

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

Hyperpolarized (HP) gas MR lung imaging is an emerging pulmonary imaging technique that uses hyperpolarized inert gases (such as helium-3 and xenon-129) as contrast agents to provide structural and functional information about the lungs. The advantages of the hyperpolarized gas MRI is non-invasive and radiation-free, compared to traditional imaging methods like CT. It can not only display the anatomical information but also assess lung ventilation, diffusion, and other functions. HP MRI holds significant promise for the diagnosis, evaluation, and treatment monitoring of various lung diseases, including: chronic obstructive pulmonary disease (COPD), asthma, and pulmonary fibrosis. Specially, it is useful for lung transplantation in the assessment of graft function and monitoring of rejection. At Monash Biomedical Imaging, we developed a hyperpolarizer (Figure 1) based on the Spin-Exchange Optical Pumping (SEOP) method. We carried out ¹²⁹Xe MR imaging demonstrating that the polarization were sufficient for lung imaging (Figure 2). However, there are several challenges. The preparation of hyperpolarized gases is expensive, limiting widespread adoption. Specialized equipment and trained personnel are required. Some clinical applications are still in the research stage and require further clinical trials to validate their efficacy and safety. HP MRI is a highly promising pulmonary imaging technique that provides unique structural and functional insights into the lungs, offering significant potential for the diagnosis, evaluation, and treatment monitoring of lung diseases. As the technology continues to advance and costs decrease, it is expected to see broader clinical application in the future.

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

The capability of hyperpolarized gas MRI can help early diagnosis of lung diseases, assessment of disease severity, monitoring of treatment efficacy, evaluation of airway obstruction and guidance for personalized treatment, assessment of lung tissue damage and monitoring of disease progression, and assessment of graft function and monitoring of rejection for lung transplantation.

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.

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.

I am funded by national imaging facility fellowship.

Q39.

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

- ☐ For expertise or advice
- ☐ Access to research resources or products
- ☒ Access to equipment for research
- ☐ Access to equipment for operational reasons
- ☐ Help in translating research
- ☒ Access to data
- ☒ Support for clinical trials
- ☐ Other (please specify)

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.