of existing Australian biobanks.
- The critical contribution and resources from pathology departments to access patient samples for biobanking and for pathology information on these samples, requires an investment in additional funding and personnel time (separate from clinical pathology work) in order to meet this expanding need and to be an ongoing and sustainable activity.
- A national network model would ideally be established with the view to be a sustainable long-term initiative with appropriate ongoing funding.

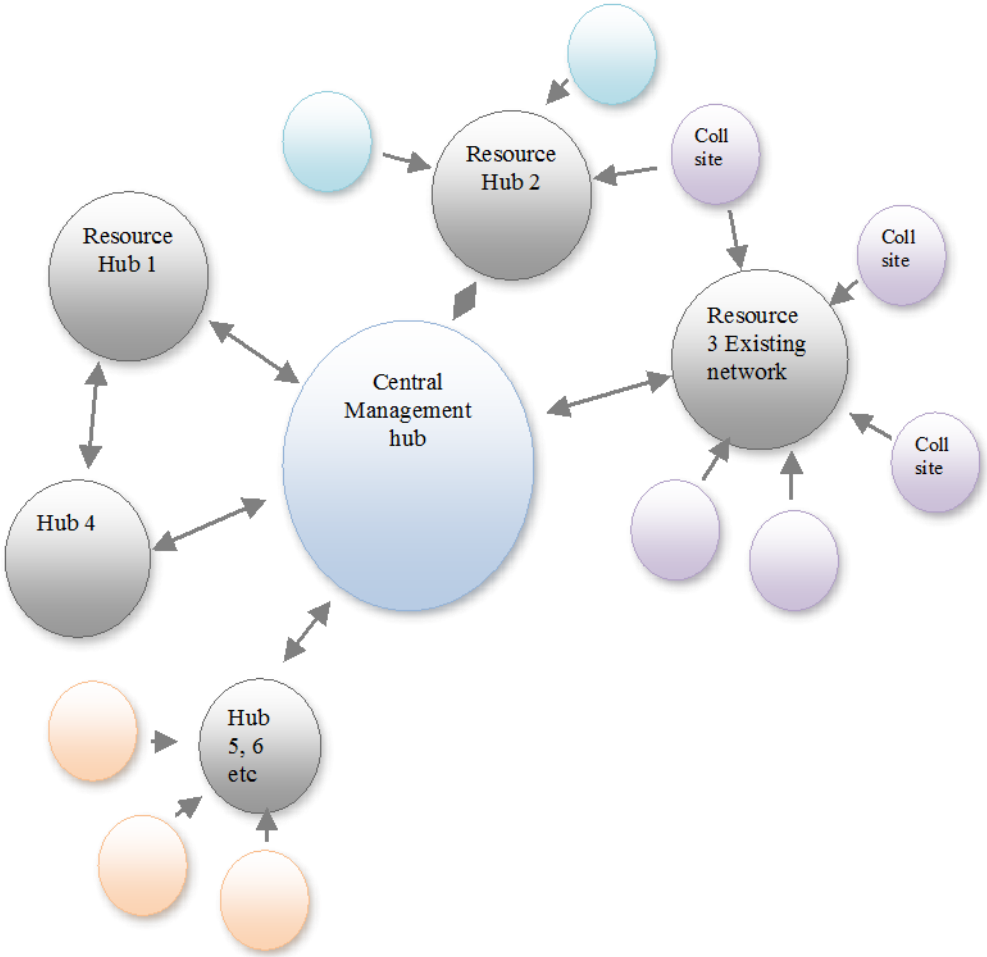
Question 11: When should capabilities be expected to address standard and accreditation requirements?

There is broad adherence by Australian biobanks to best practice, and indeed it was a requirement for NHMRC Enabling Grant funded biobanks to do so. The best practice guidelines promulgated by the peak international biobanking body, the International Society for Biological and Environmental Repositories (ISBER) are routinely used by Australian biobanks. There are current accreditation programmes for biobanks internationally, most notably in Canada through CTRNet. Australian biobanks have already received accreditation through the Canadian entity, and this programme is now being adapted in NSW for use by Australian biobanks. There is no impediment to roll out of such biobank-specific certification programmes across Australia to dedicated biobank staff; and also to hospital and research staff involved in the process of consenting patients, obtaining and processing samples - provided they have access to adequate resourcing (ie in particular ring-fenced research time) without negatively impacting on their existing clinical and research responsibilities, nor negatively impacting on the cost of collecting samples and conducting research particularly as part of multicentre studies eg clinical trials.

Other biobanks operating with NATA accredited hospital pathology departments adhere to NATA standards, although there is no NATA accreditation specific to biobanks currently.

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

Distributed models based on a Hub-and-Spoke model are widely accepted in Europe and Canada as the best models for delivery of biobanking services to researchers. Such international models were reviewed by the Writing Group in developing the model for the ACBN, which is a distributed network as shown below (reproduced from page 23 of the ACBN application).



