



Australian Government
Department of Education

The 2026 NRI Roadmap Issues Paper



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1. Introduction

[National research infrastructure \(NRI\)](#)¹ plays a crucial role in delivering breakthroughs in fundamental research, cutting-edge applied research and in facilitating industry engagement in research and development (R&D). It therefore underpins Australia's sovereign R&D capability. Providing infrastructure to advance research, and its applications requires strategic foresight and nationwide, long-term planning. NRI Roadmaps have been developed every 5 years since 2006 to ensure Australian research is supported by world-class infrastructure which is aligned to Australia's priorities. One of the key programs for Australia's NRI funding is the Australian Government's [National Collaborative Research Infrastructure Strategy \(NCRIS\)](#)² administered by the Department of Education. Additionally, NRI capabilities are also established and supported through other Federal Government portfolios, research funding agencies, state and territory governments, universities, research organisations, and the private sector.

Development of the [2026 NRI Roadmap](#)³ began in early 2025 when the Department of Education and the ministerially appointed [NRI Advisory Group](#)⁴ conducted a public survey (the Survey). The Survey asked respondents to identify future research infrastructure needs aligned to the [National Science Research Priorities \(NSRPs\)](#)⁵ and the research themes used in the [2021 NRI Roadmap](#)⁶. The Survey also sought input regarding potential new NRI capabilities. This Issues Paper has been developed through ongoing analysis of the Survey responses by the Department of Education and the 2026 NRI Roadmap Expert Working Group (that functions as a subgroup of the NRI Advisory Group).

This Issues Paper briefly summarises the current policy landscape (Section 1.4), provides a snapshot of the February Survey responses as well as a link to the publicly attributable submissions (Section 3), and intentionally seeks input on aspects of NRI applicable to a limited set of topics (Section 2):

- Aboriginal and Torres Strait Islander knowledge systems
- the humanities
- the research infrastructure workforce
- translation and industry
- new research infrastructure.

Following analysis of feedback gathered in response to this Issues Paper, outcomes of other government reviews (such as the Strategic Examination of Research and Development (SERD)), matters drawn from the Survey and other discussions and consultations, an Exposure Draft Roadmap will be released for public consultation. That document is expected to provide a preliminary view of the final 2026 NRI Roadmap.

1.1. What is NRI?

The 2021 NRI Roadmap defined NRI as:

NRI comprises the nationally significant assets, facilities, services and associated expertise to support leading-edge research and innovation. It is accessible to publicly and privately funded users across Australia and internationally.

To maintain the importance of *national significance* and *accessibility* and more strongly emphasise the importance of our *research infrastructure workforce*, an updated definition of NRI is proposed for the 2026 NRI Roadmap as follows:

NRI comprises the nationally significant assets, facilities **and highly-skilled personnel providing services that together** support leading-edge research and innovation. It is accessible to publicly and privately funded users across Australia and internationally **and may be single-sited, virtual or distributed**.

For comparison, the following definitions are presented from international peers:

1. United Kingdom Research and Innovation (UKRI), [UKRI's Infrastructure: Opportunities to Grow our Capability Report](#) (2023)⁷.

Facilities, resources and services that are used by the research and innovation communities to conduct research and foster innovation in their fields. They include major scientific equipment (or sets of instruments), knowledge-based resources such as collections, archives and scientific data, e-infrastructures, such as data and computing systems and communication networks, and any other tools that are essential to achieve excellence in research and innovation.

2. European Strategy Forum on Research Infrastructures (ESFRI), [Strategy Report on Research Infrastructures Roadmap 2026](#) Public Guide (2024)⁸.

Research infrastructures means facilities that provide resources and services for the research communities to conduct research and foster innovation in their fields, including the associated human resources, major equipment or sets of instruments; knowledge-related facilities such as collections, archives or scientific data infrastructures; computing systems, communication networks and any other infrastructure of a unique nature and open to external users, essential to achieve excellence in research and innovation; they may, where relevant, be used beyond research, for example for education or public services and they may be single sited, virtual or distributed.

Q1. Should the proposed definition of NRI in the 2026 NRI Roadmap be modified – such as by elaborating what is meant by ‘nationally significant’, or by other changes? If ‘yes’, please contribute a potential definition (or definitions).

1.2. Timeline of key research infrastructure events

Since the release of the 2021 NRI Roadmap, several notable milestones, events and outcomes have occurred, which include (but are not limited to) the points below.

- The establishment of the NRI Advisory Group in 2022.
- NCRIS funding rounds in 2023 and 2025.
- The release of the [Climate Projections Roadmap for Australia](#)⁹ 2023.
- The release of the [State of Australian Quantum Report 2024](#)¹⁰.
- The release of the [National Digital Research Infrastructure \(NDRI\) Strategy](#)¹¹ and subsequent [NDRI investment planning recommendations](#)¹², in 2024.
- Funding rounds for the Medical Research Future Fund's [National Critical Research Infrastructure \(NCRI\) initiative](#)¹³ and [Research Data Infrastructure initiative](#)¹⁴.
- Announcement of the [Strategic Examination of Research and Development \(SERD\)](#)¹⁵ in 2024, and in 2025 the release of a Discussion Paper, and several Issues Papers¹⁶.

