**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

We use a range of imaging technologies, including X-ray, CT, PET, and MRI, to support research in mining and minerals processing. For example, NIF users apply PET and CT imaging to study liquid and gas flow in coal fractures, aiming to improve methane recovery during coal mining.

*Q22.*

## Food and Beverage

*Q23.*
## Medical Products

Biomedical imaging (MR, PET, CT, MEG) is essential for developing pharmaceuticals, devices, implants, and digital products. Demand is growing driven by AI-powered drug discovery, the mRNA vaccine pipeline, and MedTech. To accelerate biomedical research into medical products, Australia needs a strong imaging translation pipeline, supporting researchers from discovery (TRL1-2) and small and large -animal preclinical (TRL3-4) to first-in-human and clinical trials (TRL5-8) and commercialization (TRL9+). Priorities: Invest in industry-focused imaging staff and accreditation (ISO, GLP) to align with TGA and FDA requirements. Expand imaging infrastructure and radiochemistry labs, addressing capacity for preclinical (small and large animal) imaging (such as ultra-high field MRI and SPECT/CT), and replace ageing equipment (12+ years). Australia's size and regulatory framework make it a prime location for clinical trials. Expanding human imaging is essential to support this growing sector. Priorities: Invest in end-to-end imaging services for clinical trials. Expand imaging infrastructure to attract trials, address geographic gaps, and enable large multi-site studies. Enhance quality accreditation to attract industry-led trials. Imaging plays a vital role in developing new treatments for neurological diseases. Next-generation instruments—powered by advances in detectors, quantum sensing, and AI—will revolutionize brain imaging, spurred by global initiatives (e.g. US BRAIN). Priorities: Invest in next-gen brain imaging technologies (e.g., MRI, PET, MEG) and replace aging infrastructure (Australia's 7T MR nearing 15 years). Grow expertise in emerging imaging technologies. Molecular imaging uses nuclear isotopes to visualise biological processes in real time, playing a crucial role in understanding dementia, cancer, and other diseases. Emerging theranostics (imaging + personal therapy) are a new pillar of cancer therapy. While Australia excels in this field, expertise and facilities remain rare. Priorities: Expand radiochemistry expertise. Enhance sovereign radiochemistry infrastructure, including a dedicated cyclotron/accelerator for alpha and long-lived isotopes, plus next-gen PET/SPECT. Standardize radiochemistry laboratories for clinical trials. AI is transforming imaging by enabling faster, more accurate diagnoses and advancing research, leading to a higher demand for imaging. Clinical imaging data, generated daily across hospitals and clinics, is vital for understanding, diagnosing, and treating diseases. However, accessing this data for research remains a challenge. Priorities: Invest in AI, digital infrastructure, and digital twins for imaging. Establish digital infrastructure to provide research access to clinical imaging data, integrating it with other clinical data sources.

*Q24.*
## Defence

*Q25.*
## Recycling and Clean Energy

*Q26.*
## Space

*Q27.*

## Environment and Climate

*Q28.*

## Frontier Technologies and Modern Manufacturing

Biomedical imaging technologies (MRI, PET, CT, US) deliver functional, chemical, and structural data that cannot be obtained through other methods. These technologies are applied daily in healthcare, allowing research innovations to be quickly translated into patient care. In the next 5–10 years, emerging biomedical imaging technologies will significantly enhance capabilities: - Quantum sensing will revolutionize imaging with unprecedented sensitivity, resolution, and new imaging modalities. - Optically pumped magnetometers (OPMs) are already measuring human brain activity, while quantum-enhanced MRI will improve brain science and diagnostics. - Compact, wearable quantum imaging devices could enable continuous monitoring and open new medical applications. Imaging of components that have been manufactured using additive manufacturing (3D printing) to identify faults or stress, is an increasingly important field – and will be crucial to any national initiatives to increase precision manufacturing. Priorities: Grow expertise in frontier imaging technologies. Ensure Australia has the scale and capacity to monitor and invest in cutting-edge imaging advancements. Ensure imaging is included in new national initiatives in modern manufacturing and nuclear materials characterisation.

