SUBMISSION

Submission to the Department of Education

Submission to the 2026 National Research Infrastructure (NRI) Roadmap consultation survey

19 March 2025

The Australian Academy of Technological Sciences and Engineering (ATSE) is a Learned Academy of independent, non-political experts helping Australians understand and use technology to solve complex problems. Bringing together Australia's leading thinkers in applied science, technology and engineering, ATSE provides impartial, practical and evidence-based advice on how to achieve sustainable solutions and advance prosperity.

The architecture of National Research Infrastructure (NRI) enables Australia to develop and deliver outcomes from its research strengths. The 2026 NRI Roadmap will fine-tune this system, facilitating consideration of emerging opportunities and guiding investment decisions using the renewed National Science and Research Priorities. Building in collaboration agreements and workforce development will enable Australia to obtain more value from its research infrastructure, supporting future commercial development and sustaining our standing in the global scientific community

Over the past two decades, the National Collaborative Research Infrastructure Strategy (NCRIS) has been vital for effectively maintaining research infrastructure. While this forms the basis for much of Australia's capability, there remain some significant gaps for priority areas such as artificial intelligence and climate research. The 2026 NRI Roadmap is an opportunity to stabilise existing facilities with ongoing maintenance and operational funding, and set up important new facilities that will enhance Australia's research outcomes.

ATSE makes the following recommendations for the 2026 NRI Roadmap:

Recommendation 1: Establish a government agency to coordinate all government research funding, including research infrastructure funding.

Recommendation 2: Apply the Infrastructure Australia Assessment Framework to evaluate proposals for new research infrastructure.

Recommendation 3: Expand research infrastructure access for industry-based users, including SMEs and startups.

Recommendation 4: Provide secure funding and a roadmap for high performance computing for weather and climate research.

Recommendation 5: Establish shared-use infrastructure for artificial intelligence and machine learning research.

Recommendation 6: Embed data sovereignty and sharing into national research infrastructure management.

Recommendation 7: Deliver the NRI Workforce Strategy.

Taking a strategic approach to long-term research infrastructure planning

Consultation for the 2026 NRI Roadmap comes at the same time as the research and development system is being examined through the Strategic Review of Research & Development and the Australian Research Council review of the National Competitive Grants Program. All three reviews highlight the need for more coordination and long-term planning for the research sector. The fragmentation of the current system creates inefficiencies, including researchers and organisations spending time applying for many different oversubscribed funding schemes.

The Roadmap approach for national research infrastructure has enabled significant reforms in its previous iterations. A key missed opportunity is long-term certainty for infrastructure. Plans and funding for operating and maintaining infrastructure should be in line with the expected lifetime of that infrastructure. This supports efficient utilisation of infrastructure across its lifetime and enables facilities to seek co-investment and engagement from industry partners. Ideally, a single government agency would coordinate research infrastructure and research funding – ensuring strategic use of resources.

Decision making for research infrastructure could be strengthened through adapting and applying Infrastructure Australia's Assessment Framework (2021). The Assessment Framework has four stages: 1) defining problems and opportunities, 2) identifying and analysing options, 3) developing a business case, and 4) post completion review. Parts of the current Roadmap development process could inform stages one and two for proposed new research infrastructure. Applying the Infrastructure Australia approach would provide a structured method for identifying gaps and options for new research infrastructure and applying a rapid cost-benefit analysis to determine a preferred option.

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Facilitating collaborative research

ATSE's newly released report, Boosting Australia's Innovation, identifies an unmet need for programs that facilitate collaboration between SMEs and others innovation actors – with access to research infrastructure being a crucial component (ATSE, 2025). The report findings were developed through roundtable discussions with more than 150 senior professionals across industry, government, academia and peak bodies to identify the step-changes needed to realise the potential of Australia's innovation system.

Universities and research agencies – large organisations which receive substantial government support – are typically the hosts for large-scale research infrastructure and scientific collections. Innovative SMEs (small and medium enterprises) and startups could greatly benefit from accessing time at these facilities. There are significant challenges for scaling innovative startups in Australia, resulting in a trend towards innovative tech companies being acquired by foreign entities. Widening access to research infrastructure is one action among many that would help reverse this trend. A key challenge for innovative SMEs is the lack of established relationships with other innovation actors. Accessing the relevant research facilities would serve an additional purpose of placing SMEs in proximity to innovation actors, facilitating relationship-building and collaboration, and contributing to the evolution of an innovation culture.

The 2021 NRI Roadmap highlighted the benefits of collaboration and co-investment for research infrastructure and recommended identifying opportunities for a more integrated and collaborative NRI ecosystem, including improving engagement with industry-based users. Enabling increased collaboration will support research translation outcomes. Embedding access agreements and increased industry engagement in the 2026 Roadmap would be an enabler for realising commercial research applications, including in priority areas. Based on the findings of the Boosting Australia's Innovation report, ATSE considers that this recommendation remains vital for the 2026 NRI Roadmap, with additional regard for facilitating SMEs to access research infrastructure.

