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Australian Academy of Science

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Australian Academy of Science submission on *National Research Infrastructure Roadmap*

The Australian Academy of Science (the Academy) welcomes the opportunity to contribute to the development of the 2026 National Research Infrastructure (NRI) Roadmap.

Australia's NRI system underpins the nation's ability to conduct high-quality research, collaborate internationally, foster innovation, and the ability and capacity to respond to complex national challenges across climate, health, energy, industry and national security.

As the Roadmap sets the direction for the next 5-year evolution of research infrastructure, we emphasise the importance of establishing a framework that strengthens the fundamental science that pushes technological advancement, drives discovery and strengthens both our sovereign capability and international collaborations.

The Academy recommends that the 2026 NRI Roadmap:

- Elaborate on the definition of 'nationally significant' to provide a whole of system approach to research infrastructure, recognising the different scales of research infrastructure Australian science relies on and allow for long-term strategic planning of infrastructure and international partnerships.
- Present a coordinated, long-term national strategy and investment to secure and build Australia's high-performance computing and data capability – increasing critical capacity for Australia to meet its challenges and national priorities.
- Establish a nationally coordinated program to maintain and mobilise Australia's research collections.
- Prioritise the development of a workforce strategy to attract and retain the highly skilled staff that underpin our NRI in collaboration with the host institutions.

Tiers of infrastructure and the NRI ecosystem

This section responds to the survey question: ***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).***

The Academy is concerned that the Roadmap process is taking a narrow focus on infrastructure that is strictly national, which will not provide the research sector with the infrastructure and strategic capabilities that Australia needs to support its national science and research priorities. As the Academy noted in its previous submission, this lens does not account for the shifts in scale of infrastructure required to support research and innovation into the future, such as exascale computing, nor a plan for researchers to access world-leading infrastructure internationally.

Australia's research infrastructure system comprises a range of infrastructure – from institutional research infrastructure, the national collaborative infrastructure funded through NCRIS, national agency infrastructure and landmark infrastructure that Australia participates in alongside international collaborators – and all are 'nationally significant' to Australia's research capability.

The Academy proposes that the 'nationally significant' definition be elaborated to recognise the different scales of research infrastructure that Australia relies on. This definition of research infrastructure would ensure that the 2026 NRI Roadmap can deliver long-term strategic and holistic planning to enable continued access to technology and infrastructure across Australia's priorities and needs of its research communities.

Taking this whole of system approach from institution level through to international collaborative infrastructure should enable coordination and strategic direction in the Roadmap, and support sustainability of research infrastructure. The Academy and its National Committees for Science have expressed concern about the lack of coordination between infrastructure funding schemes, including the future of ARC's LIEF scheme, which enables cooperative use by universities and industry, granting access to specialised equipment and large-scale infrastructure for basic and applied research that a single institution could not deliver on its own. Under this scheme, funding cliffs brought on from specified 1–5-year funding terms make long-term planning and stability of important infrastructure challenging. It is not yet clear how this will be addressed by the ARC's Policy Review of the NCGP. The Roadmap should seek to coordinate across the research infrastructure system to address gaps in the sustainability of national significant facilities and instrumentation.

Coordination and strategic thinking outside of research silos is required across multiple jurisdictions and sectors. In its submission to the Strategic Examination of R&D, the Academy has previously proposed a coordinated formal partnership model integrating state and territory governments in Australia. The NRI Roadmap should consider this coordination between jurisdictions to enhance coordination to leverage regional strength and address diverse innovation needs.

Expanding the approach to national research infrastructure capability planning should also extend to strategic alignment and strong partnerships to enable Australia's full participation in global science. This whole of system view would enable targeted investment in critical international partnerships and strengthen Australia's position as a trusted research partner, enhancing our ability to contribute to, and benefit from, major multinational initiatives such as Horizon Europe. It also maximises the impact and efficiency of public investment by leveraging existing capabilities, fostering critical mass, and supporting talent mobility and knowledge exchange. Importantly, integrated partnerships create pathways for industry engagement, innovation translation and workforce development, ensuring that Australia's research infrastructure ecosystem is globally connected, strategically coherent and capable of responding to domestic challenges and national priorities.

Targeted investments in high performance computing and data, and securing national research collections

This section is in response to ***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.***

The Roadmap must present a plan to build national high performance computing and data capability

Australia urgently requires a long-term national strategy, investment and roadmap to build sovereign High-Performance Computing and Data (HPCD) capacity. The 2026 NRI Roadmap is an opportunity to deliver strategic, long-term planning for this critical infrastructure. A national HPCD strategy should encompass the grass roots of technology, up to and beyond exascale computing. Australia has an opportunity to be a leading hub for compute power because of our regional advantage and capability. Australia requires a coordinated, complementary approach across data, Artificial Intelligence (AI) and compute to maximise investments and meet our national needs for research and industry. [1]

Access and capability in exascale computing is crucial for Australia to remain scientifically and economically competitive across many fields, including artificial intelligence. The Academy proposes that an investment of $200 million per year over 10 years would support the required sector planning, deliver upgrades to existing facilities and drive coordination and co investment in a regional or Tier-0 facility.[2]

These high-performance computing abilities can transform scientific research, attract (and retain) talent, and enable us to create domestic solutions free of interference to solve our unique problems. Many of our international peers are operating exascale capabilities, including China, the United States, and Europe. In this shifting geopolitical environment, Australia requires urgent investment in HPCD to safeguard our future interests. Expanding Australia's HPCD capabilities would provide benefits across Australia's science sector and provide further linkage and opportunities between academia and industry to boost innovation and productivity.

