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

Curtin University has been actively involved in advancing critical minerals research and infrastructure in Western Australia. The university's investment of over $60 million in critical minerals characterization, processing, and downstream value-added research has culminated in a significant proposal under the Modern Manufacturing Initiative (MMI). This proposal, in collaboration with various mining companies and the Future Battery Industries Cooperative Research Centre (FBICRC), which Curtin hosts, aims to establish a "Kwinana battery chemicals and materials hub." This hub includes a $20 million multipurpose, multi-user research infrastructure for battery metal and mineral processing, addressing a critical gap in Australia's mineral refining and manufacturing capabilities. Recognizing the importance of such initiatives the Western Australian Government recently announced a joint $3 million investment in February 2025 to support a feasibility study for a common user Critical Minerals Advanced Processing (CMAP) Facility in Western Australia. Led by the Minerals Research Institute of Western Australia (MRIWA) this feasibility study is jointly funded under the $10.2 million Critical Minerals National Productivity Initiative. This study is a step towards enhancing the state's critical minerals processing capabilities. Additionally, the Kwinana-Rockingham Strategic Industrial Area is emerging as a globally significant battery material hub, with land secured for Australia's first proposed integrated battery material facility. This underscores the region's potential in critical minerals processing and sustainable resource development. Given these developments, national support for a facility in Western Australia dedicated to critical mineral research and processing appears warranted. Such support would align with the strategic research investment areas identified within the challenges and capabilities framework set by NCRIS.

Q22.

Food and Beverage

Q23.

Medical Products

In recent years there has been notable shift towards analysing mouse physiology utilising organ-on-chip technologies and computational modelling, suggesting that animal testing facilities may become less essential. However, animal testing remains indispensable in many areas of biomedical research particularly in fields where alternative models cannot fully replicate complex biological systems. To support the increasing complexity of biomedical research the National Imaging facility (NIF) requires continued funding to expand these capabilities and maintain Australia and the forefront of translational medical research.

Q24.

Defence

Q25.

Recycling and Clean Energy

Curtin University is at the forefront of strengthening Australia's battery manufacturing capabilities through its leadership in the Cathode Precursor Production Pilot Plant (C4P). Located at the university's Bentley campus, C4P is the first facility of its kind in Australia, designed to establish the technology and expertise needed to develop cathode precursor manufacturing at a commercial and industrial scale. Launched by the Future Battery Industries Cooperative Research Centre (FBICRC), C4P represents a major milestone in Australia's battery value chain. The facility focuses on producing precursor cathode active materials (pCAM)—a critical component of lithium-ion batteries, particularly for electric vehicles. By advancing local manufacturing capabilities, this initiative strengthens Australia's ability to capture greater value from its mineral resources, moving beyond raw material extraction to high-value battery production. Given its national importance and alignment with key research priorities, C4P is well-positioned to benefit from future NCRIS funding, enabling expanded research infrastructure, deeper industry collaboration, and cutting-edge advancements in battery materials and energy storage technologies.

Q26.

Space

Curtin University is directly involved with a number of NCRIS capabilities, including most notably Astronomy Australia Limited, AuScope, and Pawsey Supercomputing Centre. These Curtin partnered NCRIS platforms are exemplified by major initiatives such as Murchison Widefield Array (MWA) and the upcoming Square kilometre Array (SKA), highlighted in the forward of NRI survey. Investment in Australia's fleet of precursor telescopes for the SKA project remains essential to sustain national and international leadership in radioastronomy and data-intensive astrophysics. These investments should be maintained until the SKA enters full-scale operations, ensuring that Australian astronomers have continued access to observing time and data at a levels that exceeds the current precursor capabilities. In particular, the Murchison Widefield Array (MWA), the only Australian precursor that is relevant to the component of the SKA being built in Australia, should remain supported until the SKA-Low telescope enters operations and can routinely exceed the MWA's varied scientific capabilities currently in use by Australian and international astronomers. The MWA has built and supported Australia's SKA scientific community since it commenced operations in 2013 and it is critical that this community is supported in the transition from SKA precursors to the SKA itself. An approximate expected timescale for this transition to be complete is the end of the decade. Currently the MWA is supported via NCRIS until mid-2027, so the completion of the MWA's precursor mission will require another approximately 2.5 years of support to reach the end of the decade.

Q27.

Environment and Climate

The Centre for Crop and Disease Management (CCDM) is a collaborative research initiative between Curtin University and the Grains Research and Development Corporation (GRDC), established in 2014 to mitigate the economic impact of crop diseases on the Australian grains industry. As a partner in the Australian Plant Phenomics Network (APPN), CCDM enhances its capacity for advanced plant research, genetic testing, and phenotyping, significantly contributing to agricultural innovation, crop resilience, and sustainable farming practices. Additionally, CCDM utilizes mobile crop phenotyping units, enabling real-time, field-based assessments of plant health and disease resistance across diverse environmental conditions, further strengthening its role in adaptive and precision agriculture research. The lack of a Western Australian (WA) node within the Australian Plant Phenomics Network (APPN) represents a significant gap, particularly given WA's strong capabilities in agriculture and plant science research, as well as the critical role of the WA farming industry in Australia's agricultural sector. In collaboration with The University of Western Australia (UWA), Curtin University has formally proposed the establishment of a Plant Phenotyping Facility encompassing industry standard greenhouses, along with our current mobile phenotyping units, to address key challenges facing farmers, including climate change adaptation, crop management, and advanced breeding strategies.

