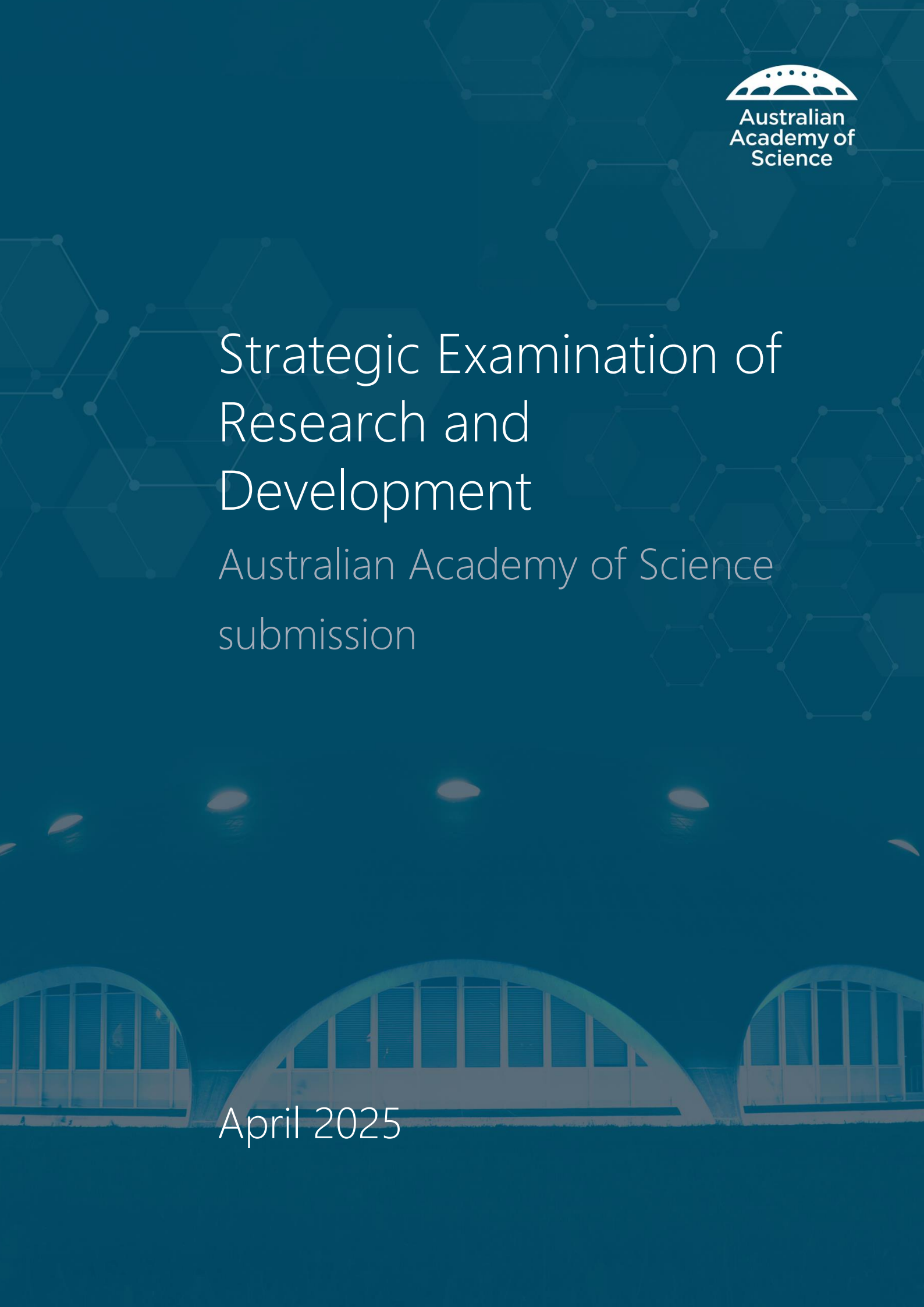


Strategic Examination of Research and Development

Australian Academy of Science
submission



April 2025



Australian Academy of Science submission to the Strategic Examination of Research and Development

