

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

A range of imaging technologies, including X-ray, CT, PET, and MRI, are already used 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. Maximizing this capability is best achieved by repurposing biomedical imaging facilities, ensuring efficient use of high-resolution and multi-spectral CT equipment. Additionally, photon counting CT and next-generation high-energy X-ray systems will enable far improved 3D elemental analysis, creating significant research opportunities for the mining and materials industries while also supporting the developing nuclear industry.

Q22.

Food and Beverage

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. —The imaging translation pipeline— 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, and replace ageing equipment (12+ years). —Clinical trials to test future medicines— 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. —Translational neuroscience and neurology— 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. —New nuclear medicines— 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. —Fostering an AI imaging innovation ecosystem— 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. De-prioritisation o

Q23.

Medical Products

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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, PET, MEG, CT, 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

National Research Infrastructure should recognize the value of Indigenous knowledge in shaping health and wellbeing research. Future NRI investments must align with Indigenous Data Sovereignty principles, ensuring Aboriginal and Torres Strait Islander communities have control over their data. This approach respects cultural protocols and supports self-determination, in line with the Australian Government's Framework for Governance and Indigenous Data. 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

Biomedical instruments (CT, MRI) are increasingly used to digitize biological collections, including plants, animals, cultural artefacts and fossils, with demand for this capability rising. NIF facilitates access to digitized biodiversity data of Australian flora and fauna, and museum collections. Digitization offers key advantages by making rare and delicate specimens more accessible but also presents challenges in data management and storage. Additionally, it provides valuable public education and outreach, as seen with NIF's digitization of *Horridus*, the world's most complete triceratops, prior to its display at the Melbourne Museum. Recommendations: - An expansion of digitisation activities across Australia's collections sector will require a scale up of preclinical CT imaging instruments at key locations. These instruments should be integrated into Australia's advanced imaging network to ensure best practices, align with expertise, and maximize impact.

Q34.

Building a secure and resilient nation

X-ray, millimeter wave, thermal imaging, and facial recognition are critical imaging technologies for Australia's security. Major innovations are emerging at the intersection of AI and imaging, making continued Australian investment in expertise essential.

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.

—Skin imaging— Australia is advancing the development of a National Targeted Skin Cancer Screening Program, with Commonwealth funding allocated for a roadmap. Given the country's high melanoma rates, significant healthcare burden, and the potential for groundbreaking research, integrating skin imaging into national research infrastructure presents a timely and necessary opportunity. A national skin imaging capability would enable the development of reliable, evidence-based solutions to transform early melanoma detection, leading to: - Improved early diagnosis, reducing mortality rates and alleviating the financial strain on the healthcare system. - Enhanced treatment testing, supporting pharmaceutical advancements and personalized medicine. - Standardized screening processes, ensuring equitable access to high-quality skin cancer detection across diverse populations. - Greater diagnostic accuracy, minimizing both underdiagnosis (missed melanomas) and overdiagnosis (unnecessary procedures). —Digital biobanking— 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) interacted 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.

Describe current national infrastructure requirements that you anticipate will no longer fit the definition of NRI in 5-10 years: All NRI must be evaluated against attributes such as: - Leading edge research and innovation - Long term research, industry and societal impact - Support to realise national policy, and - National significance. In the imaging sector, stand-alone facilities that operate in isolation without national integration will become less relevant. Impactful research is increasingly driven by large-scale, multi-site studies requiring interconnected imaging networks, standardized protocols, and shared digital infrastructure. Facilities that do not contribute to a coordinated national framework will struggle to justify continued NRI status, as they fail to maximize their impact across research, industry, and healthcare. Similarly, aging infrastructure that lacks upgrades to cutting-edge capabilities will no longer meet the criteria for leading-edge research. For example, older-generation MRI, PET, and CT scanners – replacing these systems is a major priority.