The NRI Advisory Group has also provided advice to the department on:

- biological models
- synthetic biology
- translational research infrastructure
- research collections
- supporting Australia's NRI workforce.

1.3. Next steps and how to engage

Feedback on the matters in this Issues Paper will be gathered through a public survey and through discussions with various stakeholder groups.

To provide your input on the questions in this Issues Paper please visit the [2026 NRI Roadmap Issues Paper consultation survey landing page](#).

The outcomes from this stage, and a variety of other discussions and sources, including with international counterparts, will inform the Exposure Draft. That document is expected to provide a preliminary view to the final 2026 NRI Roadmap. Topics not addressed in this Issues Paper that may be considered in developing the Exposure Draft include:

- updated NRI principles
- digital NRI considerations since release of the NDRI Strategy
- improvements in NRI planning
- collections
- biological models
- matters of governance
- international collaboration.

To keep informed of future steps in 2026 NRI Roadmap development, please continue to refer to the department's [2026 NRI Roadmap](#).

1.4. Policy landscape

To better position Australian R&D to meet national priorities, the Australian Government is undertaking reviews and developing key strategies and plans.

The SERD is examining system wide funding and governance for R&D, and the Australian Research Council (ARC) has examined how to best support the future of Australia's fundamental research through national competitive grants. There are several government lead strategies and plans underway, including critical technology, AI, quantum, health and medical research, and the Antarctic. A key analysis underway by the National Science and Technology Council (NSTC) is focused on research infrastructure. These activities take place in the context of the Government's existing funding arrangements for R&D which can be summarised by the science, research and innovation (SRI) budget tables. There are also several international roadmapping exercises in progress that provide valuable context.

To be effective, the 2026 NRI Roadmap will need to align with and leverage relevant parts of these reviews and strategies. In this section they are highlighted to signal the broader policy landscape that will be considered in the next stages of developing the 2026 NRI Roadmap.

1.4.1. The SERD

The SERD is examining the benefits to economic growth and productivity that arise from a more purposeful approach to R&D. A [discussion paper](#)¹⁷ was released by the SERD panel in the first half of 2025 to inform and support development of advice on key issues. Within this discussion paper, the role of NCRIS in underpinning Australia's NRI is highlighted. The paper states that "R&D infrastructure needs ongoing funding and renewal to ensure relevance and focus". In July 2025, the SERD panel released their [findings and analysis](#)¹⁸ based on public consultation, which included stakeholder views on NRI. The strategic examination is taking into consideration recent and ongoing reviews commissioned by Australian Government relating to research, innovation and productivity performance. Beginning in August 2025, the SERD panel initiated consultations on a series of [Issues Papers](#)¹⁹ to further explore evidence and possible future directions for reform to increase the impact of the research, development and innovation (RD&I) system. The SERD is expected to report to the Australian Government at the end of 2025.

1.4.2. Policy Review of the ARC National Competitive Grants Program (NCGP)

The [Policy Review of the NCGP](#)²⁰ led by the ARC was launched in 2024. The review aims to examine the fundamental settings of Australia's competitive research grants program to ensure it is well-designed and fit for purpose, delivering visible returns on public investment and is aligned with related government programs. A discussion paper was released in February 2025 following extensive consultations and the final report is currently under consideration.

The discussion paper references Australia's research infrastructure capabilities, including the role of the Linkage, Infrastructure, Equipment and Facilities (LIEF) rounds, which support

both basic and applied research endeavours. The ARC Board proposes a new scheme structure under which medium-sized collaborative research infrastructure will continue to be supported in the short term. This support will be through a new sub-scheme of the Collaborate Grants while the ARC continues to work across government to explore the potential for a more sustainable and connected long-term approach to infrastructure funding.

1.4.3. The Critical Technologies Framework

In 2023, the Australian Government established a framework to ensure a coordinated approach to critical technologies in support of our economic prosperity, national security, environmental sustainability and social cohesion.

The [Critical Technologies Statement](#)²¹ sets out the Government's commitment to the important role of critical technologies in Australia, and ensures we make balanced decisions about the development, uptake and growth of critical technologies. The [List of Critical Technologies in the National Interest](#)²² identifies seven technology fields that are vital to Australia's economy, national security and social cohesion and supports coordination of efforts by government, academia and industry, including research, investment and talent attraction.

1.4.4. The National Artificial Intelligence (AI) Capability Plan

Led by the Department of Industry, Science and Resources, the [National AI Capability Plan](#)²³ aims to realise the possibilities and capability-building potential of AI for all Australians, by seizing the opportunities offered by AI, sharing the benefits and keeping Australians safe.

1.4.5. The National Quantum Strategy

The Department of Industry, Science and Resources also leads the [National Quantum Strategy](#)²⁴, which recognises that Australia's strengths in quantum technologies today are the result of sustained investment over decades. This strategy projects that the development and application of quantum technologies will have far-reaching implications for Australia's economic growth, national security and wellbeing. The National Quantum Strategy supports the development of closer ties with trusted international partners. The strategy also states the importance of investments in quantum infrastructure, such as quantum computing capability and nanofabrication infrastructure, to capture the benefits quantum technologies are anticipated to deliver.

