

SUBMISSION

Submission to the Department of Industry, Science and Resources

Submission on Australia's draft National Science and Research Priorities

29 September 2023

The Australian Academy of Technological Sciences and Engineering (ATSE) is a Learned Academy of independent, non-political experts helping Australians understand and use technology to solve complex problems. Bringing together Australia's leading thinkers in applied science, technology and engineering, ATSE provides impartial, practical and evidence-based advice on how to achieve sustainable solutions and advance prosperity.

The National Science and Research Priorities outline the critical role of research in tackling the nation's most pressing challenges over the coming decade, charting an ambitious, transdisciplinary research agenda. ATSE broadly endorses the draft National Science and Research Priorities and their mission-oriented approach. However, the structure could be strengthened by outlining a vision statement, and adding a new priority to highlight Traditional Knowledge (while ensuring Traditional Knowledge is woven throughout the other priorities). To enable implementation of the Priorities, ATSE urges the Australian Government to develop an investment plan, including increasing research funding to viable levels. This submission also puts forward suggestions for refinement of the Priorities.

ATSE makes the following recommendations to implement and strengthen the Priorities:

Recommendation 1: Elevate the Priority 'Building a stronger, more resilient nation' to be a vision statement.

Recommendation 2: Add a stand-alone Priority to celebrate Traditional Knowledge and Knowledge Systems in science, research and technology.

Recommendation 3: Increase research funding to 3% of GDP.

Recommendation 4: Develop a plan for how the Priorities will inform research investment.

Recommendation 5: Embed education and digital technologies as enablers and critical research areas for the Priorities.

Recommendation 6: Refine the objectives, aims and critical research of the Priorities to comprehensively reflect national strengths and challenges.

Rising to the grand challenges of our time

The National Science and Research Priorities outlay a mission-driven approach to the society that Australia aspires to be. The final draft Priority ('Building a stronger, more resilient nation') expresses a vision that the other three draft Priorities effectively feed into. ATSE believes the Priorities could be structured more effectively by pulling this Priority out as an overarching vision. The remaining Priorities then become grand challenges to be solved through the critical research paths.

ATSE also advocates adding a stand-alone Priority for Aboriginal and Torres Strait Islander Traditional Knowledge and Knowledge Systems. Embedding this perspective throughout the Priorities, as seen in the draft, is important. Traditional Knowledge, including in health, ecology, and environmental management, can enable execution of the Priorities. ATSE recommends that in addition to integrating this throughout the Priorities, a stand-alone Priority would underscore the important role and potential of Traditional Knowledge in Australian science and research, build respect for Traditional Knowledge, and provide a signal to funding bodies.

Recommendation 1: Elevate the Priority 'Building a stronger, more resilient nation' to be a vision statement.

Recommendation 2: Add a stand-alone Priority to celebrate Traditional Knowledge and Knowledge Systems in science, research and technology.

Increasing funding for research and development

The draft Priorities outline an ambitious research agenda to underpin high, sustainable standards of living into the future. Robust research and development across science, engineering and technology will be required to tackle the pressing challenges outlined by the Priorities, including reaching net zero emissions.

ATSE urges the Government to follow the development of the Priorities with a plan to resource Australian research and innovation. This must begin by lifting investment in research and development from current low levels. Australia's research expenditure is currently at a 14-year low of 1.68% of GDP – significantly lower than the OECD average of 2.74%. ATSE advocates for an uplift to research and development funding to reach 3% of GDP, to keep up with international competitors.

Recommendation 3: Increase research funding to 3% of GDP.

Investing in delivering the Priorities

Clarity is needed on how the Priorities will be applied to steer investment and maximise coordination and collaboration, without constraining progress by diminishing fundamental, curiosity-driven research. The Government must outline how independent and expert advice will be utilised to inform the national research agenda.

It is critical that this plan reflects the interdisciplinary nature of research, as reflected in the consultation document's diagram showing intersections between the Priorities (reproduced below). Siloed research risks failing to meet the challenges articulated by the Priorities. The plan needs to recognise the importance of collaboration. Collaboration enriches research and its translation to tackle the serious challenges we face (for example climate change, closing the gap, and microbial resistance), delivering better outcomes and faster impact.

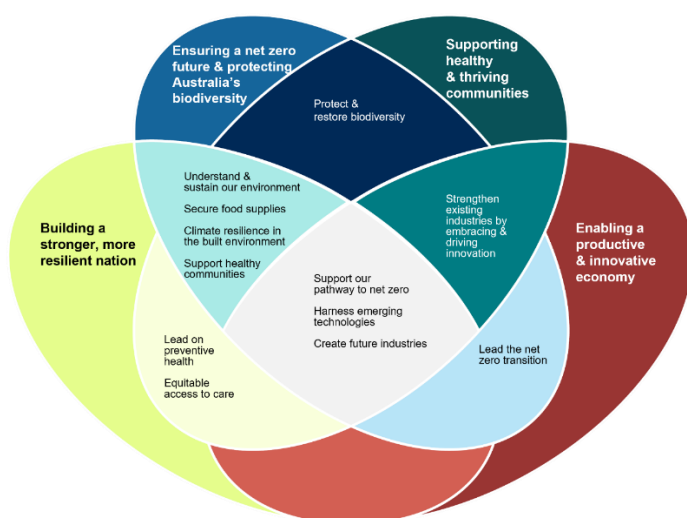


Figure 1: Overlap of the Draft Priorities and their objectives. Reproduced from Department of Industry, Science and Resources (DISR) consultation document.

