

NDRI Strategy Section-specific Responses

Please provide your view on the following statements.

Vision for future NDRI ecosystem A user-centric design (outlined in the "Vision for future NDRI ecosystem" section) is an appropriate foundation for Australia's NDRI ecosystem over the next 10-15 years.

- **Strongly agree**
- Agree
- Neutral
- Disagree
- Strongly disagree

Do you have any additional comments relating to the "Vision for future NDRI ecosystem" section of the Draft NDRI Strategy? Max 1000 characters.

The University of Sydney conducts research across all major fields, with our researchers effectively serving as consumers of the NDRI, and a significant cohort of our staff constituting a key component of the NRI.

We strongly agree that a user-centric design is an appropriate foundation for Australia's NDRI. However, we have reservations about whether the content of this strategy reflects user-centricity, or whether it is an iterative step that is incumbent-centric. Much of the focus of the strategy is targeted at data curation and secondary data use.

We RECOMMEND more attention be paid to the challenges in the primary research operations that result in data acquisition and data movement.

We also consider that agility and responsiveness will be a critical factors in the successful formulation and implementation of this strategy. The planning will benefit from expert-driven regular review processes and a courage and commitment to respond to technological advances.

Outcomes

The six Outcomes (identified in the "Outcomes" section) adequately capture the priority features of an Australian NDRI ecosystem that will meet the Vision (described in the "Vision for future NDRI ecosystem" section).

- Strongly agree
- Agree
- Neutral
- **Disagree**
- Strongly disagree

Do you have any additional comments relating to the "Outcomes" section of the Draft NDRI Strategy? Max 1000 characters.

Overall, the outcomes are directionally sound, however, the university believes there are missing elements necessary to deliver the required step-change.

We RECOMMEND further consideration of outcomes 1, 3, 4 and 6, as follows.

Outcome 1: Although frameworks are an essential foundation, comprehensive training programs and long-term career opportunities are needed to retain quality talent.

Outcome 3: There are unaddressed gaps in data acquisition and movement across governance boundaries. It can take 9 – 18 months to move data from hospitals to universities, significantly slowing down research and related impact. This strategy should address primary data access challenges, including for defence and government data.

Outcome 4: An Australian sovereign exascale compute roadmap with integrated software platforms ought be part of this fabric.

Outcome 6: As an extension to individual tools, integrated software workflows and platforms are essential.

Challenges

The identified Challenges (outlined under the headings for Outcome 1 to 6) adequately describe the major issues facing the Australian NDRI ecosystem over the next 10-15 years.

- Strongly agree
- Agree
- Neutral
- **Disagree**
- Strongly disagree

Do you have any additional comments relating to the identified Challenges? Max 1000 characters.

We agree with many aspects of the identified challenges but have concerns in the specifics, and RECOMMEND further considerations in challenges 1, 2, 3, and 4.

Challenge 1: We disagree with the second paragraph suggesting the challenge is limited to findability of training resources. The challenge must include NDRI staff career planning, progression, and support.

Challenge 2: We suggest explicit inclusion of the significant international private sector investment as a driver shaping the landscape of digital tools, workflows, and infrastructure. Examples include PyTorch, Kubernetes, and Large Language Models, and Generative AI.

Challenge 3: We suggest decoupling of FAIR usage from the challenge and inclusion of primary usage challenges in addition to those of secondary usage.

Challenge 4: Stating the challenge as “lack the expertise to identify suitable resources” is insufficient, we suggest “high-end resources do not exist in sufficient quantity to meet demand” as the core challenge.

Outcome 1. Underpinned by training frameworks for researchers and NRI workforce

The content in the "Underpinned by training frameworks for researchers and NRI workforce" section adequately presents the high-level information expected for this section of the NDRI Strategy.

- Strongly agree
- Agree
- Neutral
- **Disagree**
- Strongly disagree

Do you have any additional comments relating to the "Underpinned by training frameworks for researchers and NRI workforce" section? Max 1000 characters.

We disagree because there exist significant gaps in workforce planning for suitable skilled staff due, in part, to a lack of stable career opportunities and recognition. Beyond access to training resources or sustainable software, skilled staff will underpin the NDRI.

RECOMMENDATION

Attracting and retaining a capable NDRI workforce is essential to delivering training to our user community and it is well understood that RI competes against industry for expertise. We suggest a national program for career progression and recognition of RI professionals would strengthen this opportunity.

We recommend 'workforce planning and career support' become an additional Outcome (#7) in response to the urgent need to create sustainable career development pathways for the sector.

Outcome 2. Responsive to disruptive technological and societal shifts

The content in the "Responsive to disruptive technological and societal shifts" section adequately presents the high-level information expected for this section of the NDRI Strategy.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

Do you have any additional comments relating to the "Responsive to disruptive technological and societal shifts" section? Max 1000 characters.

We RECOMMEND that the strategy explicitly include reference to private sector investment in digital technologies for R&D as a known driver of technological change and as a source of expertise. The recent emergence of generative AI is a case in point.

We further suggest that targeted collaboration with US and EU government digital strategies for digital research infrastructure be included in the approach.

