The University of Sydney, submission in response to the Strategic Examination of R&D discussion paper, April 2025

Executive summary and recommendations

The University of Sydney welcomes the Government's Strategic Examination of Research and Development (SERD). Properly harnessing our research potential is crucial for our long-term prosperity, driving innovation, economic growth and diversity in Australian industry through the development of new technologies, products, and processes. The SERD provides an opportunity to establish bipartisan agreement on Australia's R&D ambitions. A consistent, all-of-government R&D strategy, funding and investment model is needed – one that targets 3% of GDP, provides policy stability, consolidates national priorities, and supports large-scale, high-impact investments.

University R&D has a broad and systemic translational impact which is already making significant contributions to the economy, society, and public services through existing partnerships with industry and government. An independent evaluation estimated that, in 2023, University of Sydney alone contributed $3 billion in research and development impact to the Australian economy[1].

Equally important is the role universities play in addressing national and global challenges, from climate resilience and sovereign capability to healthcare and infrastructure, where the primary benefit accrues not through commercial returns, but through improved public outcomes and long-term national resilience.

However, to achieve a dynamic, self-sustaining system that translates knowledge into impact through deep collaboration between universities, industry, and government, we need an R&D system that is fully supported across the the full Technology Readiness Level (TRL) scale.

The university sector, government and industry are the key contributors in Australia's R&D ecosystem, and our roles within it are interconnected but distinct. Australian universities excel at early-stage research (TRL 1-3), while industry and investors focus on the later stages where technologies are almost ready for the market (TRL 7-9). However, there is a gap in the middle stages (TRL 4-6). Little funding is available to universities to support our innovations as they progress through market validation, regulatory engagement, and testing in settings from a laboratory to a relevant environment, and industry is generally unwilling to invest unless risks are already mitigated.

In recent years, most universities have made efforts to support research with potential for market use, but without targeted support for this crucial phase, promising technologies often stall. We are keen to work with the Review, government and business to redress the current imbalance in the innovation ecosystem where basic research capacity is not matched to investment in translation.

Mechanisms are needed to better enable industry to meet this investment and to seize opportunities across all parts of the R&D ecosystem. Here we have provided a series of recommendations to improve the impact of Australia's R&D through deep collaboration between universities, industry, and government with robust infrastructure, sustainable funding, enabling policy and a skilled, adaptive workforce.

With our strong existing research base, Australia has the potential to be the best place in the world for translating our world-class research into real-world results.

Key points in this submission**:**

1) Securing the bedrock of Australian R&D (fueling basic and applied research, TRL1-3)

- Australian universities are major investors in R&D, but this depends directly on international student revenue. 33% of our R&D is conducted in universities, so a proposed cap on the international students would significantly reduce Australia's R&D as a proportion of GDP.

[1] *Economic impact of the University of Sydney 2006 to 2023*, ACIL Allen report to the University of Sydney, July 2024, pg 4.

- Research Block Grants should be reviewed to reflect the full cost of research. This change would reduce some of the above-mentioned dependence on income from international students.
- We support the sector push for the Australian Government to pursue Australia's participation in globally leading-edge research consortia and collaborations such as Horizon Europe.
- The National Critical Research Infrastructure Strategy (NCRIS) is now key to research in Australia. It requires ongoing support and a wholistic approach to capture infrastructure investments that are currently outside of the program.
- There is a gap in support for projects in the non-medical fields that are aimed at producing commercialisable IP (but at a stage that is not yet ready to attract industry co-investment). This is covered by Medical Research Future Fund (MRFF) for the medical domain. An equivalent is required for other disciplines.

2) Enabling pathways to impact (fuelling university-industry collaboration and translation)

- We support incentives to encourage industry-university collaboration and have provided a few examples of models that may provide this support, including by leveraging the National Reconstruction Fund.
- Industry PhD programs require finessing and incentives for industry to participate.
- We support a nationally coordinated approach to research infrastructure and innovation precincts, to maximise collaboration and the use of shared infrastructure.

3) National Strategy and policy setting

- Australia needs a National R&D Strategy. Mission-based funding could be distributed in areas of national interest or priority through a specific call for proposals.

4) A national approach to venture capital funding (bridging the translation gap, TRL 4-6)

- To make the most of Australia's world class basic research, and improve the translation to industry benefits, research commercialisation projects need access to investment funds that are willing to make the very first, very risky, early-stage investment (at an earlier stage than traditional venture capital). Federal pre-seed funding modelled on the Breakthrough Victoria approach would bridge this gap at a national level.
- To incentivise early-stage venture investment, we welcome approaches that de-risk venture capital investment for superannuation (and other investors), perhaps by providing structures that help absorb the impact where investments are made in start-ups that fail.