Summary of recommendations

- The Academy recommends the advancement of radical ideas to create a new national R&D system model. We offer a model in the body of this submission.
- Introduce a business R&D investment incentive that applies to businesses with annual revenue of \$100 million or more.
- Set a national target for lifting R&D investment to levels competitive with peer nations and adopt a phased plan to achieve it, including new funding models such as a business R&D investment incentive.
- Rebuild Australia's investment in fundamental research to ensure a strong foundation for innovation and long-term national problem-solving.
- Change Commonwealth and State procurement policies to incentivise domestic R&D through a scaled-up Small Business Research Investment Incentive.
- Implement the principles of the UNESCO Recommendation on Open Science through national policy settings that mandate open access to publications, promote FAIR data standards, and support inclusive knowledge sharing.
- Establish a national metascience capability to evaluate and improve the performance, efficiency, and public value of Australia's research system.
- Urgently develop a framework to guide Australia's approach to international research collaboration to provide strategy, clarity and purpose to international engagement.
- Diversify and support our international science collaborations to serve Australia's long-term and strategic needs by committing to participation in international collaborative research alliances such as the Belmont Forum and Horizon Europe.
- Implement policy measures to strengthen Australia's science diplomacy architecture through mechanisms such as the Global Science and Diplomacy Fund and growing Australia's network of overseas science counsellors.
- Develop a 'raise, train, attract and sustain' workforce strategy to grow and embed STEM skills across the R&D system.
- Develop a long-term national strategy and roadmap to build national High-Performance Computing and Data capacity. The Academy proposes an investment of \$200 million a year over 10 years to support sector planning, deliver upgrades to current facilities and drive coordination and co-investment in a Tier-0 facility.
- Develop an AI investment plan to build national AI capability across the R&D system, including in fundamental AI science.



It's time to think big and bold

Research in natural and social sciences, medicine, mathematics, technology, arts, and humanities generates knowledge that serves the public good. Such knowledge deepens our understanding of the natural world and ourselves while fostering solutions that promote economic growth, strengthen national security, improve public services, enhance health and quality of life, preserve democratic institutions and protect the environment.

For nations like Australia to thrive, scientific research is crucial for generating knowledge and the skills to utilise it. Therefore, science must be central to government policy to ensure prosperity in our increasingly advanced scientific and technological landscape.

Yet in this, Australia is failing – placing our future as an advanced industrial society at risk. As the discussion paper articulates, we are underperforming as a country in valuing research and development (R&D), in recognising its pivotal role in economic resilience, in investing in R&D, and hence investing in ourselves, our future prosperity, and our future security.

The Strategic Examination of Research and Development needs to change our trajectory and make science, and the solutions it enables, central to the Australian Government's agenda and grand strategy to secure our place in the world.

To do this, we need to think big and bold. It is time to rethink the fundamental architecture of the Australian R&D ecosystem to enable partnerships to build scale, focus effort and change the way we do things.

Right now, Australia, as a nation and an R&D system, is bedevilled by immature, parochial thinking. We spread our effort and focus too thin, leading to fragmentation and ineffective impact.

The Academy recommends the advancement of radical ideas to create a new national R&D system model. We offer a model below.

Reimagining a modern, coordinated R&D system

National, multi-jurisdictional, multi-sectoral and multi-portfolio coordination across the system is required – we no longer have the luxury to wallow in our silos.

Drawing inspiration from Horizon Europe's partnerships model to leverage the European market, Australia could coordinate national funding through a unified national R&D system founded on co-investment partnerships in strategic areas of national importance to achieve scale and build national strategic capability.

A partnership model integrating state and territory governments into Australia's national R&D system is essential for enhancing coordination, leveraging regional strengths, and addressing diverse innovation needs. In 2022–23, state and territory governments accounted for 36% of all government expenditure on R&D. They play pivotal roles in sectors like health and foster regional innovation through initiatives like knowledge precincts that co-locate universities and businesses.

By formalising collaboration through a partnership model, Australia can better align national and regional priorities, optimise resource allocation, and drive innovation. A schema of this coordination model is presented in Figure 1 and described below.

