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

Q24.
Defence

Q25.
Recycling and Clean Energy

Q26.
Space

Q27.
Environment and Climate

From a perspective of plant and agricultural research in this area, one emerging trend is the large scale (field to ecosystem) monitoring and phenotyping of plants and soil. This is currently being done in some areas but would require more infrastructure nationally, especially to monitor large scale changes in agricultural production, plant productivity (in real time) and natural ecosystem change. these are crucial data for breeders, farmers, conservationists and environmental planning. The need for data analytics and AI for processing and modelling would have to go hand-in-hand with data acquisition, as would the technical support and training to underpin service and innovation in this area. On the micro-scale, there is a need for ongoing and expanded capabilities in high throughout phenotyping of microscopic plant traits that are underlying responses to climate change and yield potential under minimum resource input (i.e. for net zero agriculture).

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

Similar to the comments on Environment and Climate, transition to a net zero future would require large scale changes to agricultural practices (e.g. reduced fertiliser and pesticide input) that would need better long term capabilities in monitoring of crop performance and crop health through remote sensing technologies in the field.

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.

Related to the comments on need for the plant/environment/agricultural capabilities nationally in Australia, there are two main areas that need strong long term support to enable the kind of changes needed for the Australian agricultural sector to move forward and remain competitive: 1) Expansion of the Australian Plant Phenomics Network: the current network has only been expanded recently with 7 of APPN's 9 nodes currently being set up. Significant research outcomes will require a minimum of 5 year's additional funding to fully deliver significant outcome to Oz Ag and repay investment. 2) There is a need to strengthen staff training and expertise in the data analytics and modelling area, including use of AI for analysing more and more complex datasets from multiple phenotyping platforms. There needs to be an investment in trained staff as much as in the infrastructure itself. 3) The APPN is lacking activities in Tasmania, parts of Victoria and in northern tropical regions. As these areas are diverse in terrain and crop/native plant cover, infrastructure and analysis tools would have to be adapted. 4) There is a need for a national facility to monitor below ground phenotypes, e.g. in an expanded Lysimeter facility or large scale rhizobox monitoring facility with digital phenotyping tools. This is important because of the growing recognition that traits such as root architecture, root metabolites and the root-soil microbiome are important drivers of aboveground productivity. 5) Australia is facing increased crop and native plant disease pressure that requires remote monitoring, e.g. through spectral features reflected from leaves that are indicative of disease development. 6) Scaling from field robotics to drones to satellites would be an essential expansion of our capabilities in Australia. Again, this requires large scale national infrastructure, including software development, staff training, ongoing support and data analytics tools. Equally, there is a greater need for a well supported network of microscopy facilities that would allow high throughout phenotyping of traits at a cellular level, e.g. anatomical and cell-level morphological trait detection in plants, detection of fluorescent signatures from tissues as indicators of disease or stress from climate change. Increased capability to enable correlative and multimodal microscopy solutions for more complete, multiscale and integrated data from samples across the discipline spectrum, especially in the agriculture sciences. New developments in more integrated systems would enhance our ability to capture these types of data, and then to provide support for analysis of these complex data sets. We are currently lacking the infrastructure as well as trained staff to develop data analysis pipelines.

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.

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.

The continuation of long-term investment (10+ years) in national research infrastructure, such as the Australian Plant Phenomics Network and Microscopy Australia, is critical to get return on investment over the past yeras, to allow meaningful translation and engagement with industry and to ensure continuous high-level support for all Australian researchers from emerging early career researchers through to those in national flagship research programs. Interruption or stagnation of funding would have critical consequences for Australia's future, especially in the agricultural and environmental sectors. Training of a workforce capable of innovation and engagement with the next generation is equally important to support at a national level. The staff of these facilities are crucial for training students and passing on their expertise and enthusiasm for the science, in addition to their crucial role in maintaining and optimising the infrastructure.

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.