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

We believe that there is one main area for potential investment that has been overlooked – the development of Advanced Manufacturing and Improved Supply Chains. Our original suggestion in the 2021 survey emphasized the ongoing need for modern research infrastructure coupled with secure data linkage capabilities to evaluate additive manufacturing and certify new additive manufacturing materials and parts. For example, on a basic level this research infrastructure would allow on the spot evaluation of metallurgical properties of metal parts and determine their resistance to corrosion and expected time of replacement. Such capabilities are absolutely critical to both industry and Defence sectors in Australia. Linking this to NCRIS would foresee the development of digital manufacturing testbeds connected to materials testing facilities and research labs, facilitating breakthrough in areas such as bio-based circular economy materials (reducing reliance on finite resources) or AI-powered cyber-secure digital manufacturing to ensure critical industry supply chains. This would permeate through the development of a highly skilled technologically and proficient workforce positioning Australia as a secure and technologically resilient nation. Curtin University is a strategic partner in new initiatives to develop a Henderson Build and Sustainment Research and Innovation Hub, a cutting-edge facility supporting naval shipbuilding and sustainment through pressurized seawater testing tanks (corrosion and biofouling research), additive manufacturing, materials science, and RFI/EMC facilities. By co-locating research, testing, and certification capabilities, this hub would foster faster innovation, streamlined certification processes, cost reductions, and enhanced fleet readiness, benefiting both Australia's defense sector and AUKUS partners. A research consortium bringing together university expertise with primes and SMEs aligns with key NCRIS research themes, including additive manufacturing and rapid prototyping for on-demand ship component fabrication, advanced materials science to develop corrosion-resistant alloys, composites, and coatings, electromagnetic shielding and signal integrity validation for secure naval communications, and a high-pressure seawater testing facility providing real-world environmental simulations for naval infrastructure durability. Expanding NCRIS investment in this hub would provide a national platform for cutting-edge naval research and advanced manufacturing, ensuring sustained technological leadership, greater integration with sovereign defense priorities, and long-term industry benefits. National funding would enable scalable infrastructure, workforce development, and cross-sector collaboration, reinforcing Australia's strategic position in naval innovation and defense resilience.

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.

Long-term resourcing for high-quality research software has been highlighted globally as a missing, but key requirement for the success of the entire research ecosystem. Furthermore, numerous reports have highlighted that this is a specialist domain requiring dedicated research software engineers working alongside domain experts to achieve the best and longest lasting returns on national research infrastructure investment. Countries like the Netherlands and UK have already invested in national research software centers such as the eScience Centre in Delft, (https://www.esciencecenter.nl/) and the Software Sustainability Institute which is distributed across three universities (Edinburgh, Manchester, Southhampton: https://www.software.ac.uk/) and more recently the German government has approved the creation of FutuRSI - a service organization for research software engineering with distributed teams in 5 institutions. All of these organisations provide a pool of research software engineers and data scientists that can be deployed via merit allocation to assist researchers nationally to create and maintain high-quality research software using the best possible practices. In Australia there have been smaller scale efforts to provide research software support including the Curtin Institute for Data Science which provides domain agnostic research software engineering and data science to research, academia and government, the Queensland Cyber Infrastructure Foundation (QCIF) which provides primarily digital infrastructure capabilities for research, industry & government but includes a software offering, the domain-specific Astronomy Data and Compute Service (ADACS) program operated by Curtin, Swinburne and Macquarie university on behalf of Astronomy Australia Limited, and the Australian Space Data Analysis Facility (ASDAF) operated by Curtin which provided research software to the Australian Space sector nationally. QCIF and ADACS are NCRIS funded but not at a national scale, ASDAF was nationally funded by Department of Industry Science and Resources (DISR) but only for 3 years before needing to move to a commercial model. It is clear there is a need for long-term funding for a distributed National Software Centre to provide merit allocated access to pools of research software engineers to maximize the return on investment in both research and research infrastructure in Australia. A distributed model as in the UK and Germany, similar to the structure of an ARC Centre of Excellence, combining the existing expertise across the country would be ideal. As we advance towards an era of unprecedented growth driven by AI and quantum computing, there is an urgent need for research infrastructure that supports a sustainable and intelligent future. This demands the development of highly energy-efficient, federated AI-optimized computing clusters capable of handling big data processing, deep learning models, and real-time simulations while minimizing environmental impact. By leveraging federated learning, this new infrastructure will comply with stringent data protection regulations, including patient privacy frameworks, thereby reducing risks while maintaining research scalability. Future research into synthetic biology and climate change modeling may also benefit in the long term from locally trained models, decreasing potential bias in their respective fields. To ensure AI scalability and security, the establishment of a dedicated NCRIS node may be warranted. These energy-efficient clusters will be essential for critical applications in health and national security, providing a highly secure, sustainable, and future-ready computational framework for advanced research and innovation.

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
- [x] Other (please specify) Not applicable

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.

We thank the NRI for acknowledging Curtin University's comments and for considering our recommendations. We look forward to reviewing the 2026 Roadmap draft and providing further input to support the advancement of Australia's national research infrastructure.