Australasian Biospecimen Network Association Response to 2026 NRI Roadmap Consultations Survey

The Australasian Biospecimen Network Association (ABNA) is the leading professional networking organization dedicated to supporting excellence in biobanking and biospecimen science across Australasia. ABNA's membership encompasses biobanks from Australia, New Zealand, and the Pacific, fostering a collaborative network of multi-disciplinary researchers involved in diverse fields such as human disease, veterinary science, environmental conservation, and museum collections. The mission of ABNA is to promote best practices in biospecimen collection and management, while raising awareness about the critical role that biobanking and biospecimen science play in advancing research. ABNA seeks to engage various stakeholders, including funding bodies, government agencies, researchers, and the general community, in recognizing the value of biobanking. The organization encourages collaboration and knowledge exchange through activities such as a Seminar Series, an annual conference, and Special Interest Groups. ABNA also supports Australasian biobanks by promoting their services and collections, with tools like the Member Biobank Register and Specimen Locator to facilitate information sharing and collaboration within the community.

Response to 2026 NRI Roadmap Consultations Survey: Biobanks and Physical Collections
The role of biobanks and physical collections in advancing medical, environmental, and biological research is critical, yet these infrastructures have long been underprioritized in successive national roadmaps. Biobanks have faced persistent neglect in responses to previous roadmaps, including the 2021 roadmap, and the absence of concerted national leadership has hindered their strategic development. As we look ahead to the next 5-10 years, the urgent need for the development and delivery of biological models as research infrastructure remains one of the most significant unmet needs in the field.

Part 2.1 Research Themes

Medical Products:

Emerging Research Directions and Critical Infrastructure Requirements
The growing complexity of health and disease research demands access to high-quality biological samples and models. In particular, there is a pressing need to advance personalized medicine and precision healthcare, both of which rely heavily on well-curated, diverse biobanks that can provide insights into genetic and environmental factors influencing health outcomes. Genomic research, immunotherapy, and rare disease studies will all require large-scale, diverse biological collections that are deeply integrated into the research landscape. The digital science revolution, including advancements in data integration, machine learning, and artificial intelligence (AI), will underpin much of this research and require biological models and samples to be digitized, standardized, and accessible for analysis at an unprecedented scale.
Currently, biobanks and physical collections are insufficiently supported, with infrastructure not scaled to meet these emerging demands. The lack of investment has resulted in underdeveloped national resources, and uncoordinated management of these resources limits their potential. If Australia is to stay at the forefront of biomedical research, concerted national leadership is

essential for the strategic development of biobanks as research infrastructure, fostering collaboration between sectors and advancing data-driven approaches to biological research.

The deferral of the collections step-change opportunity in the 2021 roadmap response highlights the missed opportunity to meaningfully support biobanks and biological collections at a national level. This deferral indicates a trend where biobanks once again risk being overlooked despite their fundamental role in advancing research.

Future National Infrastructure Requirements

Looking ahead, it is anticipated that the current national infrastructure for biobanks and physical collections will not fit the definition of NRI in the next 5-10 years unless significant investment is made. The increasing complexity of biological research, including the integration of high-throughput sequencing, phenotypic data, and environmental factors, will demand that biobanks are equipped with enhanced capabilities. These capabilities must include not only the physical storage of biological samples but also sophisticated systems for data management, linkage, and analysis. Without these advancements, biobanks will fall behind in terms of both quality and scale, making them ineffective as a tool for cutting-edge research.

Defence:

Building a Secure and Resilient Nation

- Disease preparedness, particularly in the context of pandemics, national biosecurity, and bioterrorism threats, requires the preservation of both human and non-human microbial samples for future research and response efforts. Biobanks play a critical role in supporting national biosecurity preparedness by storing valuable biological samples that can be used to understand and respond to emerging infectious diseases, environmental threats, zoonotic outbreaks, and potential bioterrorism events. Ensuring the integrity and availability of these samples is crucial in mitigating the impact of such threats and strengthening global health security.

- As rapid advances in genomic sequencing, data storage, and AI continue, biobanks will be tasked with managing increasingly larger and more complex datasets. This underscores the need for robust systems not only for the physical storage of biological samples but also for the cybersecurity of sensitive genetic data. To address these challenges, biobanks must integrate next-generation technologies, such as blockchain, to enable secure and transparent data sharing while ensuring the integrity of the data. In light of growing concerns over data breaches and privacy violations, it is imperative to establish a future-proof security framework to safeguard both biological and genetic information.

Part 2.2 Research Priorities

Supporting healthy and thriving communities

Critical Infrastructure Needs:

- National biobanks that comprehensively store diverse genetic, phenotypic, and environmental data are essential for advancing precision medicine. Such biobanks will

be instrumental in enhancing drug discovery processes and facilitating the development of targeted clinical trials, thereby fostering significant advancements in personalized healthcare.

Emerging Research Directions:
- Biobanks will be integral in collecting biospecimens and data from diverse populations, thereby enabling the discovery of disease biomarkers and enhancing the effectiveness of personalized treatment strategies.
- The integration of genomic data with other health information will accelerate precision health approaches, facilitating more targeted drug discovery, including the development of novel gene and cell therapies, while also enhancing capabilities for disease prevention.

Part 2.3 New Capability – The Case for National Investment in Biobanks and Biological Models

Given the national interest in advancing medical products, defence research, and public health, there is a clear need for a new NRI capability dedicated to the strategic development and expansion of biobanks and biological models. The proposed capability should include:

1. **National Biobank Approach** – An integrated, scalable system to collect, store, and manage biological samples from diverse populations across Australia is essential. This infrastructure should be designed to accommodate the growing needs of precision medicine, genomic research, and public health surveillance. A unified national approach, with clear guidelines on ethics and governance, would significantly enhance this effort. Specifically, a coordinated framework for how ethics committees address biobanks across Australia is needed to ensure consistency, transparency, and trust in the handling of sensitive biological data. Establishing these ethical and governance guidelines would foster collaboration, streamline processes, and ensure that biobanks are managed in accordance with the highest standards of integrity and public accountability.
2. **Enhanced Data Infrastructure** – Biobanks must be integrated with advanced data management platforms that allow for big data analysis, genomic sequencing, and longitudinal data tracking. These platforms should enable researchers to efficiently access and query large datasets to drive discovery.
3. **Research Capacity Expansion** – The development of biological models, including organoids, cell lines, and animal models, will be crucial in facilitating therapeutic development and clinical trials. National investment is needed to scale the production and distribution of these models to meet future research demands.
4. **Support for Interdisciplinary Research** – Biobanks should be integrated with other critical research infrastructure to support interdisciplinary collaborations across fields such as environmental science, neuroscience, and infectious disease research.
5. **Workforce Development for Biobankers -** Investment in training programs, career pathways, and upskilling initiatives to ensure a skilled workforce capable of managing high-throughput automation, implementing novel technologies/techniques, data science, and regulatory compliance in biobanking.

The timeframe for establishing this capability is urgent—within the next 3-5 years, given the rapidly evolving landscape of biomedical research. This infrastructure will serve not only as a foundation for advancing Australian research excellence but also as a key contributor to global health innovation.

Conclusion

In conclusion, biobanks and biological models are at the heart of future research directions across multiple disciplines. Their strategic development and integration into a national research infrastructure are long-term unmet needs that must be addressed through concerted national leadership. It is essential that biobanks are given the support and investment they require to become a world-class resource capable of underpinning the digital science revolution and driving forward research in areas critical to Australia's health and security. Failure to act now will risk once again sidelining biobanks, missing the opportunity for a significant step change in infrastructure that could transform the research landscape for years to come.