1.4.6. The National Health and Medical Research Strategy

The Department of Health, Disability and Ageing and the National Health and Medical Research Council are currently supporting the Chair, Ms Rosemary Huxtable AO PSM, to develop a [National Health and Medical Research Strategy](#)²⁵. This strategy aims to deliver a plan to strengthen and leverage Australia's world-leading research capabilities and deliver better health outcomes from a productive and efficient research ecosystem. It also seeks to provide national direction, build on Australia's strengths in the health and medical research

sector, fill any gaps, and continue to attract researchers and investors to Australia. The [draft strategy](#)²⁶ was released in September 2025 for open consultation.

1.4.7. Australian Antarctic Science Decadal Strategy 2025-2035

The Australian Antarctic Program is coordinated by the Australian Antarctic Division, as a division within the Department of Climate Change, Energy, the Environment and Water. The [Australian Antarctic Science Decadal Strategy 2025-2035](#)²⁷ builds on all previous Antarctic science strategies and plans. It was developed by the Australian Antarctic Science Council at the request of Government and in consultation with the Australian Antarctic research community. The published strategy acknowledges that delivery of the Australian Antarctic Program requires “sustained access to national and dedicated enabling capabilities” and provides references to existing NCRIS projects as examples.

1.4.8. The Science Toolkit: Is Australia’s research infrastructure fit for purpose and future proof?

The NSTC is developing the Science Toolkit: Is Australia’s research infrastructure fit for purpose and future proof? The project explores Australia’s existing research infrastructure landscape and the nation’s role within the global research infrastructure community. Amongst other considerations, the NSTC aims to understand whether Australia’s approach to managing research infrastructure is resilient to evolving research needs and potential threats and opportunities. This highlights the importance of an NRI landscape that aligns with national needs and works efficiently to integrate Australia’s current and future research infrastructure requirements.

1.4.9. The Research Funding Environment

The NCRIS program currently sits amongst a broader national landscape of [SRI initiatives](#)²⁸ that are supported by Government investments. Table 1 illustrates the Australian Government’s current SRI program investments (only individual programs with a budget estimate valued over \$100 million in 2025-26 are shown).

Table 1: SRI budget tables by program and activities (> \$100 million) from budget estimates 2025-26 (\$ million).

Program	Amount
R&D Tax Incentives - Refundable	3,817.00
Research Training Program	1,262.36
Research Support Program	1,098.81
ARC - National Competitive Grants Program	1,036.21
NHMRC Research Grants	999.62
Commonwealth Scientific and Industrial Research Organisation (CSIRO)	983.12
R&D Tax Incentives - Non-Refundable	770
Australian Renewable Energy Agency (ARENA)	708.92
Medical Research Future Fund	650
Defence Science and Technology Group (DST Group)	543.06
NCRIS	464.75
Australian Antarctic Division	274.95
Australian Nuclear Science & Technology Organisation (ANSTO)	265.36
National Institutes Program – Australian National University Component	250.26
Cooperative Research Centres (CRC) Program	206.31
Advanced Strategic Capabilities Accelerator (ASCA)	198.43
Australia's Economic Accelerator	188.87
Australian Centre for International Agricultural Research (ACIAR)	120.37
Grains Research and Development Corporation	109.15
Meat and Livestock Australia Limited	100.65
TOTAL	14,048.22

1.5. The international research infrastructure context

Research is pursued in a global context and international developments in research infrastructure planning and provisioning have direct implications for our national considerations. While funding and organisational arrangements vary widely across jurisdictions, many of the emerging directions and challenges are common.

The 2026 NRI Roadmap development process includes scanning relevant international processes, and engaging where appropriate. Processes of interest include:

- the [UKRI Infrastructure Roadmap Programme](#)²⁹ to be published in 2025
- the [UK Compute Roadmap](#)³⁰ published in July 2025
- the [ESFRI Roadmap 2026](#)³¹ to be published in 2026
- the [European Strategy on Research and Technology Infrastructures](#)³² published in September 2025
- the [Canadian Sovereign AI Compute Strategy](#)³³ published in May 2025.

Internationally, environmental sustainability, such as responsible management of resources, energy efficiency, and environmentally sustainable infrastructure practices, including for

digital operations, forms part of practices regarding research infrastructure planning. Examples include:

- the ESFRI [Strategy Report on Research Infrastructures Roadmap 2026](#) Public Guide³⁴
- the [UKRI Environmental Sustainability Strategy](#)³⁵
- the [Concordat for the Environmental Sustainability of Research and Innovation Practice](#)³⁶.

2. Areas where we are seeking your input

This section covers 5 topics – Aboriginal and Torres Strait Islander knowledge systems, the humanities, the research infrastructure workforce, translation and industry, and new research infrastructure – where feedback is being sought to assist in identifying and prioritising future NRI capabilities.

2.1. Aboriginal and Torres Strait Islander knowledge systems

2.1.1. Context

The 2021 NRI Roadmap highlighted the potential for Aboriginal and Torres Strait Islander knowledges to contribute to addressing major research challenges that cut across many disciplines, and the imperative for leadership to be in the hands of Aboriginal and Torres Strait Islander peoples.