A coordinated national R&D system

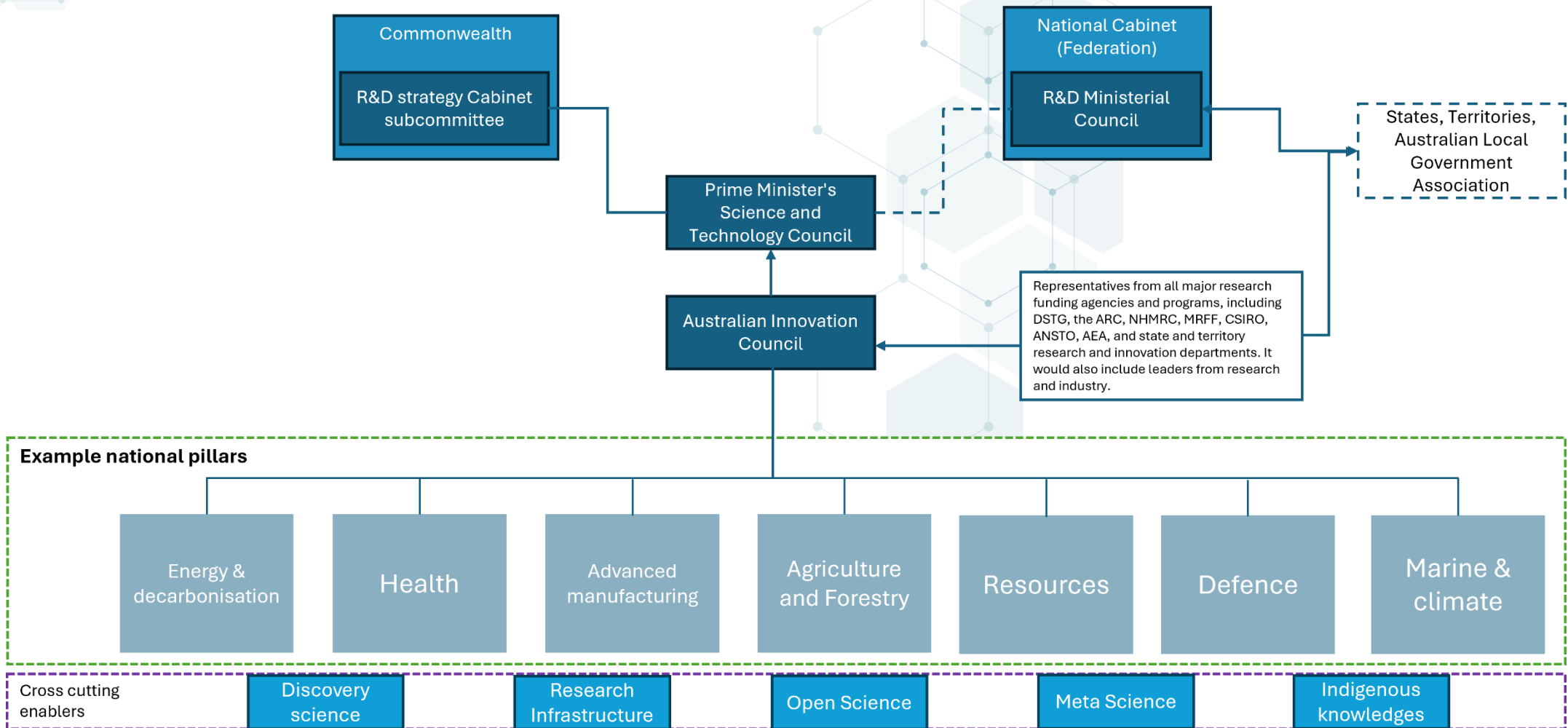


Figure 1 A model for coordination of Australia's R&D system, proposed by the Australian Academy of Science

1. An Australian Innovation Council

A dedicated Australian Innovation Council under the National Science and Technology Council—renamed the Prime Minister’s Science and Technology Council and established under the Department of Prime Minister and Cabinet—to coordinate representatives from all major research funding agencies and programs.

This council would serve as a collaborative forum bringing together representatives from major research funding agencies and programs, including Defence Science and Technology Group, the Australian Research Council (ARC), the National Health and Medical Research Council (NHMRC), the Medical Research Future Fund (MRFF), the Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australian Nuclear Science and Technology Organisation (ANSTO), Australia's Economic Accelerator (AEA), and state and territory innovation departments. Additionally, leaders from research and industry sectors, such as Chief Scientists, learned academies, universities, and peak bodies would be integral members.

The Australian Innovation Council’s primary functions include providing strategic advice on R&D policy and planning, including to a newly formed R&D Ministerial Council in National Cabinet, coordinating joint initiatives and logically sequencing funding to ensure continuity from discovery to application. For instance, a research project could progress from an ARC grant to AEA for translation and subsequently to industry and the National Reconstruction Fund for manufacturing. This integrated approach aims to minimise project attrition, maximise the impact of innovations, and create robust commercialisation pathways.