Recommendation 3: Expand research infrastructure access for industry-based users, including SMEs and startups.

Securing high performance computing for national priority research

High performance computing infrastructure is the backbone of the climate and weather projections that will enable Australia to understand and prepare for the effects of climate change. While NCRIS does support two Tier-1 high performance computing facilities, the National Computation Infrastructure and the Pawsey Supercomputing Centre, these are not sufficient to meet emerging and future climate services needs, and are already experiencing high demand. The rise of machine learning and artificial intelligence has led to increased data storage requirements. High performance computing infrastructure typically has a lifespan of five to six years. To date, there has been a lack of planning, with organisations proposing a new funding case each time infrastructure meets its end of life. The Australian Academy of Science's Decadal Plan for Earth System Science proposes that upscaling high performance computing and big data should be integrated into NCRIS, with computing systems co-located with climate data collection systems (AAS, 2024). Given the national significance and potential international collaborations in the region, it would be prudent to lift high performance computing to a landmark capability like the Square Kilometre Array or ANSTO. This would require a long-term strategy for high performance computing, with secure funding for replacing and maintaining facilities, to support vital climate change research into the future.

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Additionally, there is an unmet need for shared-use infrastructure to support the development of artificial intelligence and machine learning (AI/ML) – enabling data storage, model training and fine tuning. AI/ML research infrastructure would differ from existing high performance computing in that it requires a larger number of graphics processing units and a greater volume of data storage. This was identified as a priority area for the 2021 Research Infrastructure Roadmap by ATSE and the Australian Academy of Science (ATSE & AAS, 2021). With the generative AI revolution since late 2022, this is now an even greater opportunity, with research questions in a range of disciplines from astronomy to health increasingly relying on access to AI/ML. Innovations in AI/ML could support progress across all National Science and Research Priorities.

Recommendation 4: Provide secure funding and a roadmap for high performance computing for weather and climate research.

Recommendation 5: Establish shared-use infrastructure for artificial intelligence and machine learning research.

Leveraging data and collections as resources

Data storage and access is a fundamental requirement of research infrastructure. The establishment of the Australian Research Data Commons (ARDC) by merging three previous data organisations, as recommended by the 2016 NRI Roadmap, has driven progress in data management. Datasets as well as archives and libraries are also an important resource for the research community. Physical archives represent a rich source for researchers, especially in humanities, arts and social sciences (HASS) disciplines. The need for a national approach to physical collection management was highlighted in the 2021 NRI Roadmap.

The 2021 Roadmap also identified that advances in digital technologies had resulted in increasingly large datasets, requiring planning to consider how to both store these datasets and make them accessible nationally, and potentially many years into the future. Potential sovereignty issues from using of commercial cloud services was identified as a risk. The 2021 Roadmap foresaw that data management would only become more important – and more challenging. Now, with sovereign risks created by Australia heavily using cloud storage from US companies such as Amazon Web Services and Microsoft Azure, it is vital to establish sufficient onshore data storage.

First Nations data sovereignty is another key issue identified in the 2021 Roadmap. The Roadmap emphasised the importance of shared decision-making and developing suitable data governance and capability, and recommended engagement with the Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS) Code of Ethics for Aboriginal and Torres Strait Islander Research.

These ideas were evolved in the National Digital Research Infrastructure (NDRI) Strategy, published in 2024. The Strategy considers that NDRI is cross-cutting infrastructure that underpins all fields of research.

The principles outlined in this Strategy would provide a firm foundation for managing Australian data, including from NCRIS facilities, and providing access for researchers. As the next NRI Roadmap is developed, it will be important to keep the NDRI Strategy in focus for planning and investment decisions.
Recommendation 6: Embed data sovereignty and sharing into national research infrastructure management.

Supporting workforce capability

The technical staff, including engineers, supporting research infrastructure are vital to the implementation of the next Roadmap. With skills shortages across science, technology and engineering, and the need for highly specialised skills for maintaining and operating research infrastructure, there is a risk of losing national capability. Not only does the technology age, but so does the human capital, which can diminish due to age, retirement, and departure to other fields. Skilled workforce development is a consideration for the establishment of new research infrastructure. For example, a new national mathematics research institute would both facilitate innovation across fields such as financial modelling, cryptography, and data science, and serve as a training ground for emerging talent in an area of skills shortage.

The 2021 NRI Roadmap notes challenges such as casualisation of research infrastructure staff, lack of career progression, and skills shortages. The 2021 Roadmap therefore committed to the development of an NRI Workforce Strategy. As of 2024, development of this Workforce Strategy was underway (Department of Education, 2024). Progressing and delivering this work is critically important to support the development and retention of a skilled workforce to operate and use national research infrastructure.

Recommendation 7: Deliver the NRI Workforce Strategy.

ATSE thanks the Department of Education for the opportunity to respond to the 2026 National Research Infrastructure (NRI) Roadmap consultation survey. For further information, please contact academypolicyteam@atse.org.au.

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