1) Recommendations to fuel the bedrock of Australian R&D (fueling basic and applied research)

Australia's universities are major contributors to the overall R&D ecosystem. At a sector level, it is estimated that universities contributed approximately 33 per cent of Australia's total R&D expenditure in 2021-2022[2]. Although, in theory, universities host research that is funded from external sources, we invest a great deal in supporting activity across the spectrum of basic, applied and translational research (TRL 1-3). In fact, a full 51 per cent of the ~$12 billion spent on Higher Education research across Australia comes from general university funds and this proportion is much higher for research intensive universities. At the University of Sydney, the total external income we receive specifically for R&D and research training purposes, including all grants, industry contracts and philanthropic support, is less than half our total research spend of ~$1.5 billion p.a.

Group of Eight (Go8) universities are responsible for 70 per cent of the research conducted by Australian universities, investing $7.7 billion annually[3]. However, they rely very heavily on income from international students to support their research and the Discussion Paper acknowledges this. Cuts to the number of students without addressing the funding shortfall will have a major impact on Australia's R&D output, an outcome that sits at odds with the Review's aim of addressing the current crisis in the Australian R&D ecosystem.

Chronic underfunding of the full costs of research by successive governments has led to the university sector having to utilise alternative sources of revenue to pick up this gnawing gap between what the Research Councils fund and the actual costs required to undertake the project. This pressure could be alleviated if the Research Support Program Block Grant is reviewed and funded appropriately to ensure that the full economic cost of doing research is met. This includes paying appropriate salary rates and not requiring co-investment by universities.

Australian universities are investing in innovation and applied research, but we are, and should be, about more than driving R&D. We welcome initiatives to strengthen research and industry sector collaborations, but it is vitally important that these do not come at the expense of supporting the vibrant ecosystem that generates basic research. Our universities are seen by industry as a national strength – particularly as a source of specialised talent, technical depth and cutting-edge infrastructure. Continuing to grow knowledge through discovery research provides the vital capacity building, in terms of talent, the pipeline of ideas, and enabling infrastructure that enables R&D and supports sovereign capability.

International experience consistently demonstrates that vibrant innovation ecosystems are underpinned by sustained national investment in fundamental research. Countries such as South Korea, Israel, and Germany offer compelling models. These nations have built globally competitive economies, not by focusing narrowly on commercialisation or applied research, but by recognising that excellence in basic science and foundational research is the engine that drives long-term innovation and technological leadership.

South Korea, for example, has invested heavily in both R&D infrastructure and university-based science, fostering close links between academic research and high-tech industry – particularly in semiconductors, telecommunications, and biotechnology. Israel has cultivated a strong culture of innovation through its dual focus on tech mission-oriented R&D and world-class basic science, resulting in a dynamic start-up ecosystem with global reach. Germany, meanwhile, has developed an ecosystem that balances rigorous fundamental research, anchored by institutions like the Max Planck Society and the Fraunhofer Institutes, with a highly collaborative industrial base, including its globally successful Mittelstand of innovation-driven SMEs. In each of these examples, the commitment to basic research has not come at the expense of economic impact; rather, it has been the foundation of it.

Australia must similarly recognise that sustained investment in curiosity-driven research is a strategic necessity. Without a strong and continuous pipeline of fundamental research, our innovation system risks becoming reactive, short-term, and disconnected from the frontiers of global discovery. Research that doesn't involve industry and benefits society by contributing to, for example, better health outcomes and making our communities safer and more inclusive, should be valued equally to research that contributes to industry growth and new commercial technologies.

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[2] *Australia's Research and Development (R&D) Intensity: A Decadal Roadmap to 3% of GDP*, Group of Eight (Go8) Universities Report to the Australian Government, 2024, pg 18.

[3] *Australia's Research and Development (R&D) Intensity: A Decadal Roadmap to 3% of GDP*, Group of Eight (Go8) Universities Report to the Australian Government, 2024, pg 5.