The 2023 NCRIS Investment Plan led to some significant relevant NRI uplift. For example, the [Improving Indigenous Research Capabilities \(IIRC\)](#)³⁷ project is developing and improving access to secure, culturally appropriate data management tools and platforms that enable more effective management, sharing and protection of Aboriginal and Torres Strait Islander peoples' data. Similarly, the [Language Data Commons of Australia \(LDaCA\)](#)³⁸ project is enabling researchers and communities to access and use nationally significant collections of written, spoken, multi-modal and signed language, which is opening up social and economic possibilities for Australia's language data in translational research.

Australia's NSRPs include the priority "elevating Aboriginal and Torres Strait Islander knowledge systems". This priority highlights the importance of a science and research system that is culturally safe, that supports preservation and protection of Aboriginal and Torres Strait Islander traditional knowledges, languages, data sovereignty, and cultural expressions and other intellectual property. It also calls for the incorporation of Aboriginal and Torres Strait Islander knowledge into the development and application of critical and emerging technologies, especially in relation to digital and data technologies.

The 2026 NRI Roadmap must build on these foundations and identify directions for the NRI system to further foster long-term arrangements that recognise, protect, and elevate Aboriginal and Torres Strait Islander knowledge systems across Australia's science and research sectors.

2.1.2. What we have heard

Drawing on responses from the Survey, which gathered community input on directions for the 2026 NRI Roadmap and other expert inputs, two complementary trajectories have been identified to meet growing demands for digital infrastructure, data security, cultural protocols, and supporting Aboriginal and Torres Strait Islander communities to maintain control over their knowledge:

1. Establishment of a dedicated Aboriginal and Torres Strait Islander Peoples Research Data Commons capability. This would require scaling up from the IIRC and LDaCA programs currently established under the Australian Research Data Commons (ARDC), and should draw on related collaborative initiatives hosted by various institutions.

Such a capability would require committed multi-year investment potentially covering:

- Aboriginal and Torres Strait Islander-controlled data repositories and catalogues that implement both [FAIR \(findable, accessible, interoperable and reusable\)](#)³⁹ and [CARE \(collective benefit, authority to control, responsibility and ethics\)](#)⁴⁰ principles with appropriate metadata standards to support Aboriginal and Torres Strait Islander data governance.
 - expert resources for managing, protecting, and sharing Aboriginal and Torres Strait Islander data to facilitate large-scale research, policy development, and community-driven on-Country initiatives.
 - ensuring AI is being used responsibly as a tool in research practices relevant to Aboriginal and Torres Strait Islander peoples – this includes processing tools being specifically designed for Aboriginal and Torres Strait Islander languages, and AI-supported provenance and metadata creation to support the management and discoverability of Aboriginal and Torres Strait Islander people's data at scale.
 - development and promulgation of processes to embed Aboriginal and Torres Strait Islander peoples data governance and sovereignty protocols as well as CARE principles, including ethics frameworks that prioritise community consent and benefit-sharing into the activities of all relevant NRI.
2. Recognising that Aboriginal and Torres Strait Islander knowledges are inherently interdisciplinary and intersect with multiple research communities across Australia, scale up of these knowledge systems must happen through coordination across many entities, as well as linking and interconnection of multiple sources – such as collections, health services, land and water authorities and institutional archives. Facilitating such collaborative integration of Aboriginal and Torres Strait Islander and Western knowledges requires uplift within and across existing NRI capabilities and associated expertise clusters such as research hubs and centres.

Such a capability uplift would require committed multi-year investment across multiple NRI providers. Examples highlighted in the Survey responses as to where such opportunities arise include:

- development and adoption of technologies for Aboriginal and Torres Strait Islander cultural and intellectual property protection and cultural heritage

tracking to ensure compliance with privacy legislation, cultural protocols and principles of Aboriginal and Torres Strait Islander people's data governance whilst safeguarding against the risks of their data being exploited, misused or lost.

- preserving and applying [Indigenous Ecological Knowledge](#)⁴¹ in the management of Australia's diverse landforms, soil types and cropping systems.
- integrating Indigenous Ecological Knowledge and modern biotechnology to support biodiversity conservation, natural resource management and ecosystem restoration efforts.
- engaging with Indigenous Ranger programs, given the fundamental role they play in managing Country and monitoring native and non-native species in remote and regional regions of Australia.
- collaboration on sustainable fishing and reef management, applying Aboriginal and Torres Strait Islander knowledge and stewardship of marine and coastal environments.
- involvement of Traditional Owners of Sea Country in the discovery of submerged Aboriginal and Torres Strait Islander landscapes and heritage sites.
- infrastructure support to enable Aboriginal and Torres Strait Islander-led and community governed biobanking and associated services.
- ensuring that Aboriginal and Torres Strait Islander ways of knowing, being and doing are embedded in all aspects of creative arts.
- improving our understanding of Australia's groundwater resources by integrating Aboriginal and Torres Strait Islander knowledge of water resources, water management and groundwater flows with research practices employing dating methods.
- connecting social and cultural collections to create the ability to elicit relationships between collection objects, people, ecology and Country.