*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

Biomedical imaging is essential to Australia's NSRP's, playing a growing role in addressing health challenges. The National Imaging Facility (NIF) supports thousands of studies (ARC, NHMRC, MRFF) across cancer, mental health, neurology, cardiovascular disease, and beyond. The NSRP highlights that "new treatments, medicines and therapies will help the healthcare system to better adapt to and support our ageing population." Imaging enables earlier detection, precise disease tracking, and targeted interventions, improving patient outcomes. It is now indispensable for diagnosing, monitoring, and treating Australia's highest-burden diseases, including neurological disorders, cardiovascular disease, and cancer (Australian Burden of Disease Study, 2022). PET, CT, MEG, and MR imaging are key to disease monitoring and align with the NSRP's goal of "improved physical and mental wellbeing indicators." Imaging advances precision biomarkers, allowing researchers to track disease progression and treatment effects. For example, NIF supports over 50 long-term studies on depression, anxiety, and addiction, facilitating the measurement of mental illness and experimental treatments. Imaging also plays a critical role in preventive health, a key NSRP priority which calls for "improved preventive health through new screening, diagnostic and treatment techniques". Three of Australia's four national screening programs (breast, lung, melanoma) rely on imaging, with AI and emerging technologies further enhancing early detection, reducing healthcare costs, and improving patient outcomes. Imaging is instrumental in advancing precision medicine, aligning with the NSRP's priority to develop "therapies that use precision medicine to treat diseases." As an example, Australia leads in precision nuclear medicine, exemplified by the deployment of 68Ga-PSMA-11, a breakthrough prostate cancer diagnostic. National imaging infrastructure was pivotal in securing its inclusion in the Medical Benefits Schedule, ensuring nationwide access to this cutting-edge technology. Priorities: - Sustain an imaging translation pipeline to fast-track research from biomedical discovery to clinical application. Increase funding for new generation MRI (particularly ultra-high field MRI), PET, MEG, CT, SPECT, and radiochemistry labs. - Boost funding for imaging expertise to underpin research that leads to new medical products and improved clinical practice. Expand industry-focused imaging expertise to support clinical trials and commercialization in national health priority areas. - Fund initiatives to expand the availability of imaging data for research to create a data ecosystem for AI product development. Build digital infrastructure to ensure secure research access to clinical imaging data. Develop a national prospective digital biobanking strategy to improve reference data availability, support health research, and increase study productivity.

*Q32.*

## Elevating Aboriginal and Torres Strait Islanders knowledge systems

Imaging is a highly sensitive practice, and meaningful engagement with Indigenous researchers and communities requires policies that ensure ownership, control, and access to imaging data. This includes: Establishing clear protocols for the use, sharing, and storage of imaging data in ways that respect cultural sensitivities. Engaging Aboriginal and Torres Strait Islander leaders—including Elders, community representatives, and Indigenous researchers—early in research projects to embed data governance principles from the outset.

*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.

Digital population biobanks integrate genetic, imaging, phenotypic, and health data across a population sample, offering researchers secure access under ethical and legal guidelines. The UK Biobank, which has collected anonymized data from 500,000 individuals since 2004, is a prime example of how large-scale, well-structured biobanking can drive breakthroughs in epidemiology, genomics, public health, clinical research, and personalized medicine. Australian researchers are major users of this data, yet no equivalent national resource exists locally. To address this gap, a staged approach could be taken. The first step is strengthening national coordination and standardization of biobanking data, including digital and physical biobanks. Currently, biobank collections across Australia operate in a fragmented manner, limiting discoverability and accessibility. A coordinated, community-driven strategy would streamline standards and practices, making existing datasets more accessible and reusable through a central digital platform. This would improve efficiency and create a foundation for a more comprehensive system. The second step is investing in a national prospective population biobank, similar to the UK Biobank, which would provide essential normative data to support medical and health research. Such a resource would enhance the productivity of existing studies while enabling new research that is currently unfeasible. A national digital biobank would be an important national research infrastructure and is well aligned to the NCRIS principles. The NCRIS Health Group, and other NCRIS partners, would provide existing capacity and capability platforms to deliver this resource. An Australian national digital biobank would be an important data source for understanding unique Australian health challenges including those associated with a changing environment, indigenous health, and an ageing population.

*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.

*Q49.*
4.2 Optional Document Attachment.
Note: Our strong preference is that answers are provided against the relevant questions in the survey. However, this file upload option is available for submissions in file format, where needed. Please ensure the document includes your name or organisation.