The role of international partnerships

International partnerships are also essential for the development of sovereign capability. We support the sector push for the Australian Government to pursue Australia's participation in globally leading-edge research consortia and collaborations such as Horizon Europe to support and diversify our international relationships. This is important because it opens up new opportunities globally and further integrates Australian businesses and researchers into R&D globally. Boosting Australia's R&D workforce through skilled migration will also support sovereign capability building, and the new National Innovation visa should include specific provision for the attraction and retention of high-quality international researchers. Currently, there is an opportunity to attract top talent from US institutions and a Commonwealth fund to support strategic hires would be instrumental to enabling this. Such a fund could support the relocation and start-up packages of recruits while institutions support the salary of the individual.

Infrastructure as a key enabler

NCRIS has played a pivotal role in establishing key research infrastructure and facilities across the country but has suffered from uncertainty on its longevity and funding. Many State Governments are investing in research infrastructure outside of a nationally coordinated effort. The Advanced Manufacturing Readiness Facility in NSW is one example. Competing RNA efforts in NSW and Victoria are others. A wholistic approach would generate scale and better leverage state investment (along with private and university contributions) to create a truly significant and integrated research infrastructure landscape. At a time when the ARC is considering the removal of a dedicated large infrastructure and equipment scheme, a well-funded, long-term commitment to NCRIS has never been more paramount.

2) Recommendations to enable pathways to impact through university-industry collaboration and translation

Impact is often narrowly interpreted as the creation of university spin-out companies or the licensing of intellectual property to private sector partners. While these are important pathways, and many of our recommendations focus on better supporting these pathways, it is also true that they represent only a fraction of the broader spectrum of commercial engagement. True impact also encompasses the role universities play in working directly with both SMEs and large companies to enhance productivity, embed innovation, and co-develop new or improved products and services.

Industry PhD programs

Industry PhD programs are effective mechanisms to cross-skill the future workforce and are valued by industry partners for the access they bring to new ideas and emerging talent. Most Australian universities have been actively engaging in industry Higher Degree Research (HDR) candidate programs, but industry engagement could be further enhanced by the government providing funding or other incentives for industry partners to supplement the cost of internships and research training. The National Industry PhD Scholarship scheme attempted to provide a vehicle to this end, but for the industry-linked component it is reliant on universities having Research Training Program (RTP) scholarships available and therefore does not help to build capacity. At present, the industry-linked component of the scheme is small and overly bureaucratic, and it replicates what many universities are already doing. As the Australian Council of Graduate Research argues, if each university were provided additional RTP scholarships designated for industry, they would have been able to achieve similar outcomes with far less administrative work and a lower overall cost per candidate.

Supporting precincts

Co-located research precincts that bring together researchers, students and businesses in a shared physical space are proving to be powerful engines for innovation. By embedding industry partners alongside academics and PhD students, precincts foster the co-design of research projects, strengthen talent pipelines, and accelerate the commercialisation of research. Many of Australia's top universities have embedded this model into their strategy, creating vibrant hubs of activity aligned to real-world problems and opportunities. A nationally coordinated approach to research infrastructure and innovation precincts, working with States/Territories and local government to coordinate existing programs and support to incentivise development of knowledge precincts would capitalise on the potential of these models to drive regional economic growth and national R&D outcomes.

Fuelling pathways to translation

Opportunity lies not just in scaling the commercialisation effort, but in resetting the policy and funding environment to drive much greater engagement between universities and Australia's industry base – including SMEs, which often lack awareness, capability, or incentives to partner with universities.

Revisiting policy, tax and funding mechanisms with a view to incentivising businesses to invest in R&D in Australia has been called out by bodies such as the Business Council of Australia (BCA) as key to enabling the change we seek at the scale that is required. In our view addressing the following areas that at a national level would shift the dial to rectify this imbalance and revitalise Australia's R&D landscape.

Australian Government funding for R&D is distributed by different Departments across a wide landscape of different schemes. These include, to name just a few examples, the Department of Industry, Science and Resources' Cooperative Research Centres Program, and the Department of Education's Australia's Economic Accelerator (AEA) and Trailblazer Universities programs. We support calls for consolidation of the many existing schemes to make them more accessible, and for us to better support them. Some schemes are well designed, but too small in scale to make a difference.

A peculiar feature of this funding landscape, and one that is of critical importance as we seek to boost the future of Australian R&D, is that very few mechanisms currently exist to support non-medical research that leans towards translation. That is, research that creates intellectual property (IP) that can be licensed or patented but does not yet have an industry partner willing to take the project forward. It is still difficult to find support for research projects that are aimed directly at commercialisation. Even the Australia's Economic Accelerator Program, which was designed to support university research commercialisation (through the TRL 4-6 phase), requires projects to be de-risked before an industry partner is willing to commit cash. Projects that have been derisked to this point may have proceeded without government support. The removal of the requirement for an industry partner contribution could incentivise industry to participate, even on risky projects. To be truly successful, support structures for commercialising university research require a different approach. The Israeli Innovation Agency has good examples of investment programs that provide non-dilutive resources for entrepreneurs and companies of all sizes and stages within Israel.