2.1.3. Questions

Q2. What should be done, and over what timeframe, to ensure future NRI investments respect cultural protocols, support self-determination, and promote benefit sharing, in line with the Australian Government's [Framework for Governance of Indigenous Data](#)⁴²?

Q3. How might an appropriate balance be achieved between investment in a dedicated Aboriginal and Torres Strait Islander Peoples Research Data Commons capability, and provision of uplift in capability across relevant discipline and theme-oriented NRI? Your response should include consideration of possible design approaches for a dedicated capability and/or of mechanisms and incentives for alignment and collaboration across NRI providers.

2.2. The humanities

2.2.1. Context

Humanities help us understand our place in the world in time and space, and our relations to others. Humanities research is critical for addressing societal global challenges and priorities and for promoting an informed understanding of society and culture. The 2021 NRI Roadmap pointed to outcomes from humanities research as being critical for economic, social and environmental benefits and highlighted the centrality of collections to humanities research infrastructure.

Infrastructure that supports the humanities research sector thus plays a key role in ensuring the health, wealth and wellbeing of the nation.

The 2023 NCRIS Investment Plan led to some significant relevant NRI uplift, particularly the HASS and Indigenous Research Data Commons funded through the ARDC. Specific humanities focus areas include the [Australian Creative Histories and Futures project](#)⁴³, the [Australian Internet Observatory](#)⁴⁴ and the [ARDC Community Data Lab](#)⁴⁵. In 2024 the [Decadal Plan for Social Science Research Infrastructure 2024-33](#)⁴⁶ was published, which can inform discussions of future social science research infrastructure needs. However, gaps continue to remain in the data infrastructure needed to support broad societal challenges, including improving the accessibility of such data to support government and other decision makers.

2.2.2. What we have heard

The recent waves of digital transformation have produced a new generation of platforms, devices and AI capabilities impacting almost every aspect of social and cultural life and increasing the imperative for an uplift in NRI investment directed towards humanities research.

Cultural collections are central to humanities research, but Australia needs a nationally coordinated approach to enhancing NRI collections. Australia's national collections are siloed across disciplines, geography, culture, jurisdiction and material classification. A lack of interoperability across governance and protocols, standards, classifications, platforms and technologies, creates barriers to interdisciplinary research and for research end-users. There is also a need for a digitisation and cataloguing initiative for significant cultural materials.

The humanities have mature data assets such as the [AustLit](#)⁴⁷ bio-bibliographical database that serve national research communities in fields such as literary studies. Some of these data assets have sustainable business and data models but need further investment to support enhancement activities such as indexing and the development of digital tools and technologies for query and data analysis.

Respondents believe Australia needs a national capability for digital observability that allows researchers and end-users to collect, audit, and analyse data from digital tools, services, devices and the "Internet of Things". The research infrastructure should support new models of data collection such as crowdsourcing and data donation and be built on

networked open technology standards built for public-interest governance frameworks and multi-sector participant communities.

Respondents highlighted that humanities researchers need access to digital compute and storage infrastructure for sensitive data including audio, video and visual media, to enable compliance with legislation, privacy requirements, cultural protocols and participatory governance frameworks. Digital research infrastructure includes sovereign large language models (LLMs) and secure development environments for generative AI and simulation.

There is a sector wide requirement for capacity building and workforce development. This includes a specialist research infrastructure workforce for humanities research infrastructure that can also contribute to digital research skills training for humanities researchers.

2.2.3. Questions

Q4. What are the current top 3 priorities for NRI investment for the humanities?

Q5. What new or emerging areas of humanities research will require NRI investment in the next 3-5 years?

Q6. Should Australia focus on developing a specialist humanities research infrastructure workforce or a generalist research infrastructure workforce with humanities domain expertise and ability to bridge across disciplines?

- Responses expressed in terms of the pros and cons of each approach would be especially useful.

2.3. Research infrastructure workforce

2.3.1. Context

Australia's research infrastructure workforce is a vital component to the successful functioning of our NRI landscape. These personnel provide invaluable expertise and knowledge that ultimately supports Australia's researchers to effectively and efficiently conduct their work. Hence, growing and retaining our research infrastructure workforce is crucial and in the interest of the nation's research efforts.

We must also ensure workplaces are safe and inclusive for all people. To attract and retain a skilled and diverse research infrastructure workforce, employment conditions should support career pathways that are flexible and accessible.

Human capital and workforce issues have been identified in previous NRI Roadmaps⁴⁸, and the NRI workforce was an identified priority area in the [NCRIS 2025 Guidelines](#).

2.3.2. What we have heard

Training and career development will foster a highly sought-after skillset that ranges across all fields and fosters research-industry collaborations. Long-term investments in supporting Australia's current and future NRI staff are critical to maintain and enhance Australia's research and translation capability and capacity. Programs should ensure that staff mobility is possible to provide opportunities for sharing of experiences and knowledge. This will help improve workforce participation and retention, including of people from historically underrepresented cohorts.