The issues paper identifies a strong demand for enhanced computational capability and mathematics modelling, including for climate projections, environmental modelling and national security applications. These capabilities are underpinned by strong national HPCD infrastructure planning and long-term investment.

The need for a coordinated system of compute, AI and data is a high priority reinforced by the Academy's National Committees for Science who additionally called for investment in frontier capabilities such as quantum testbeds and integrated atmospheric and marine observation systems. To remain globally competitive, this infrastructure must be coordinated and support experimental measurement, large-scale facilities, and the computational platforms essential for data driven discovery and industry translation, as outlined in the Academy's April submission to the NRI Roadmap. [3]

The Academy recognises that Government alone cannot reverse the decline of research and development investment in Australia. **Opportunities to grow investment in research infrastructure and deepen research-industry partnerships should be considered,** including public private partnerships and superannuation as an investment in research infrastructure.

Maintaining Australia's nationally significant research collections

As noted in the Academy's April submission, the 2026 NRI Roadmap should establish a nationally coordinated program to better maintain and mobilise Australia's nationally significant research collections.[3] **Targeted investments in new technologies, national standards, and digital curation would enable access and allow upgrades to systems, opening access for researchers.** A coordinated and national directive is needed to uplift Australia's research collections to protect our physical and digital assets, including metadata which are vital to Australia's research sector. These collections preserve irreplaceable and verifiable biological, geological, environmental, cultural and data rich records that underpin research, underpin past findings and support new questions as technology and research methods evolve.

Workforce alignment

This section responds to the survey question ***Q8. What is the best approach to retain staff and to add new capabilities to the current NRI workforce?***

The Academy strongly supports inclusion of highly skilled personnel in the updated 2026 definition of NRI to cultivate and retain a highly skilled research workforce. Long-term stable funding and strategically planned infrastructure enables researchers and NRI staff to build expertise, maintain capability and foster scientific excellence.

The issues paper emphasises the skills the NRI workforce needs. While developing skills is a component of workforce needs, providing stability and support to NRI capabilities and staff within host institutions is critical to attracting and retaining skilled people, enabling them to progress and develop their expertise and keep pace with global advances. One of the main impediments to retaining a skilled workforce is that current research funding schemes largely only address the direct costs of research and don't support (and often specifically exclude) the funding of indirect costs including the costs of operating and maintaining research infrastructure. This is beyond the current scope of the NRI but remains a major impediment to retaining the skilled workforce required and needs to be addressed whether via the NRI Roadmap directly or in conjunction with any funding arrangements that follow from the Strategic Examination of R&D or National Health and Medical Research Strategy.

International partnerships and exchange opportunities provide knowledge sharing and progression opportunities for both Australian and international researchers. **The NRI roadmap should provide specific focus on the training pipeline of Australia's workforce, both current and future capabilities including attracting new skilled NRI experts.**

National infrastructure that encompasses international, national and institutional infrastructure needs

This section responds to the survey question *Q13. Review the full set of available suggestions for potential new or enhanced capabilities from the published Survey responses 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.*

The Academy's National Committees for Science suggested national scale infrastructure such as High-performance computing and data and access to complex infrastructure such as synchrotron, advanced microscopy, and national bioprocessing and materials hubs to serve advancement in pharmaceuticals and environmental remediation.

HPCD, AI expertise and access to complex research infrastructure are required to be at the frontier of modern science and innovation, accelerating discovery and enabling sophisticated calculations and predictions. Access to world class facilities provide opportunities which cannot be replicated at the institution level and are critical to breakthroughs. Embedding these capabilities into the 2026 NRI Roadmap ensures Australia remains competitive and provides the tools, expertise and training pathways required to address national challenges.

The Academy gratefully acknowledges contributions from its National Committees for Science in preparing this submission. The National Committees for Science foster scientific disciplines in Australia and globally and provide scientific advice on relevant policy matters.

To discuss or clarify any aspect of this submission, please contact Lauren Sullivan, Manager Policy at science.policy@science.org.au.

References

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2. Why investment in Australia's supercomputing should matter to every Australian | Australian Academy of Science. https://www.science.org.au/supporting-science/science-advice-and-policy/why-investment-in-australias-supercomputing-should-matter-to-every-australian [Accessed 2 December 2025].

3. Submission—2026 National Research Infrastructure Roadmap | Australian Academy of Science. https://www.science.org.au/supporting-science/science-advice-and-policy/submissions-to-government/submission-2026-national-research-infrastructure-roadmap [Accessed 2 December 2025].