

Australian Government Australian Research Council

Policy Review of the National Competitive Grants Program

DISCUSSION PAPER

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Purpose of the Review

The Australian Research Council (ARC) and the Australian Government Department of Education (the Department) are undertaking a policy review (the Review) of research schemes under the National Competitive Grants Program (NCGP). The Review will ensure that the NCGP aligns and contributes to:

- the ARC's renewed role and purpose as defined in the Object of the Act under the recently amended Australian Research Council Act 2001
- the Government response to the Review of the Australian Research Council Act 2001 (ARC Review)
- recommendations set out in the Australian Universities Accord Final Report (Accord).

The Review builds on the Australian Government's current reform agenda by examining the NCGP to ensure it continues to deliver economic, social, environmental, and cultural benefits for all Australians through the funding of excellent pure basic, strategic basic and applied research.

All interested parties are invited to engage in helping to reform and revitalise the NCGP so that it can best support Australia's dynamic and diverse higher education research community.

Context

The NCGP is unique in Australia's research system, supporting university research across the humanities, arts and social sciences (HASS) and science, technology, engineering and mathematics (STEM).¹ Since its inception, the NCGP has developed a reputation as a highly rigorous program for supporting research excellence.

The contribution of the NCGP extends well beyond the direct funding of research. While the NCGP administers 7% of the Government's annual investment in R&D (around \$895 million in 2023–24), NCGP funding makes up more than a third of the competitive research income received by universities² and significantly influences the calculation of Research Block Grant allocations.³ For every \$1 spent through the NCGP, returns on that investment are in excess of \$3 in economic output for Australia. This confluence of factors makes the NCGP an important driver of Australian university research that contributes numerous benefits to the nation.

Thematic areas of interest

This Review focuses on the following 6 themes identified in the Terms of Reference (refer Appendix A):

- Purpose and impact of ARC grants
- Program structure and design
- Alignment with other government research funding programs
- Strong and diverse research sector
- Advancing support for Indigenous Australian research and researchers
- National priorities for research.

This discussion paper seeks to shed further light on these themes and provide an opportunity for all interested parties to contribute to the design of a reinvigorated NCGP.

¹ The NCGP does not fund medical and health research, which is the responsibility of the National Health and Medical Research Council (NHMRC).

² Department of Education, *Research income time series* [data set], accessed 22 February 2024, <u>www.education.gov.au/research-block-grants/resources/research-income-time-series</u>.

³ Department of Education, *Calculating research block grants*, accessed 22 February 2024, <u>www.education.gov.au/research-block-grants/calculating-research-block-grants</u>.

Making a submission

Your input will inform the incoming ARC Board as they develop a final report and recommendations for consideration by the Minister for Education, in the second half of 2024.

Submissions are invited up until **13 May 2024** via the following <u>Consultations | Australian Research</u> <u>Council</u>.

About the NCGP

The ARC is a statutory agency within the Australian Government under the Australian Research Council Amendment (Review Response) Act 2024 (the Act). The Act amends the Australian Research Council Act 2001 and sets out a renewed role and purpose for the ARC in supporting Australian universities to conduct excellent research, promoting and conducting activities to shape and foster the national research landscape and community, and administering funding to research programs that will result in economic, social, environmental and cultural benefits for Australia.

The NCGP is the core mechanism that the ARC uses to administer research funding and support Australia's universities to conduct excellent research. The amendments to the Act make clear that the ARC will administer funding of excellent pure basic research, strategic basic research and applied research in all disciplines (excluding medical research) under the NCGP, except experimental development. The NCGP comprises a range of schemes under the Discovery Program and Linkage Program that provide grants to individuals, research teams and large-scale centres (**Figure 1**). Through these schemes grants are competitively awarded on the basis of excellence through a rigorous peer review process that promotes transparency, probity and fairness.

The Discovery Program recognises the importance of Australia's universities as major sources of basic and applied research, dedicated to the creation of new knowledge. It is comprised of 5 different schemes with a project-oriented scheme, Discovery Projects, being the largest pool of funds. There are 3 schemes that support research fellowships across various career stages as well as a project-oriented Indigenous researcher scheme that includes Indigenous fellowships as an element of project funding.

