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

With improved extraction technologies developing, it is possible to effectively recover minerals of use from increasingly smaller concentrations in the raw material. When searching for these rare minerals however, detecting and confirming the presence of the target minerals requires improved sensitivity and efficiency. One of the instrumental pieces of technology used for this application is the Scanning electron microscope. Having sufficient national capacity will be essential going forward.

Q22.

Food and Beverage

Q23.
Medical Products

Q24.
Defence

Q25.
Recycling and Clean Energy

Q26.
Space

Many developments in the space sector are driven by development of new materials which allow us to save weight, or push the boundaries of what is currently possible to launch. The development of these materials relies on thorough characterisation. Electron microscopy is an essential part of robust characterisation of high performance materials, and has been instrumental in the advancement of aerospace technology, and will continue to be.

Q27.
Environment and Climate

Q28.
Frontier Technologies and Modern Manufacturing

For the development of novel materials as a solution to manufacturing problems or new technologies, high end electron microscopy is essential, as the nature of a material can often only be thoroughly understood with atomic level TEM imaging and analysis. There also mush be a sufficient amount of workhorse instruments available to screen samples and take care of more routine investigations. Electron beam sensitive materials are currently challenging to work with, and new advanced instruments are required to allow these materials to be analysed effectively. These materials are used in applications such as: energy generation and storage advanced alloys semi- and super-conductors quantum and optical devices flexible electronics smart materials space craft.

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

Advanged materials development is fundamental in the development of new solar cell or battery technologies, which are both going to be essential as we push towards a net zero future. The development of these materials required access to advanced microscopy for characterising and truly understanding these materials.

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

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.

The success of Australia's advanced microscopy infrastructure depends on reliable long term funding. This ensures continuity of a long term skilled workforce, who can ensure these instruments are used well, and that the results and outcomes are of a higher standard. This also allows for planning and the ability to keep the equipment up to date and relevant. A microscope is often in service for a minimum of 10 years, and over it's life may receive several upgrades. Planning ahead for future upgrades and keeping workhorse equipment up to date and in a usable condition relies on reliable funding from LIEF/NCRIS

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:

This question was not displayed to the respondent.

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.

Microscopy underpins broad science disciplines, from medical, soft matter, plant, materials, agricultural and geological sciences, that require cutting-edge microscopy to address Australia's future research and industry needs. A significant uplift in advanced microscopy is urgently required across the country. The continuation of long-term investment (10+ years) in national research infrastructure, such as Microscopy Australia, is critical. A long-term, ongoing timeframe would ensure continuous high-level support for all Australian researchers from emerging early career researchers through to those in national flagship research programs, such as MRFFs, CRCs, ARC Centres of Excellence and Laureates, and NHMRC Investigator Fellowships. Interruption or stagnation of funding would have critical consequences for Australia's future. I most sincerely hope that Microscopy Australia is recognised for the fundamental underpinning infrastructure that it is and that the 2026 Roadmap recognises the critical need to increase funding to ensure continued research excellence by emerging and established Australian researchers. The 2021 Roadmap survey identified microscopy in the top 4 capabilities necessary for planned future use, but it was critically underfunded in NCRIS 2023. Microscopy Australia received just $12M of the total $650M uplift from NCRIS in 2023 (four-year timeframe). This is compounded by significant underfunding in electron microscopy with just $11M in ARC funding through LIEF (over four years). If the lack of investment continues, sovereign capabilities are at risk, and the potential impact for translation and prosperity won't be realised.