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

One of the key challenges is the rapid deployment of bespoke diagnostics for the agriculture and food industries to ensure safe and sustainable food production. Improved capability can be achieved by leveraging and integrating existing ‘omics technologies. This will require the integration of multi-omics data across research domains. Deploying an ‘Omics to service’ model – supported by bioinformatics resources and dedicated translation teams – will fast track fast-track the development of bespoke diagnostic methods for industry adoption. This approach will accelerate time-to-market for new products, services and innovations ultimately driving job creation and economic growth for future generations. Fostering collaboration of highly skilled professionals across ‘omics capabilities and sensory approaches will strengthen services for emerging food producers and facilitate product development. Applications include new protein products, non-dairy dairy products, novel ingredients and future precision fermentation applications. The proposed enhancements to the Biobank of industrial and emerging microorganisms for food, beverage and agricultural applications will unlock further opportunities for commercialisation and value creation. Metabolomics, alongside other omics infrastructure, not only enables the discovery of new biomarkers for pest and diseases but also plays a crucial role in guiding national plant breeding programs through the translation of marker detection. Improved capability can be gained by leveraging and integrating existing ‘omics technologies. ‘Omics to service’ can be deployed to fast-track development of bespoke diagnostic methods for industry adoption (underpinned by ‘omics and bioinformatics resources) via dedicated translation team/s. This will address the opportunity to achieve faster time-to-market for new products, services and other innovations, creating jobs for generations to come.

Q23.

Medical Products

Q24.

Defence

The South Australian Metabolomics Australia node is exploring opportunities for augmenting DSTO’s analytical capabilities and providing research support under the Science Technology and Research (STaR) Shots strategy. This might include servicing research related to chemical, biological, radiological and nuclear (CBRN) threat environments; validating methods for detection, detecting and interpreting subtle variations in a human’s biomarkers caused by exposure to chemical or biological threats, and supporting advanced data analytics to draw accurate inferences from variations in biomarker signals.

Q25.

Recycling and Clean Energy

Q26.

Space

Q27.

Environment and Climate

Critical mass around ‘omics infrastructure including analytical technologies for metabolomics and/or sequencing technology for genomics-based diagnostics will become more important over the next 5 to 10 years to be proactively equipped for the community to respond quickly to arising issues. The South Australian Metabolomics Australia Node will continue to support our clients and community in facilitating climate adaption for agricultural crops and mitigating the effects of wildfires and controlled burns. A key focus will be the functional characterisation of biological communities in soils, water, and plants using metabolomics approaches to complement and enhance information generated by conventional metagenomics approaches. The concentration of specialised expertise in key technological areas such as metabolomics, other ‘omics capability within the Bioplatforms Australia’s network provides a key national mechanism for the efficient mobilisation of staff and resources that can collaborate with industry during biosecurity or environmental crisis events. For example, the South Australian NCRIS facility, Metabolomics Australia, supported by Bioplatforms Australia, the South Australian State Government and The Australian Wine Research Institute, mobilised staff and resources quickly to collaborate with industry in conducting smoke taint testing of bushfire-affected samples and in supporting trials to help wine-grape growers better predict future smoke taint impact.

Q28.

Frontier Technologies and Modern Manufacturing

Bioplatforms Australia infrastructure is well positioned to be at the forefront of technological advancements in life science, spatial analysis, omics integration, synthetic biology, and supporting innovative product development in Australia. Data-driven manufacturing led by the integration of omics data into AI-driven predictive models to optimise production lines and reduce waste. The metabolomics and omics infrastructure provides the means to develop innovative technology for biomanufacturing and synthetic biology. Omics driven approaches will enhance precision fermentation, bio-based materials and production of high-value products or compounds (nutraceuticals, pharmaceuticals, probiotics). Pertinent to this development is the critical mass of skilled workforce in data science, mathematics, data engineering and bioinformatics, coordinated across domains. This will require enhanced/transparent pipelines for students entering or in our universities with clear pathways in industry directed work and/or involvement in projects of national importance that address our national agenda.

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

There are significant opportunities to transform national biosecurity diagnostics underpinned by 'omics data and standardised bioinformatics workflows through nation-wide led initiatives. 'Omics technology will help to address the impact of Chemicals of Emerging Concern (CECs) in our ecosystems and to assess PFAS toxicokinetics, bioavailability, and metabolic disruptions in key ecological receptors. These advancements are important for ensuring our food safety, protecting human health and supporting the regenerative future of our environment – going beyond sustainability.

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 rapid advancement of mass spectrometry, nuclear magnetic resonance, metabolomics, multi-omics, bioinformatics, and data science is reshaping the research and industry landscape. A critical gap exists in training and workforce development, which threatens the effective translation of these technologies into industry applications. While skilled graduates have foundational exposure to these advanced technologies, they often lack hands-on experience with mass spectrometry and metabolomics in industry-driven service environments. This results in a steep learning curve when transitioning from academia to industry, where the demand for professionals proficient in omics-based diagnostics, analytical workflows, and data interpretation is growing. To address this, existing NRI capabilities could be enhanced through a national training framework that integrates cutting-edge omics technologies with industry-driven service models. This initiative would bridge the gap between academic training and workforce readiness, equipping students with the skills needed to contribute to food safety, environmental monitoring, precision agriculture, and biomedical innovation. A coordinated national effort would enable research infrastructure to play a greater role in workforce development, ensuring Australia remains competitive in global research and innovation. Over the next 5 to 10 years, national investment is required to establish structured training pipelines, including internships, industry placements, and advanced hands-on training within existing NRI-funded facilities. This will accelerate knowledge transfer, support emerging research fields, and create a sustainable talent pipeline that aligns with national priorities in technology-driven agriculture, health, and environmental sciences.

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.