This governance would be supported by an R&D Strategy Cabinet subcommittee and an R&D Ministerial Council under the National Cabinet federation architecture, providing a jurisdictional forum for cooperation between the Commonwealth and State and Territory governments.

2. Introduce an R&D investment incentive applied to large businesses

Bold steps are needed to boost R&D funding to levels that - at the very least - keep Australia competitive, secure, economically resilient, diverse, technologically savvy, and able to deliver the benefits of R&D to the community.

Government investment in research is funded by taxpayers and is at historically low levels. This research generates knowledge that is used by the private sector for commercial purposes. Many companies have rightly and sensibly invested in R&D activities to innovate their businesses and to enable their success. Their engagement in R&D is rewarded via the R&D Tax Incentive, which provides targeted tax offsets that are equivalent to more than 40 cents for every R&D dollar.

The Academy proposes that businesses with revenue of \$100 million or more annually be levied a percentage using a methodology to be determined following a detailed analysis by the Australian Treasury. This levy would be used to fund research of strategic and national importance under this model. This research would continue to assist businesses in prospering and the community in benefiting in a virtuous cycle.

Levying is a commonly used revenue generation mechanism and is well accepted. For example, the Australian meat and livestock industry applies several levies, primarily on the sale of livestock. These levies fund various activities, including research and development, marketing, and animal health programs.

Similarly, the Australian Government applies agricultural levies. For example, levies are used on some grain crops for biosecurity and R&D.

The proposed levy must be directed to a research fund to support areas of national strategic importance. The fund must be governed and protected so that its use is specifically for research and knowledge generation purposes designed to contribute to



national strategic benefit. It should be the underpinning funding source to stimulate cross-jurisdictional collaboration in the coordinated R&D system presented above.

The discussion paper clearly states that there is a growing reliance on SMEs to drive business expenditure on research and development (BERD) in Australia, which contrasts with other advanced economies, where large companies primarily lead BERD. In Australia, large businesses have decreased R&D expenditure despite having built their success on it.

The proposed R&D levy addresses this and lifts the contribution of large businesses to Australia's R&D system. It also assists in lifting Australia's performance as a country that values R&D and recognises its pivotal role in productivity, economic growth and resilience.

Recommendation: Introduce a research levy that applies to businesses with annual revenue of \$100 million or more.

3. National pillars for co-investment

Another key feature of the proposed coordination model is establishing multi-jurisdictional pillars for co-investment across programs between federal and state governments, industry and research institutions. These pillars would focus on areas of strategic importance, such as clean energy, health, and defence, facilitating coordinated funding across federal and state governments, industry, and research institutions. The national pillars in Figure 1 are illustrative.

A robust governance framework would be necessary to integrate various portfolios (e.g., environment, health, agriculture, defence) to address complex challenges.

Distribution of the proposed research levy could be aligned with these pillars to enhance national benefits. State and territory governments would have the opportunity to bid for participation in specific pillars, allowing them to concentrate on areas that align with their unique strengths and strategic objectives.

This model would also allow Australia to offer leadership and become an R&D hub for our region, offering opportunities for regional partners to co-invest in our research pillars. This is similar to the Horizon Europe model, which allows partners to collaborate. Many projects require participation from multiple organisations and countries, which drives different disciplines and cross-border collaboration rather than competition.

In the Australian context, it also has inspiration from various City Deals developed under the former Australian Government, which fostered innovative, market-aligned urban development by aligning federal, state, and local governments with private sector participation.¹

The Australian Innovation Council would take responsibility for implementing the pillars and report on progress across the programs.

4. Elevate governance and leadership of R&D in Australia

To ensure R&D is prioritised at the highest levels of decision-making, it is recommended that the NSTC be repositioned within the Department of the Prime Minister and Cabinet, reflecting its cross-disciplinary advisory role. Furthermore, establishing an R&D Strategy Cabinet Subcommittee and an R&D Ministerial Council under the National Cabinet framework would provide dedicated forums for intra- and inter-governmental cooperation and strategic alignment.

¹ Pill, M., Gurran, N., Gilbert, C. and Phibbs, P. (2020) Strategic planning, 'city deals' and affordable housing, AHURI Final Report 331, Australian Housing and Urban Research Institute Limited, Melbourne, <http://www.ahuri.edu.au/research/final-reports/331>, doi: 10.18408/ahuri-7320301



Incorporating an R&D statement in the Federal Budget would further underscore the government's commitment to research and innovation. This coordination model would also require an open science policy, similar to that adopted by Horizon Europe, to ensure that knowledge isn't just created but also accessible and shared.