International partnerships must also be embedded into the next steps for the Priorities. For example, there is an opportunity for Australia to work with the Indo-Pacific on energy, food and water security, as highlighted by ATSE's [submission](#) to the Conversation Starter. Strategic partnerships, including in our region, both strengthen national research capability and facilitate translation of Australian research.

Recommendation 4: Develop a plan for how the Priorities will inform research investment.

Highlighting enablers for the Priorities

Strengths in education and in digital technologies are required to unlock successful implementation of the Priorities.

The introduction to the draft Priorities notes that Australia's world-class education sector underpins its status as a sought-after science and research partner. ATSE recommends that the role of education should be woven into the Priorities. The education system – from early learning all the way to tertiary education, including lifelong learning – is the foundation upon which Australia's progress and prosperity are built. It is only through the education system that Australia will be able to foster the skilled workforce needed to implement the priorities. Innovation will be needed for the systemic changes to meet the needs of 21st century learners. This system can be strengthened by Government initiatives, such as the Universities

Accord, that look towards its purpose and future. Australian education is both an asset and an enabler for the environmental, industrial, and public health goals articulated by the Priorities.

Digital technologies are likewise an enabler for the Priorities. While some specific technologies such as Artificial Intelligence (AI) and robotics are called out, the draft Priorities miss the linkage between digital technologies and implementation of all Priorities. Data, computing infrastructure, digital skills, and enhanced productivity unlocked by advances in AI, are foundational to all four Priorities.

Both digital skills and education can also be highlighted as critical research areas as part of Priority 3 (Enabling a productivity and innovative economy) and Priority 2 (Supporting healthy and thriving communities) respectively, as outlined in the next section.

Recommendation 5: Embed education and digital technologies as enablers and critical research areas for the Priorities.

Refining the Priorities

The role of the critical research areas is unclear in their present form. Ensuring that the critical research areas for each Priority adequately reflect the Priorities' aims would help address this, as would articulating the role of these areas in future investment and prioritisation decisions.

In addition to the changes proposed above, ATSE recommends the following tweaks to the draft Priorities, to refine their purpose and direction:

Priority 1: Ensuring a net zero future and protecting Australia's biodiversity

- Strengthen the wording of the first objective "supporting our pathway to net zero" to "lead and accelerate the transition to net zero", signifying increased ambition. This objective is also largely repeated under Priority 3.
- Add an objective: "drive the uptake of new low-carbon technologies at scale (including ensuring social licence)".
- Amend the objective "understand and sustain our environment" to "understand and protect our environment (air, soil, and water)".
- Include new areas of critical research for sustainable fuels, decarbonising infrastructure, and accelerating negative carbon technologies. Research and development in these areas will be crucial to decarbonise high emitting sectors and should include achieving social license.

Priority 2: Supporting healthy and thriving communities

- Emphasise all dimensions of health by amending the objective "support healthy communities" to support healthy and resilient communities", and by amending the objective "ensure equitable access to care" to specifically include mental healthcare. This would also consolidate repetition under Priority 4.
- Add an objective for energy and water system resilience, and securing resource supplies.
- Incorporate a new aim for responding to infectious diseases, pandemics and antimicrobial resistance. These are expected to be of increased importance for public health over the coming decades.
- Add a critical research area for "educational systems and learning technologies that promotes equitable access, scalable solutions and enable lifelong learning".

Priority 3: Enabling a productive and innovative economy

- Highlight supporting advanced manufacturing as an objective, indicating its potential for sovereign growth and contributing to economic resilience.
- Amend the objective "create future industries" to "enable future industries and manage declining industries", reflecting the role of industry and governments in partnership in a changing economy. Managing the social implications of the necessary transitions will be important in achieving this priority.
- Add a critical research area for "harness innovation in data and computational science to improve productivity and growth".

Priority 4: Building a stronger, more resilient nation

- Promote this Priority to a vision statement.
- Integrate the objectives, aims and critical research currently listed under this priority into the other three Priorities.

Recommendation 6: Refine the objectives, aims and critical research of the Priorities to comprehensively reflect national strengths and challenges.

ATSE thanks the Department of Industry, Science and Resources (DISR) for the opportunity to respond to the consultation on the draft Science and Research Priorities, and thanks DISR and the Chief Scientist, Dr Cathy Foley AO PSM FAA FTSE, for incorporating ATSE's input throughout the process of developing the draft Priorities. For further information, please contact academypolicyteam@atse.org.au.