The Linkage Program aims to ensure better collaboration between researchers across universities and across the innovation system and to encourage individual universities to share infrastructure and facilities. In addition, the NCGP has a Centres of Excellence scheme to support research requiring significant national and international collaboration. The Linkage Program is comprised of 11 different schemes which are either project-based grants aimed at supporting research partnerships, fellowships aimed to promote collaboration between industry and universities (noting funding is only until 2026), or research capability-based grants for major centres or infrastructure. See <u>About the ARC | Australian</u> <u>Research Council</u> for a summary of schemes.



Figure 1: Current NCGP scheme structure

Note: Circle size is proportional to the amount of NCGP funding announced for each scheme in 2023 rounds, excluding any contributions from participating organisations. The total funding for Centres of Excellence 2023 was divided by 3 to account for the scheme being run triennially. Schemes without a circle did not have rounds in 2023.

Purpose and impact of ARC research grants

University research is uniquely important to Australia. In few other countries does university research comprise such a large proportion of overall national research. It is highly regarded and globally connected.⁴ Despite the high quality of Australia's university R&D, the nation does not currently utilise its full potential as a source of innovation,⁵ nor as a source of inspiration for efforts to address national and strategic policy challenges. Recognising this, our ambition is to reform the NCGP to be a key enabler for Australia to realise its potential over the coming decades. Critically, this applies as much to humanities and social science (HASS) disciplines as it does to science, technology, engineering and mathematics (STEM) fields.

The NCGP has a fundamental role in deepening Australia's research capability within and across HASS and STEM disciplines and helping create a future where our researchers are the international partners of choice. It will position Australia as a world-leader in a range of research areas and deliver benefits to the economy, culture, society and environment. With this in mind, we need to consider how the NCGP will best enable us to deliver on this ambition.

Future-focused objectives of the NCGP

The independent review into the *Australian Research Council Act 2001*'s Final Report *Trusting Australia's Ability: Review of the Australian Research Council Act 2001*, advised that the objectives of the NCGP and its schemes must be clearly defined and that their structure and design promote the achievement of these goals.⁶ While the objectives of individual schemes are set out in grant guidelines, the overarching objectives of the NCGP are not explicitly stated. Using the Act as the starting point, we have drafted 6 complementary objectives for the NCGP to generate discussion with stakeholders. Once fully developed these objectives could guide future changes to the design of the NCGP.

Draft objectives for the NCGP:

- **Research Excellence** Identify and support high quality and innovative pure basic, strategic basic and applied research across and between all disciplines (excluding experimental development and medical research).
- **Research Impact** Identify how funded research drives the advance of knowledge and contributes to, benefits and influences society, culture, the economy and the environment.
- **Research Collaboration** Promote quality and mutually beneficial research collaboration between higher education institutions, industry, Commonwealth entities, non-profit, and other local, national and international research partners, including Indigenous communities.
- **Research Translation** Promote the use and commercialisation of research that underpins the development of new policies, technologies and services with the potential to deliver economic, social, cultural and environmental benefits, domestically and internationally.
- **Research Capacity** Support the attraction, development and retention of research talent to promote academic pathways and build a sustainable and diverse research sector.
- **Research Alignment** Enable research activities that align with national priorities and other Commonwealth government research and development investments, to support focused and scaled investment.

⁴ Department of Education, *Australian Universities Accord Final Report*, (2024), <u>www.education.gov.au/australian-universities-accord/resources/final-report</u>.

⁵ Department of Education, Australian Universities Accord Final Report, (2024), <u>www.education.gov.au/australian-universities-accord/resources/final-report</u>.

⁶ Sheil, Margaret; Dodds, Susan and Hutchinson, Mark. *Trusting Australia's Ability: Review of the Australian Research Council Act 2001 Final Report* (Department of Education, 2023), <u>www.education.gov.au/higher-education-reviews-and-consultations/resources/trusting-australias-ability-review-australian-research-council-act-2001</u>.