This new model would achieve:

- Greater alignment and cooperation between federal and state government investments
- Greater alignment and cooperation between federal portfolios
- Maintain a balanced portfolio across public and private stakeholders to support discovery, application, translation and commercialisation
- Avoid duplication and create scaled investment through strategic, impactful programs rather than the proliferation of short-term, ad hoc programs
- Facilitate mission-driven research aligned with national priorities
- Provide mechanisms for end users (e.g. industry, policymakers) to inform research agendas
- Support knowledge brokering and connection between parts of the R&D system
- Potential harmonisation of application processes for research funding
- Long-term strategic funding of national research infrastructure, with decision making closely connected to the science portfolio

The Academy welcomes further engagement with the Panel to design an appropriate model for the coordination of Australia's R&D system.

5. Define the roles of government, research organisations, industry, and philanthropy

For the proposed coordination model to function effectively, each actor in Australia's R&D system must have clearly defined roles, responsibilities, and incentives.

Governments should provide the long-term, strategic investment and stewardship required for foundational research and national infrastructure. This includes reforming procurement policies to act as a first customer for innovation and undertaking deliberate efforts to grow research capability in strategic areas, learning from models such as the Defence Advanced Research Projects Agency (DARPA) and SBIR in the United States.

Research organisations and universities—currently under increasing pressure from unstable revenue sources—require sustainable support for both fundamental research and talent development. A reformed funding architecture should ensure that universities are enabled to perform their dual roles as knowledge generators and training institutions.

Industry should be more effectively incentivised to translate knowledge into new products and services. This means targeting support more strategically so that incentives are encouraging new R&D activity. In particular, the R&D Tax Incentive should be evaluated and reshaped to prioritise experimental development, reward collaborative research with clear public benefit, and support career mobility between industry and academia. A rebalanced mix of tax-based and direct support could drive greater alignment between business R&D and national priorities.

Philanthropy should be cultivated as a partner in long-term, institutional research funding—not merely project-specific grants—helping to build system resilience and innovation capability. Models from leading global institutions show that philanthropic capital can sustain core capabilities aligned to national strategic needs.

To underpin a coordinated and modern research system, Australia should commit to implementing the principles of the UNESCO Recommendation on Open Science. This



includes establishing policies for open access to publications, FAIR data standards, and knowledge sharing that promotes inclusivity and transparency. An open science approach maximises the public value of research, accelerates discovery, and facilitates international collaboration.

In parallel, the Government should establish a national metascience capability to evaluate and improve the efficiency, effectiveness, and impact of Australia's research system. Metascience—the science of science—provides a critical evidence base to inform system design, assess funding models, identify structural barriers to collaboration and translation, and ensure that incentives align with long-term public value. Together, these measures would position Australia as a global leader in research excellence and integrity.

Finally, research performance assessment should shift from narrow, individualistic metrics to approaches that measure system-wide impact, societal benefit, and collaborative knowledge translation.

Recommendation: Change Commonwealth and State procurement policies to incentivise domestic R&D through a scaled-up Small Business Research Investment Incentive.

Recommendation: Implement the principles of the UNESCO Recommendation on Open Science through national policy settings that mandate open access to publications, promote FAIR data standards, and support inclusive knowledge sharing.

Recommendation: Establish a national metascience capability to evaluate and improve the performance, efficiency, and public value of Australia's research system.

Strengthening Australia's research foundations to drive national productivity

Research and development (R&D) is central to productivity, national resilience, and long-term economic prosperity. It underpins the capabilities Australians rely on every day—from advanced healthcare and biosecurity to clean energy, critical minerals, and emergency preparedness. Yet, despite its essential role, R&D in Australia is undervalued and underfunded, especially in comparison to global peers that are actively strengthening their research systems as part of their economic and strategic agendas.

Australia needs a coherent R&D system that supports the full spectrum of activity—from fundamental research to translation and development. Research and development are not the same activities, nor do they occur in a linear sequence. Basic research generates the new knowledge that underpins future innovation, while development applies this knowledge to real-world challenges. A high-performing system depends on both.