With a shift toward basic research for the new structure of the National Competitive Grants Program (NCGP), which proposes to abolish the Linkage Program and remove the recently introduced Industry Fellowships, there is a risk that we have no mechanism to support research that is directed towards producing patentable, commercialisable discoveries. The university sector has previously recommended establishing a translation fund similar to the MRFF but focussed on non-medical fields of research. This approach needs to be considered more seriously than ever to cover this emerging gap and deliver a pipeline of industry-relevant ideas, technologies and processes.

Another non-dilutive model that has been very successful in the US is the America's Seed Fund Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs. These programs invite university researchers or startup companies to develop innovative products and technologies to solve local problems, including for government agencies such as defence. Having the government as a first customer can support start-ups to secure other contracts.

Driving impact through mission-directed national research efforts

Mission-based funding can align research efforts with national needs. The UK's Grand Challenges, Japan's Moonshots, Canada's National Research Council, and Singapore's Artificial Intelligence Programme all focus on high-impact areas and align government, industry and researchers. These represent different blueprints for national investment at scale, that attracts co-investment and accelerates commercialisation.

In the current geopolitical climate, with increasing uncertainty, technological competition, and shifting global supply chains, the need for sovereign R&D capacity is more urgent than ever. Australia must have the ability to develop, adapt, and deploy critical technologies domestically, particularly in areas such as national security, health, energy, cyber infrastructure, and advanced manufacturing. These are domains where reliance on imported technologies or offshore expertise introduces strategic vulnerabilities. Universities are well replaced to respond to open calls for mission directed research projects that are tightly aligned with the specific needs of government, defence, and industry.

Removing barriers to collaboration

The existing barriers to industry and research sector collaboration have not improved over many years despite multiple policy initiatives. Stronger incentives for business are needed to unlock greater collaboration between business and the research ecosystem. The Go8 has previously recommended that the government leverage the Research and Development Tax Incentive (R&DTI) by offering businesses that qualify for the R&DTI, and enter into formal R&D collaboration with an Australian research institution, an additional equity or debt finance incentive from the National Reconstruction Fund. BCA has similarly recommended implementation of a Collaboration Premium to encourage collaboration between the industry and research sectors:

- Establish a 20% premium of the RDTI for industry collaboration startups, public research organisations and universities
- Target support to partnerships that accelerate early-stage commercialisation and leverage complementary strengths across the innovation system.

Alternatively, government funding to industry could be contingent on businesses spending an agreed percentage of that funding on educating students via PhD internships or work integrated learning, engaging with university researchers, or otherwise contributing to building our knowledge economy in association with our higher education sector. There is also a need to cultivate and encourage a culture of high-risk, long-horizon R&D in the business sector by reforming corporate governance to include innovation expertise and providing low-interest loans to businesses undertaking experimental research.

Government could also be an exemplar of university collaboration by procuring R&D services primarily through university and other research organisations. With such an array of deep research talent, it is surprising at the least that Governments do not turn to universities more often to commission research, for consulting needs, for policy work and for related activities. As the Accord's final report put it (Recommendation 25a): *Australian governments lead by example in the use and uptake of Australian research and innovation and develop processes to draw heavily on the research and consulting capacity and capability of Australia's universities and publicly funded research agencies in addressing acute and stubborn economic, social, health, climate and environmental challenges*.

Philanthropy as a powerhouse to drive greater investment in R&D

The University of Sydney is the highest philanthropic-generating higher education institution in Australia, with a proven track record of mobilising private capital to support world-leading research. Philanthropy has played a crucial role in funding both fundamental and translational research at the University, as demonstrated by initiatives such as the Sydney Mathematical Research Institute, the Charles Perkins Centre and the new Snow Vision Accelerator.

Philanthropy is uniquely positioned to fund high-risk, high-reward research that traditional funding sources, such as government and industry, may be hesitant to support. Mission-based funding, an approach increasingly favoured by philanthropic donors, aligns well with Australia's national priorities, particularly in areas such as biomedical research, artificial intelligence, and the net-zero transition.

