Please note: the substantive content of the 2026 NRI Roadmap Survey begins at Question 20 (with prior questions dealing with administrative and other information).

As such all submissions that are published include the responses submitted from Question 20 onwards only.

Q20.

Part 2: Research themes

2.1 NRI comprises the assets, facilities and associated expertise to support leading-edge research and innovation in Australia and is accessible to publicly and privately funded users across Australia and internationally. We are seeking your input on possible directions for future national-level investment - i.e., where the requirements are of such scale and importance that national-level collaboration and coordination are essential.

The 2021 Roadmap used a challenge framework to support NRI planning and investment. With this in mind, consider likely future research trends in the next 5 - 10 years, and with respect to one or more of the 8 challenge areas identified in the 2021 Roadmap as listed below:

- describe emerging research directions and the associated critical research infrastructure requirements that are either not currently available at all, or not at sufficient scale and
- describe current national infrastructure requirements that you anticipate will no longer fit the definition of NRI in 5-10 years.

Do not limit your commentary to NCRIS funded capabilities.

Q21.

Resources Technology and Critical Minerals Processing

Q22.

Food and Beverage

Q23.
Medical Products

Q24.
Defence

Q25.
Recycling and Clean Energy

Q26.
Space

Q27.
Environment and Climate

Q28.
Frontier Technologies and Modern Manufacturing

Q29.

2.2 The 2024 statement of National Science and Research Priorities (NSRPs) includes outcomes linked to each priority to assist in identifying critical research needed in the next 5 to 10 years.
Consider the priority statements and, with respect to one or more of the 5 priority areas as listed below:

- describe emerging research directions and the associated critical research infrastructure requirements that are either not currently available at all, or
- not at sufficient scale and describe current national infrastructure requirements that you anticipate will no longer fit the definition of NRI in 5-10 years.

Do not limit your commentary to NCRIS funded capabilities, and where relevant, refer to the underpinning outcomes and research identified in the NSRPs document.

Q30.

Transitioning to a net zero future

Q31.

Supporting healthy and thriving communities

Q32.

Elevating Aboriginal and Torres Strait Islanders knowledge systems

Q33.

Protecting and restoring Australia’s environment

Q34.

Building a secure and resilient nation

The Australian Mathematical Sciences Institute (AMSI) is the peak body for the mathematical sciences in Australia, representing key fields such as mathematics, statistics and data science, alongside other highly quantitative disciplines. With a broad membership base spanning universities, professional societies, government agencies and industry, AMSI plays a vital role in advancing research, workforce development and industry collaboration. Mathematical sciences are fundamental to national security and resilience, underpinning critical areas such as artificial intelligence (AI), cybersecurity, climate modelling, public health analytics and defence technologies. As AI and big data continue to shape the global landscape, the demand for advanced mathematical capabilities will only increase. To address emerging threats, including climate-related disasters, cyber-attacks and pandemics, Australia must strengthen its mathematical sciences foundation. Advanced mathematical concepts are crucial for safeguarding sensitive information through cryptography and data encryption and are key drivers in many technological innovations. Mathematical optimisation and predictive modelling play a pivotal role in securing critical infrastructure, including energy grids and financial markets. Such modelling helps mitigate disruptions caused by economic shocks, natural disasters and climate-related events. In environmental science and healthcare, mathematical sciences enable rigorous data analysis, effective disaster management, epidemic control and climate resilience, ensuring preparedness for future challenges. Despite their foundational importance, and unlike most advanced economies, Australia lacks dedicated national research infrastructure to support mathematical science research. To bridge this gap, AMSI strongly recommends that the 2026 NRI Roadmap include a National Residential Research Institute for the Mathematical Sciences to: • Support high-impact research in security, defence, public health, and environmental resilience. • Facilitate international collaboration and position Australia as a global leader in mathematical sciences. • Develop a highly skilled workforce in emerging fields such as AI, quantum computing, and data science. • Strengthen Australia's research and innovation ecosystem, ensuring we remain globally competitive in critical technologies. Mathematics, statistics and data science provide essential tools for advanced modelling, risk assessment and decision-making, all key to national preparedness and response. To maintain Australia's security, resilience and global competitiveness, mathematical sciences research infrastructure must be recognised as a critical priority in the NRI Roadmap through the establishment of a National Residential Research Institute for the Mathematical Sciences.