In the specific case of gen AI, we recommend sovereign compute capability, experts and derivative tools to enable our use of the highest impact research involving personally identifiable data and research IP including defence and industrial capabilities. Precarious geo-political dynamics together with our reliance on off-shore gen-AI solutions makes us vulnerable to be effectively cut-off from this increasingly critical technology. This vulnerability requires mitigation.



Outcome 3. Consistent in its standards for data collection, curation and access

The content in the "Consistent in its standards for data collection, curation and access" section adequately presents the high-level information expected for this section of the NDRI Strategy.

- Strongly agree
- **Agree**
- Neutral
- Disagree
- Strongly disagree

Do you have any additional comments relating to the "Consistent in its standards for data collection, curation and access" section? Max 1000 characters.

We agree that the rapidly increasing volumes of data being generated are a challenge. We note the emphasis on FAIR but consider that the gaps in governance, siloed systems, and data standards are key challenges around primary data access.

We agree with the statement that "data access in complex collaborative environments to be as open as possible, as closed as necessary" but wish to emphasise that this will require central infrastructure, not just frameworks. There needs to be national coordination on data storage, movement, and management with interoperability between NDRI, Universities, hospitals, and commercial partners.

We agree with the long-term archiving of nationally significant datasets in accordance with FAIR/CARE. We suggest an extension in shared decision-making with the healthcare sector and patients as well as governments.

Outcome 4. Integrated across levels of computing and data

The content in the "Integrated across levels of computing and data" section adequately presents the high-level information expected for this section of the NDRI Strategy.

- Strongly agree
- Agree
- Neutral
- **Disagree**
- Strongly disagree

Do you have any additional comments relating to the "Integrated across levels of computing and data" section? Max 1000 characters.

We do not agree that the integration should be limited to computing and data. A comprehensive view would include:

1) NDRI as a fabric that spans instruments, sensors, clouds, HPC, informatics systems, AI systems, human systems, and data collections – all connected to international initiatives. We would suggest that the Strategy provide integration between cloud and edge computing in addition to Tier 1 & 2 HPC

2) Integration at the software level, with multiple levels of computing and data being seamless and invisible, to increase accessibility and allow researchers to focus on their fields of research

We RECOMMEND broadening Outcome 4 to “integrated across the NDRI fabric, and expansion of the role of edge computing for real time reconstruction, analysis, or AI inference, during operations of large data producing instruments.” We also recommend explicit inclusion of a green exascale compute roadmap to meet the demand high-end GPUs for emerging technologies such as generative AI.

Outcome 5. Cybersecure, particularly for national-scale data and computing

The content in the "Cybersecure, particularly for national-scale data and computing" section adequately presents the high-level information expected for this section of the NDRI Strategy.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

Do you have any additional comments relating to the "Cybersecure, particularly for national-scale data and computing" section? Max 1000 characters.

It is essential that our cyber platforms are secure. They also need to be user-friendly and meet the research needs and challenges.

With the aim to build alignment across systems, agencies, institutions, we suggest a standardized framework and definitions for what level of certification is required for different stratifications of sensitive research.

We RECOMMEND that trust and identity be addressed as issues that can cause barriers for researcher interaction with industry, the health sector, and international collaborations. We also advocate for training and implementation of the '5 Safes framework' for managing sensitive data.

Outcome 6. Maximised by openly available research software tools

The content in the "Maximised by openly available research software tools" section adequately presents the high-level information expected for this section of the NDRI Strategy.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

Do you have any additional comments relating to the "Maximised by openly available research software tools" section? Max 1000 characters.

We agree with the need to invest and support research software. We consider that this ought to extend beyond individual tools towards more comprehensive compute workflows and pipelines, providing seamless experiences to researchers. While individual tools are important, it is their integration into comprehensive ecosystems that allows research to happen. They should be enabled by secure national code repositories, linked with trusted research environments, with proper access controls, used by all researchers at all institutions for all training, research and collaboration.



We RECOMMEND that this outcome be changed to “Maximised by openly available research software tools, workflows, and platforms. We advocate for initiatives that bridge the short-term funding cycle that presently underpins the generation of research software. Approaches such as Continuous Integration Continuous Delivery (CICD) could be explored, and a process for allocating national infrastructure for secure software development and distribution could be devised.

NDRI Strategy Overall Response

Overall, the presented NDRI Strategy will help shape a future Australian NDRI ecosystem that meets the rapidly growing demands of researchers and other users for increasingly complex digital tools and services.

- Strongly agree
- **Agree**
- Neutral
- Disagree
- Strongly disagree

Please write any additional comments or feedback that you may have relating to NDRI Strategy overall. Max 1000 characters.

The operationalization of this strategy will require careful attention to the issues around and gaps in data custodianship, governance, and security. These are set to become increasingly complex issues for researchers and have the potential to serve as barriers to collaboration with (e.g.) the medical, defence, and commercial sectors. Finally, we further emphasise active monitoring, engagement and relationship building with the NDRI approaches being developed internationally with those of the US, the UK, and Europe being particularly noteworthy.

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Please attach any supporting documents.