A national biobanking infrastructure framework model with a range of hubs will allow:

- Maximisation of access to and use of biomaterials and data to academic and industry researchers
- Standardisation of general operational policies and procedures to optimise quality sample and data collections
- All patients to contribute to biobanking
- Certification procedures for existing and new biobanks
- Awareness of current research ethics and governance provisions for biobanking practice [including international ELSI 2.0 initiatives]
- Data mapping between biobanks and integrated health databases
- Standardisation of effective consent forms and material transfer agreements
- Development of effective models to manage the disclosure of individual research results and incidental findings
- Continuous professional development and training for biobank staff and awareness among researchers, clinicians and other health professionals engaged in biobanking
- Infrastructure for integrated data linkages for biobanks
- Data standardization between biobanks of the same disease and different diseases
- Assistance with administrative processes and researcher access to materials
- Reduction in the duplication of effort and administration
- Promote collaborations between researchers, clinicians and other health professionals
- Biobanks to be actively engage with international networks

- Infrastructure for study specific collections
- Local site infrastructure for clinical trials for sample and data collection and storage
- Researchers to identify and access materials and data they require for their study from multiple biobanks between and across diseases
- Public awareness of and trust in biobanking and medical research
- Promotion leverage for state, industry, not-for-profit and philanthropic partnerships

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?

The NHMRC Enabling Grant funded biobanks and resources that have ceased operations would be a good model to examine.

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

The Writing Group from the ACBN considered that a national distributed network of biobanks would be able to maintain a focus on income generation, to further leverage Government investment. This has been the experience of the Canadian CTRNet. In particular, a national biobank network would have a high profile and as a single national entity would be attractive to other funding bodies, including disease-specific Foundations, charitable organisations, Cancer Councils, Cancer Australia, State Governments, international agencies, and philanthropists. The status of individual biobanks that form part of the national network will be enhanced by being accredited members of the network, increasing their ability to attract funds from granting agencies or individuals who seek targeted investment in specific cancer types. Additional engagement with the Office of BioRepositories and Biospecimen Research, NCI where a sustainable business model for the USA national biobanking initiatives is being developed, would also be constructive.

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?

The demand for fully accurately annotated, and high quality material for translational research, now and in the future will only increase, primarily due to the proliferation in the level of “omics” and personalised / precision medicine research initiatives. Biobanks underpin~~s~~ translational research and are important for the acceleration of bench to bedside research. As highlighted in the issues paper in Section 5.2.4 Biobanking and Population Genomics, there would be significant improvement in Australian research effectiveness if a national approach is taken to biobanking by integrating existing tissue biobanks into collaborative networks linked to the research communities in Australia and internationally.

While the need for biobanks is unarguable in the national and international arena, establishing and maintaining biobanks that will provide suitable, fully annotated, and high quality material for basic and translational research, now and in the future, remain challenging endeavours in Australia and internationally. Largely as a consequence of the NHMRC Enabling Grant Scheme, Australia has

already made excellent progress in this area. However, for Australia to remain competitive, and to capitalize on the resources already established, it is essential to have an ongoing Federal strategy for investment in research enabling biobank capabilities.

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

- UK Biobank
- OECD Global Biological Resources Centre Network
- Network Pan European Biobanking and Biomolecular Resources Infrastructure [BBMRI]
- International Cancer Genome Consortium
- Public Population Project in Genomics [P3G]
- The Global Health Network [ELSI2.0]https://elsi2workspace.tghn.org/making-connections/biobanking/
- BioSHaRE-EU (Biobank Standardisation and Harmonisation for Research Excellence in the European Union. Available at: www.bioshare.eu
- http://www.ndph.ox.ac.uk/helex Centre for Health, Law and Emerging Technologies (HeLEX), Nuffield Department of Population Health University of Oxford UK
- Swiss Biobanking Platform http://www.swissbiobanking.ch/ and their BioLink grants http://www.snf.ch/en/funding/infrastructures/biolink/Pages/default.aspx

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?

Other ethnic groups in addition to Aboriginal research platforms, including the collection of biological samples, not just data.

Alignment with clinical registries to ensure clinical data will have supporting matched tissue and blood samples for future research. As new in depth, high throughput technologies and biomedical discoveries unfold, large disease-specific cohorts with highly clinical annotated bio-specimens will be needed for validation and/or further discovery of these biomarkers. Thus, it is a missed opportunity if new disease-specific clinical registries are established without accompanying biospecimen collections. Similarly, impediments to the use of data in clinical registries to annotate banked bio-specimens inhibits the ability to maximise the utility of both the specimens and the collected data.

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?

The value proposition of biobanks is not just in the tissue they store, but the associated data on patient treatments and outcomes and as such they not only underpin biomedical research, but also statistical analyses into relationships between important disease and treatment factors.

Better data and enriched analyses will potentially improve outcomes and lead to the development of new therapies to reduce long-term side-effects. Because biobanks will hold information from many patients, the ability to see and compare successful treatment patterns and pathways is amplified.

This ongoing program of data collection, storage and analyses needs to be funded as part of a national biobanking strategy.

Synergies may be leverage with clinical registries, hospital medical electronic records and clinical trials.

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.