Q35.

2.3 The case for a new NRI capability, or enhancements to existing capabilities, typically emerges through advocacy from research communities clustering around rigorously identified needs and goals. Such a concept could respond to a requirement for novel or expanded capacity within a domain, or across domains, and must be such that it could only be made available with national-level investment.

If you have identified such a requirement, briefly describe the need, the proposed infrastructure capability, the medium-term goals, impacted research communities, and the timeframe over which you advocate its establishment. Your response can include links to relevant existing reports.

Case for a National Residential Research Institute for the Mathematical Sciences Mathematical sciences drive innovation across all disciplines, delivering benefits through enhanced employability, job creation, economic mobility, productivity and global competitiveness. Fundamental research in mathematics underpins these applications, fostering breakthroughs that advance applied mathematics and related fields including AI, space science, quantum computing, cybersecurity, optimisation and environmental modelling (e.g., weather, finance, epidemics, and natural disasters). Despite their critical role in scientific discovery and technological advancement, Australia lags behind nations such as the United States, the United Kingdom and China, which have invested significantly in dedicated mathematical sciences research institutes. These institutes provide essential infrastructure for research, innovation and workforce development. To close this gap, AMSI proposes a National Residential Research Institute, with MATRIX ideally positioned to lead its development. MATRIX is a residential research institute that serves as a facilitator and incubator for emerging disciplines reliant on mathematical sciences, and key hub where academic and industry leaders collaborate to solve complex problems and drive innovation. Since 2016, MATRIX has hosted 88 research programs, attracting 2,100 scientists from 47 counties. However, it operates on limited funding, supported by five Australian universities and the Simons Foundation, with only one ARC LIEF grant providing national funding. Sustained national investment and dedicated research infrastructure are essential to maintain and expand its impact. The need for such an institute is clear. Both the Decadal Plan for Mathematical Sciences (2016-2025) and the Australian Academy of Technological Sciences and Engineering (ATSE) Pre-Budget Submission (2025-26) highlight the importance of strengthening Australia's mathematical research capabilities. A MATRIX-led institute will: • Serve as a hub to connect academia, industry, and government. • Drive collaborative research to address national challenges. • Develop a highly skilled workforce to meet future demand. • Position Australia as a global leader in mathematical sciences. Funding will enable MATRIX to expand its operations, increase research programs and strengthen international collaborations. A significant portion of the investment will support large-scale research initiatives that address global challenges, enhancing Australia's role in solving critical scientific and technological issues. A National Residential Research Institute for the Mathematical Sciences will provide vital research capabilities across multiple sectors, driving innovation, industry collaboration, and economic growth. By advancing research and strengthening partnerships between academia, industry and government, this investment will ensure Australia remains globally competitive and well-prepared for emerging challenges and opportunities.

Q36.

Part 3: Industry perspectives

This section is seeking input specifically from industry-based respondents. Other respondents can skip this section.

Recommendation 6 of the 2021 Roadmap related to improvements in industry engagement with NRI. To complement work on this topic that has occurred since then, we are seeking additional advice on NRI requirements as perceived by current or potential industry-based users.

Q37.

3.1 Have you (or your organisation) interreacted with or used Australia's NRI?

- ○ Yes
- ◉ No

Q38.

3.2 If so, please briefly outline the NRI capabilities you (or your organisation) have interacted with or used. Do not limit your response to NCRIS capabilities.

This question was not displayed to the respondent.

Q39.

3.3 Please indicate your (one or more) primary reasons for interacting with NRI:

This question was not displayed to the respondent.

Q40.

3.4 If you answered no, please indicate your (one or more) primary reasons:

- ☐ I did not know about it
- ☐ Other facilities suit my needs better
- ☐ I would like to, but cannot get access due to geographical location
- ☐ I would like to, but believed that access was only available to academic researchers
- ☐ I am not aware of any capability that meets my needs
- ☐ Other (please specify) [ ]

Q41.

Part 4: Other comments

4.1 Please elaborate on any of your above responses or add any other comments relevant to the development of the 2026 Roadmap. Your response can include reference or links to existing reports that you recommend be considered during the 2026 Roadmap development process.

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