A cultural shift is required in many of the organisations where NRI staff work. Issues such as recognition, career development, progression and security need to be addressed sector wide. Solutions will require long-term funding for programs to support staff. Skilled NRI staff are also key to development of significant and productive research-industry collaborations. Movement of overseas staff into Australian facilities and Australian staff into overseas facilities will provide invaluable development of Australia's NRI capability. Similarly, placements of staff to and from the commercial sector will enhance the understandings required for effective use of NRI capabilities for translation of research outcomes.

2.3.3. Questions

Q7. What are the critical skills that the NRI workforce should have regardless of their technical expertise?

Q8. What is the best approach to retain staff and to add new capabilities to the current NRI workforce?

2.4. Translation and industry

2.4.1. Context

During the past decade, the Organisation for Economic Co-operation and Development (OECD) has consistently highlighted that a significant proportion of national gross domestic product (GDP) growth is due to the uptake of innovation by business and industry sectors. Innovation active firms consistently outperform firms that don't innovate on a range of measures including productivity and profitability. Cutting-edge technology and world-class research infrastructure have each been identified as primary enablers of performance in both the research and industry sectors. Consequently, major research infrastructure is consistently included in national research and innovation strategic plans as a key enabler of industry, where research collaboration drives research translation and the emergence of new products and processes.

The 2021 NRI Roadmap pointed to the important role that NRI can play in bridging the gap between discovery research and the points beyond which industrial drive carry the translation process. The 2026 NRI Roadmap presents an opportunity to further emphasise the benefits anticipated from greater engagement between Australia's NRI capabilities and the nation's industry sector. Better tools to analyse and track Australia's NRI and to highlight linkages for development and innovation, can improve productivity and meet the broad needs of Australia's various industries.

While many of Australia's NRI facilities engage and collaborate with business and industry groups across Australia, and the number of industry users of NCRIS facilities continues to increase, it is recognised that the location and potential benefits of many facilities may not be visible or known beyond a relatively small group of industry users in any one jurisdiction. There can also be concerns, particularly for small and medium enterprises (SMEs), about the potential cost of access to and the longer-term value of new technologies.

Facilitating research translation presents a multi-faceted challenge where Australia's NRI community can play an active and more visible role in ensuring access to key research infrastructure for SMEs, business and industry sectors and in documenting and promoting the outcomes of such access. Development of appropriate measures of the contribution of NRI to business development and growth, that are consistent across infrastructure facilities and industry sectors would provide an important baseline.

2.4.2. What we have heard

In addition to the general observations above regarding increasing the visibility and benefits of NRI to potential industry users, Survey respondents highlighted a range of opportunities to harness nationally funded research infrastructure in order to build industry growth across a range of sectors. Examples of these opportunities included:

- **Discovery of novel drug candidates** through development of a nationwide network of interconnected translational research capabilities. Key components could include

facilities for high-throughput screening, bioanalytical characterisation together with advanced computational and AI research infrastructure tailored to support expedited discovery of novel drug candidates.

- **A marine technology accelerator** to support the progression of autonomous systems from proof-of-concept to the realisation of operational capabilities. Such an accelerator would function as a national test and evaluation facility for next-generation marine technologies, suitable for both civilian and defence purposes.
- **Cellular agriculture research translation hubs** that host research infrastructures required to develop, prototype and scale the output of agricultural products. Examples include fit-for-purpose bioreactors (accommodating increasing volumes) that facilitate the optimisation of upstream and downstream processing at scale.

2.4.3. Questions

Q9. How can NRI facilities ensure their capabilities are made widely known and available to potential users in relevant industry sectors across Australia's cities and regions?

Q10. How can NRI facilities build the know-how and support that will lead to an increase in productive research-industry collaborations?

Q11. To improve research translation capability, can you identify and briefly describe needed enhancements of existing NRIs, and/or new NRI?

Q12. How should research translation be planned for in the development of new NRI?

2.5. New research infrastructure

2.5.1. Context

One of the Survey questions invited respondents to identify potential new NRI capabilities, or enhancements to existing capabilities, within or across domains. Specifically, they were asked to briefly describe the need, the proposed infrastructure capability, the medium-term goals, impacted research communities, and the timeframe over which its establishment should occur.

A wide range of responses was received – some representing research communities with documented detailed plans, some from existing facilities describing emerging needs, some proposing pilot activities or scoping studies, and some describing discipline specific gaps, but ones that may not fit in the category of NRI. Many responses emphasised the imperatives in domains that are touched on elsewhere in this Issues Paper. Many drew attention to the need to enhance systematic coordination and collaboration at national scale across geographic and disciplinary boundaries, through investing in existing and potentially new organisations with appropriate expertise and authority.

2.5.2. What we have heard

The full set of the [Survey responses with consent for publication and attribution](#) can be found published on the department's NRI webpage. Examples of research infrastructure suggestions provided by Survey respondents include:

- **Biobanking infrastructure**, consolidating existing and new biological samples, genomic and phenotypic data, health records and environmental data to support large-scale research in many disciplinary areas, and to participate in international consortia. Bioresource and synthetic modelling platforms would be included.
- **Earth system modelling infrastructures** such as an integrated atmospheric composition observing facility, and further investments in integration involving marine, coastal, freshwater, and groundwater observation infrastructure. A calibration facility and appropriate data and compute capacity would be included.
- **Mathematical sciences infrastructure** in the form of a dedicated residential facility, following a model used in several other countries.
- **Translational research infrastructures** such as a distributed quantum device testbed to allow industry access to quantum characterisation tools for novel materials; space-testing infrastructure for radiation-tolerant and radiation-hardened components, novel radiation shielding materials and radiation-resistant plants; a distributed large-scale aero- and hydrodynamic facility to boost the capacity of domestic industry to innovate in the fluids domain.