Governments have a unique role in providing 'patient capital' for high-risk, long-horizon research that industry cannot or will not fund. However, Australia's public investment has shifted steadily toward near-term translation and commercialisation, eroding the foundational research base that fuels long-term impact. This imbalance weakens the pipeline of discovery and undermines national capability.

If Australia is to compete globally and respond effectively to future shocks—whether geostrategic, environmental, or economic—it must reverse this trend. A system-wide shift is needed to elevate R&D as a national strategic priority, with deliberate investment to grow capability across all stages of research.

One mechanism to achieve this is a business R&D investment incentive, modelled on existing co-investment structures, to ensure the private sector contributes to and benefits from the national research system. This approach would grow overall



investment, embed a shared stake in outcomes, and support the development of a more sustainable and resilient R&D system.

Recommendation: Set a national target for lifting R&D investment to levels competitive with peer nations and adopt a phased plan to achieve it, including new funding models such as a business R&D investment incentive..

Recommendation: Rebuild Australia's investment in fundamental research to ensure a strong foundation for innovation and long-term national problem-solving.

Securing Australia's R&D capability in a contested world and strengthening national security

Australia's research and development (R&D) system must adapt to a complex global environment characterised by escalating geostrategic competition, warfare, climate change, pandemics, supply chain disruptions, demographic shifts, inequality, emerging technologies, democratic erosion, and the proliferation of misinformation. Given that approximately 97% of global knowledge is generated outside Australia, international collaboration is indispensable for accessing cutting-edge research that allows Australia to advance technologically, share infrastructure, and address transnational challenges.

The nation's current approach to mitigating risks in international research collaboration—focusing on collaborations with “like-minded” countries or restricting or blacklisting certain technologies—is inadequate in an era characterised by abrupt global shifts, where a reliable partner may become unpredictable, or where it is imperative that Australia access high quality research done by nations that may be seen as adversaries. Many technologies, particularly platform technologies such as artificial intelligence and gene editing, are dual-use, and nations and institutions can simultaneously be collaborators, competitors, or adversaries in different contexts.

Australia requires a framework and strategic approach to guide international R&D collaboration. In fact, Australia has operated without an international research engagement framework since 2010. This is not strategic in the current geopolitical environment we operate in.

Australia must remain vigilant to global signals and shifts with significant implications for its citizens, fostering a responsive and adaptable R&D system. Policymakers should consider how Australia can shape its international collaborations to align with long-term strategic goals, respond to global shifts in knowledge and infrastructure distribution, and increase private sector investment.

In the medium to long term, Australia can implement policy measures to expand the geographic footprint of its international R&D collaborations with responsible countries and elevate our presence in international forums. This includes engaging in collaborative research alliances such as Horizon Europe and the Belmont Forum; leveraging the framework of the successful Global Science and Technology Diplomacy Fund and extending it to more countries; expanding Australia's science counsellor network to build relationships globally, recognising the role of science and technology in diplomatic efforts; and deepening ties with India and Japan through the Quad partnership.

Recommendation: Urgently develop a framework to guide Australia's approach to international research collaboration to provide strategy, clarity and purpose to international engagement.

Recommendation: Diversify and support our international science collaborations to serve Australia's long-term and strategic needs by committing to participation in international collaborative research alliances such as the Belmont Forum and Horizon Europe.

Recommendation: Implement policy measures to strengthen Australia's science diplomacy architecture through mechanisms such as the Global Science and Diplomacy Fund and growing Australia's network of overseas science counsellors.

Building a STEM-skilled workforce for R&D

Science, technology, engineering and mathematics (STEM) skills are fundamental foundations in our lives and our future. Science literacy is at the heart of almost everything we do and how we advance as a nation and a globe, from solving major problems to creating new businesses and jobs we haven't yet imagined.

In an increasingly competitive market, we cannot rely on attracting talent from overseas to fill our skills shortages – we must create an education and workforce pipeline to ensure that we have the skills base to support our R&D ambitions.

Enrolments in year 12 STEM subjects have been static in the past few years, and the total number of enrolments in mathematics subjects at all levels has declined.²

The number of domestic PhD students is declining, which is concerning, given that they represent 45% of Australia's research workforce. Incentives to study at a doctoral level are stymied by low-level financial support. An annual stipend of \$32,192 (in 2024) it is only slightly above the poverty line in Australia, and PhD candidates are excluded from key government benefits like Parental Leave Pay.³ This makes completing a PhD increasingly unfeasible for Australians facing cost of living pressures and is no way to develop skilled people who make a significant contribution to Australia's R&D capability.