A government-backed philanthropic matching scheme would create strong incentives for private capital to support R&D in critical national priority areas. Venture philanthropy is an emerging concept that has captured the interest of a range of donors, foundations, family offices and impact investors. It offers a promising avenue to blend philanthropic giving with scalable impact-driven research investments. In addition to valuable capital, this approach also engages supporters through strategic advice, networks and commercial expertise that prove invaluable for the translation of research.

Philanthropy can be a critical vehicle for moving capital directly to First Nations communities, allowing for self-determined research priorities and funding focus areas. Dedicated philanthropic streams for First Nations-led R&D should be developed to ensure sustained and meaningful investment.

To maximise impact, philanthropy should be embedded within a broader national strategy that encourages public-private collaboration. Clear policy settings, including tax incentives for philanthropic contributions to R&D, can help unlock further private investment.

The University of Sydney is uniquely placed to contribute to this national discussion. Our deep expertise in securing major philanthropic commitments for research, coupled with our strong industry and government partnerships, positions us as a leader in shaping the role of philanthropy in Australia's R&D ecosystem. Recognising philanthropy as a critical funding pillar, alongside government and industry, will help ensure Australia's research system is globally competitive, innovative, and sustainable for the future.

3) National Strategy and policy setting

An immediate quick win is the requirement for the Government to develop and implement a comprehensive National R&D Strategy with the first objective to set and commit to a R&D target of 3% of GDP. A medium-to-long-term strategy would also signal continuity and consistency to all sectors that contribute to R&D investment. This would ensure the continuity of funding programs and incentives without fear that support, for example, Australian Research Council (ARC) Industry Fellowships, will not be tossed aside after only two rounds. The Strategy could include the government's priorities over the 2-3 year horizon and be updated regularly to reflect emerging issues. This is a similar approach to the MRFF which works on Priorities every two years, but which sit within an overarching 10-year plan. A National Strategy should not be confused with the National Science and Research Priorities, which are a set of science

priorities providing a more general direction and alignment framework. Funding mechanisms to tackle these government priorities through mission-based challenges would allow business, universities, start-ups, SMEs and others to work collaboratively on solutions to them, with businesses providing leveraged funding. International examples show that National Flagships, Grand Challenges, and mission-based funding can align research efforts with national needs. While not all R&D can be channelled into missions – the very nature of R&D is that it is innovative, organic and often specific to the industry undertaking the R&D – targeting big societal challenges to be addressed through R&D at a national level would increase impact. We discussed mission-directed research in detail in section 2. The Strategy should also clearly link with the National Health & Medical Research Strategy now under development.

4) Recommendations to support phase TRL 4-6 translation

National approach to venture capital funding

The "valley of death" for commercialisation projects occurs because university research discoveries are too early stage to attract venture capital or to license to existing industry. The startup pipeline coming out of Australian universities will require billions in capital to scale up in the next decade, funds that are currently not accessible in the existing ecosystem. For many years we have been trying to connect our projects to traditional venture capital but, in order to provide good returns to investors, venture capital is looking for projects that have a validated market, a business plan and have been derisked. Successful research commercialisation needs access to pre-seed funds that are willing to make the very first, very risky, early-stage investment. Some universities are establishing these funds (University of Melbourne's Genesis Pre-Seed Fund, Monash University's Pre-Seed Investment Initiative, Australian National University's Connect Ventures Discovery Translation Fund, and University of Sydney's Pre-Seed Launch Fund), but this opportunity is not available to all universities. Victoria's commitment to funding commercialisation activities through their dedicated AU$2 billion *Breakthrough Victoria* initiative, coupled with the pre-seed funding ecosystem in Victoria, has changed the game for Victorian universities. Since 2017, the number of spin-out companies from Victoria has been growing almost seven times faster than in NSW, with an average annual growth rate of 34% since 2017, compared to NSW's growth rate of 5%.[4] Federal pre-seed funding modelled on the Breakthrough Victoria approach could help to bridge this gap at a national level. The National Reconstruction Fund is ideally positioned to act as a cornerstone investor for an investment fund that would have the scale for other large partners (for example superannuation funds) to come in.

Access to more venture capital would help to draw university research out of the lab. A great deal of capital in Australia is tied up in superannuation funds, and incentives to encourage this to be directed to venture capital could have a big effect. The government could consider incentives to de-risk venture capital investment for superannuation (and other investors), perhaps by providing structures that help absorb the impact where investments go wrong.

[4] *Accelerating university research commercialisation in New South Wales* joint paper by USyd and UNSW, July 2024, available on request.