2.5.3. Questions

Q13. Review the full set of available suggestions for potential new or enhanced capabilities from the [published Survey responses](#) (Question 35) and identify up to 3 that you regard as most important to consider for inclusion in the 2026 NRI Roadmap. Please provide a brief rationale for your view and include the response number(s) for your selection.

Q14. If you wish to propose an additional priority suggestion for a new or enhanced capability, that was not in the Survey responses, please name it here, and briefly describe the need, the capability, the medium-term goals, impacted research communities, and the timeframe over which its establishment should occur.

2.6. Summary of questions

2.6.1. Definition of NRI

Q1. Should the proposed definition of NRI in the 2026 NRI Roadmap be modified – such as by elaborating what is meant by ‘nationally significant’, or by other changes? If ‘yes’, please contribute a potential definition (or definitions).

2.6.2. Aboriginal and Torres Strait Islander knowledge systems

Q2. What should be done, and over what timeframe, to ensure future NRI investments respect cultural protocols, support self-determination, and promote benefit sharing, in line with the Australian Government’s [Framework for Governance of Indigenous Data](#)?

Q3. How might an appropriate balance be achieved between investment in a dedicated Aboriginal and Torres Strait Islander Peoples Research Data Commons capability, and provision of uplift in capability across relevant discipline and theme-oriented NRI? Your response should include consideration of possible design approaches for a dedicated capability and/or of mechanisms and incentives for alignment and collaboration across NRI providers.

2.6.3. The humanities

Q4. What are the current top 3 priorities for NRI investment for the humanities?

Q5. What new or emerging areas of humanities research will require NRI investment in the next 3-5 years?

Q6. Should Australia focus on developing a specialist humanities research infrastructure workforce or a generalist research infrastructure workforce with humanities domain expertise and ability to bridge across disciplines?

- Responses expressed in terms of the pros and cons of each approach would be especially useful.

2.6.4. Research infrastructure workforce

Q7. What are the critical skills that the NRI workforce should have regardless of their technical expertise?

Q8. What is the best approach to retain staff and to add new capabilities to the current NRI workforce?

2.6.5. Translation and industry

Q9. How can NRI facilities ensure their capabilities are made widely known and available to potential users in relevant industry sectors across Australia’s cities and regions?

Q10. How can NRI facilities build the know-how and support that will lead to an increase in productive research-industry collaborations?

Q11. To improve research translation capability, can you identify and briefly describe needed enhancements of existing NRIs, and/or new NRI?

Q12. How should research translation be planned for in the development of new NRI?

2.6.6. New research infrastructure

Q13. Review the full set of available suggestions for potential new or enhanced capabilities from the [published Survey responses](#) (Question 35) and identify up to 3 that you regard as most important to consider for inclusion in the 2026 NRI Roadmap. Please provide a brief rationale for your view and include the response number(s) for your selection.

Q14. If you wish to propose an additional priority suggestion for a new or enhanced capability, that was not in the Survey responses, please name it here, and briefly describe the need, the capability, the medium-term goals, impacted research communities, and the timeframe over which its establishment should occur.

3. What we heard from the Roadmap Survey consultation

Note: The following content represents a snapshot of the diverse and informative submissions received from the Survey. The information presented here represents a sample of the wide-ranging content submitted by Australia's NRI stakeholders.

The following sections should not be interpreted as any attempt to prioritise or exhaustively summarise the Survey responses.

We continue to review and analyse all submissions received.

3.1. Overview of Survey respondents

The Survey received 523 responses in total. Of this, 62% of submissions were received from individuals and the remaining 38% were received on behalf of organisations. Nearly half of respondents identified as researchers (48%), followed by senior management in a research organisation (24%). The remaining respondents were made up of research support staff, technical staff, industry professionals and other categories.

With regards to the Survey respondents' familiarity with NCRIS, the breakdown for 'very familiar', 'somewhat familiar' and 'not familiar' was 60%, 32% and 8%, respectively. This compares to the 2021 NRI Roadmap Survey, which found that 69% of respondents had either interacted with or used Australia's existing NRI (from 2,936 total responses).

The [submissions received](#) with full permissions allowing publication of both content and attributing information have been made available on the department's website.

[The Survey questions](#) can be found on the department's website.

3.2. Australia's NRI needs in the context of the NSRPs⁴⁹

This section briefly summarises Survey submissions received in response to seeking further information regarding Australia's NRI needs in the context of the NSRPs.

The Survey sought input from respondents on possible directions for future national-level planning and investments for Australia's NRI. Survey respondents were asked to comment on emerging and future research trends and the critical research infrastructure requirements that are either not currently available or not at sufficient scale. Respondents were also asked to describe any existing NRI that is expected to align with the current expectations and definitions of NRI in the coming 5-10 year period. Respondents were asked to present their comments in the context of the research themes presented in the 2021 NRI Roadmap, as well as the NSRPs.