Seeking your feedback

1. What are the best guiding objectives for the NCGP to support excellent pure basic, strategic basic and applied research that will enable it to deliver economic, social, environmental, and cultural benefits for Australia?

Driving the future impact of the NCGP

Australia must ensure support for high quality research, and use the new knowledge generated to drive the development of new technologies, products and ideas, the creation of jobs, economic growth and an enhanced quality of life in Australia.⁷ ACIL Allen's recent independent *Impact assessment of ARC-funded research* found that during the last 20 years the NCGP has delivered significant and diverse social, cultural, economic, environmental and other benefits to a broad range of end-users and beneficiaries in Australia.⁸ The assessment showed that the NCGP provides value for money, with every \$1 of research that the ARC funds generating \$3.32 in economic output back into the Australian community.

However, as the NCGP supports basic research, outputs from NCGP grants can often need additional effort and investment to be utilised, translated or commercialised. Researchers can experience difficulties in supporting translational or commercialisation activities associated with their research, which is sometime referred to as the 'valley of death'. Some international funding agencies provide supplementary funding to accelerate realisation of impact for projects with demonstratable potential for utilisation, translation or commercialisation, for example, the European Research Council's Proof of Concept grants.⁹

Measuring and communicating the impact of NCGP-funded research provides accountability for public investment in research, promotes further translation and adoption of excellent research and advocates for the value and benefits it delivers for Australia.¹⁰ Noting the challenges of research impact assessment, ACIL Allen's report identified opportunities for the ARC to better support, monitor and communicate the impact of NCGP-funded research.¹¹ This included developing an NCGP impact evaluation framework, including data-driven approaches to strengthen NCGP impact data collection. Other Australian Government and international research funding programs have different approaches to monitoring, evaluating and communicating the impact of the projects they fund, including the regularity and forms of reporting required.

⁷ Department of Education, Australian Universities Accord Final Report, (2024), <u>www.education.gov.au/australian-universities-accord/resources/final-report</u>.

⁸ ACIL Allen, *Impact Assessment of ARC-funded research*, (ARC, 2023), <u>www.arc.gov.au/news-publications/media/feature-articles/research-excellence-delivering-exceptional-outcomes-australia</u>.

⁹ European Research Council, *Proof of Concept*, accessed 23 February 2024, <u>erc.europa.eu/apply-grant/proof-concept</u>.

¹⁰ Department of Education, Australian Universities Accord Final Report, (2024), <u>www.education.gov.au/australian-universities-accord/resources/final-report</u>.

¹¹ ACIL Allen, *Impact Assessment of ARC-funded research*, (ARC, 2023), <u>www.arc.gov.au/news-publications/media/feature-articles/research-excellence-delivering-exceptional-outcomes-australia</u>.

Seeking your feedback

- 2. How can the NCGP further support and encourage:
 - a. high-calibre research that drives the advancement of knowledge?
 - b. the utilisation, translation or commercialisation of research to deliver benefits to Australia's society, economy, and community?
- **3.** How can the outcomes, impact and contribution of NCGP funded research be best identified and communicated?

Streamlining the structure of the NCGP

Since its inception more than 20 years ago, the schemes that make up the NCGP have changed in response to sector feedback and government policy and priorities. There have been several new schemes added in recent years so that there are currently 16 schemes sitting under the Discovery Program or the Linkage Program. While most schemes align closely with either the Discovery or Linkage Program there are some, such as Centres of Excellence, that support the objectives of both programs.

The NCGP currently has several different types of schemes that aim to support different objectives, including fellowship, project, partnership, hub/centre and infrastructure schemes. Project grants provide opportunities for a diversity of investigator-initiated ideas to be pursued by research teams. Fellowships support excellent researchers, including at particular career stages, to develop their capabilities and independent research. Partnerships support use-inspired research, while centres bring together networks of organisations and researchers to build scale and focus in a research area. Infrastructure grants ensure researchers have the cutting-edge equipment and facilities they need to undertake the high-quality research supported through other schemes.