A raise, train, attract, sustain R&D workforce strategy could help overcome the decline in STEM enrolments across all levels of education, increase recruitment of domestic and international students, develop the skills Australia needs across STEM areas, attract talent in areas of need and provide ongoing support to retain a skilled workforce. The workforce strategy should identify and address barriers to mobility that currently prevent STEM professionals from moving between the public and private sectors.

To further bolster our R&D system, Australia should also look to improve representation of STEM skills in leadership positions across industry. Only 3% of Australian directors have a STEM background.⁴ While executives and directors may not require specialist technical skills, an understanding of STEM enables leaders to make decisions about R&D, emerging technologies and sustainability in their businesses.

Australia must also continue its efforts to improve diversity across the R&D system, including implementing the recommendations of the Pathways to Diversity in STEM review. The benefits of a diverse workforce to innovation are well documented. Australia needs all available talent, and barriers to participation in science and research must be eliminated to create safe, respectful workplaces that enable people to flourish.

Recommendation: Develop a 'raise, train, attract and sustain' workforce strategy to grow and embed STEM skills across the R&D system.

² Marchant, T., & Kennedy, S. (2024). *Year 12 Mathematics participation report card: Mathematics Enrolments Remain at All-Time Lows*. Available at <https://amsi.org.au/?publications=year-12-mathematics-participation-report-card-mathematics-enrolments-remain-at-all-time-lows> accessed 07/04/2025

³ *Investing in PhD candidates in Australia*. (2024). Available at <https://universitiesaustralia.edu.au/wp-content/uploads/2024/12/Investing-in-PHD-Candidates-in-Australia.pdf>

⁴ Australian Institute of Company Directors, 2019, *Driving innovation: the boardroom gap*, <https://www.aicd.com.au/innovative-technology/disruptive-innovation/sustainable-technology/driving-innovation-the-boardroom-gap.html>

Preparing Australia's R&D system for the future of artificial intelligence and supercomputing

High-performance computing and data (HPCD) and artificial intelligence (AI) are disrupting and transforming scientific research worldwide by augmenting science capabilities and accelerating discovery. The future of our R&D system relies on our how prepared we are to take advantage of opportunities presented by advances in these technologies and take a strategic approach to ensure Australia can collaborate and compete globally.

Bringing Australia's supercomputing up to speed

Australia has no plan for the next generation of supercomputing or to replace the supercomputing infrastructure we currently rely on. Without a national strategy to acquire and sustain next-generation HPCD, Australia's sovereignty, security, innovation capability, and ability to tackle societal challenges will be at risk.

Supercomputers are essential infrastructure for Australia's future, driving R&D effort and economic growth. Their ability to rapidly analyse large datasets enables vital capabilities such as climate modelling for adaptation strategies, cyber threat detection, discovery of new drugs, development of quantum computing and AI, logistics planning for supply chains, and responses to extreme weather events and public health crises.

Australia's current petascale HPCD capacity is oversubscribed and ageing, unable to support the growing demands of modern science and society's challenges. Data-intensive research requires faster, scalable systems to process massive datasets and run high-resolution simulations. The expansion of HPCD capability also offers opportunities for innovative industry-research collaborations.

Our international peers are already operating or planning for exascale HPCD capabilities and beyond. The Academy's fact sheet, *Bringing Australia's supercomputing up to speed*, provides further information and case studies for HPCD.

Recommendation: Develop a long-term national strategy and roadmap to build national HPCD capacity. The Academy proposes an investment of \$200 million a year over 10 years to support sector planning, deliver upgrades to current facilities and drive coordination and co-investment in a Tier-0 facility.

Preparing Australian science for AI

AI tools are already essential to most scientific fields, improving efficiency and productivity across many disciplines. Australia must act quickly to steer the development and adoption of AI in our national interest, including the infrastructure, scientific knowledge and skilled workforce required to participate in AI R&D to boost economic productivity and innovation.

AI capability is intertwined with HPCD capability—access to onshore computing power is a critical enabler for adopting AI tools and advancing AI development. Without sufficient onshore HPCD capabilities and infrastructure, Australia's AI capability will be dependent on other nations, hindering scientific progress and our ability to tailor AI tools to Australian-specific challenges.

Recommendation: Develop an AI investment plan to build national AI capability across the R&D system, including in fundamental AI science.

Contact

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