The following section provides a high-level snapshot summary of the responses received in the context of the NSRPs.

3.2.1. Priority 1: Transitioning to a net zero future

The Survey responses highlighted the critical need for research infrastructure that supports research in carbon capture and storage, advanced coastal and maritime research, and the enhancement of computational capabilities for climate modelling. Stakeholders also emphasised the importance of research infrastructure in developing and implementing renewable energy technologies, such as solar and wind power, alongside advancements in energy storage solutions, which include next-generation batteries and hydrogen electrolysis hubs. Furthermore, the integration of these technologies with existing research infrastructure was seen as crucial to ensure a seamless transition.

Research infrastructure that promotes research in sustainable agriculture practices and biomanufacturing innovations was put forward as essential components in achieving net zero emissions. The feedback also emphasised the need for research infrastructure that enables the monitoring and reduction of greenhouse gas emissions across various sectors, including transportation, industry, and construction.

3.2.2. Priority 2: Supporting healthy and thriving communities

Survey participants highlighted the need for enhanced research infrastructure in precision medicine and personalised therapies, the translation of research into clinical applications, and the development of robust national data and biobanking capabilities.

Enhancing biomedical imaging infrastructure and integrating multi-omics data were also key themes identified for supporting health advancements. The Survey responses highlighted the importance of continuing to develop state-of-the-art biomedical imaging facilities equipped with advanced technologies.

The feedback underscores the importance of AI and computing capacity in biomedical applications, particularly in the analysis of large datasets generated from multi-omics studies. Further, a need was argued for upgraded social datasets to inform policy decisions, particularly in the areas of public health, social services, and urban planning.

3.2.3. Priority 3: Elevating Aboriginal and Torres Strait Islanders knowledge systems

The Survey responses emphasised the importance of integrating Aboriginal and Torres Strait Islander knowledge systems into modern research methodologies. This included recognising the value of traditional ecological knowledge, cultural practices, and oral histories in informing contemporary scientific research. Investment in data management platforms, cultural mapping, and training programs for Aboriginal and Torres Strait Islander

communities was recommended to support the preservation and dissemination of this valuable knowledge.

Critical research infrastructure requirements put forward by respondents included facilities for large-scale, community-led research that respects indigenous protocols and integrates traditional ecological knowledge with modern biotechnology. The feedback highlighted the need for collaborative partnerships between Aboriginal and Torres Strait Islander communities, researchers, and policymakers to ensure that research initiatives are culturally appropriate and beneficial to all parties involved. A recurring theme was the importance of Indigenous Data Sovereignty, ensuring Aboriginal and Torres Strait Islander communities control their data and its use. This necessitates culturally appropriate protocols for data collection, storage, and sharing, respecting cultural sensitivities and prioritising community consent.

3.2.4. Priority 4: Protecting and restoring Australia's environment

Digitisation of collections was identified as a vital area of research infrastructure provision. The feedback highlighted the need for integrated data management practices and advanced technologies, such as remote sensing and AI with expanded geographic coverage, to enable research associated with the monitoring and protection of environmental resources. It was suggested that digitisation initiatives should focus on creating accessible and comprehensive databases of Australia's natural heritage, including flora, fauna, and geological specimens. A clear theme was that environmental and climate modelling requires enhanced high performance compute and data (HPC-D) capability.

To support eco-restoration efforts and contribute to preserving Australia's unique ecosystems, Australia's environmental scientists indicated they require access to national-scale research infrastructures, including future portable/field-deployable analytical and surveillance tools to enable immediate, on-site measurements, and triaging of samples for re-direction to higher-end laboratory equipment for further analysis.

These research infrastructures should feed into data supply chains, integrated alongside industry-generated data, to enhance regional scale environmental planning, management and reporting. Continued and expanded access to FAIR-compliant environmental data is deemed essential with recognition of the ongoing (and substantial) costs associated with generating the corresponding metadata, dataset management and making the data accessible through web-based platforms.

Other examples of research infrastructure technologies included national biodiversity biobanks to store ecological genetic data and to support advanced bioinformatic analyses whilst also aiding in research associated with the identification and conservation of threatened species.

Research infrastructures to monitor and survey our nation's coastal environments were also described as essential to support our efforts to combat the adverse impacts of climate change.

3.2.5. Priority 5: Building a secure and resilient nation

Investments in enhancing our national ocean monitoring research infrastructure capabilities, including sensing technologies to detect temperatures, salinity, currents and improved bathymetric mapping is considered critical to understanding ocean conditions. Furthermore, these capabilities can support research that seeks to address climate change and protect at-risk communities, businesses and habitants. Mathematical sciences were highlighted for their potential to underpin critical areas fundamental to national security and resilience, with proposed mathematics research infrastructure including a national residential research facility dedicated to advancing mathematical sciences in the nation's interests.

The feedback emphasised the need for investment in biomanufacturing facilities, to bolster national food supply chains and reduce reliance on foreign technologies. One example included capacity to manufacture the medicines necessary to protect the health and wellbeing of our population during times of crises (including pandemics and medicine shortages).

4. Endnotes

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