The research sector benefits from having research grants that are streamlined and easy for all stakeholders to interact with. There may be opportunities to revise the NCGP's structure to reduce complexity, improve clarity on the funding opportunities available and reduce the burden for applicants, assessors and administrators.

Encouraging greater creativity and innovation

Some research aims to make incremental, but still valuable, knowledge gains whilst other research aims to make major knowledge breakthroughs. It follows that this type of potentially transformative research (PTR) that is highly novel in terms of ideas, techniques and/or discipline combinations comes with a greater level of uncertainty in terms of outcomes. Internationally there have been concerns raised about a tendency across the selection processes employed by research funding bodies to become too conservative, which may disadvantage proposals with greater transformational potential and thus risk.¹² A lack of support for these more 'out of the box' ideas could limit a country's ability to compete economically and address national and global challenges in the longer term. This is an important question for Australia and for the potential shape of the NCGP going forward.

Internationally, research funders are taking several approaches aimed at fostering PTR. These include funding schemes that are specifically designed and exclusively support PTR, for example, Canada's New Frontiers in Research Fund.¹³ There is also the approach of having a separate funding pool and assessment process specifically for PTR proposals within a scheme, for example, New Zealand's Endeavour Fund.¹⁴ There may be opportunities to modify the design of the NCGP to support greater creativity and innovation through research that pushes the frontiers of knowledge.

Optimising the design of schemes and assessment

There are several key design elements associated with all scheme types that impact on their efficiency and effectiveness. For example, there have been calls to have a greater proportion of grants that

¹² OECD, Effective policies to foster high-risk/high-reward research, (2021), <u>https://www.oecd.org/sti/effective-policies-to-foster-high-risk-high-reward-research-06913b3b-en.htm</u>.

¹³ Canada Research Coordination Committee, New Frontiers in Research Fund, accessed 21 March 2024, <u>https://www.sshrc-crsh.gc.ca/funding-financement/nfrf-fnfr/index-eng.aspx</u>.

¹⁴ New Zealand Ministry of Business, Innovation & Employment, Endeavour Fund Investment Plan 2022-2024, (2021), <u>https://www.mbie.govt.nz/assets/endeavour-fund-investment-plan-2022-2024.pdf</u>.

provide sufficient funding for longer durations of at least 5 years.¹⁵ There are several international examples of schemes offering flexible research grants of at least 5 years duration, including the European Research Council's Starting and Consolidator grants for early and mid-career researchers (EMCRs).¹⁶ Only 5% of NCGP grants awarded in 2023 were for 5 or more years, with 75% being awarded for 3 years (**Figure 2**). It may be possible that recalibrating the duration of grant support for research projects could further promote major breakthroughs and the delivery of benefits.



Figure 2: Proportion of grants by duration awarded and scheme, 2023

The assessment process to decide which applications are to be recommended for funding is a crucial aspect of the NCGP in terms of the outcomes and impacts of the program. The United States' National Science Foundation (NSF), for example, has a goal to inform 75% of applicants whether their proposals have been declined or recommended for funding within 6 months. To meet this goal, NSF Program Officers (who have significant discipline expertise and training) allocate grants onto different pathways for peer review (termed 'merit review'). These paths include 'ad hoc' (detailed) review only (7% in 2020), panel review only (65%), a combination of both (22%), or internal review only (6%). The rationale guiding these decisions is sketched out in the NSF publication *Merit Review Process*.¹⁷ Such a pathway approach is significantly different from the typical ARC scheme design.

As set out in the ARC Review recommendations and enshrined in the amendments to the legislation, the ARC will 'uphold peer review as a core process to identify excellent research'. Peer review can take several different forms. Given the large volume of applications received, the model of peer review used needs to balance an appropriate level of rigour with the burden placed on the research sector. Different types of assessment processes may be best suited to different types of schemes. There may be opportunities alongside revitalising the NCGP's schemes to consider tailored refinements to the associated peer review processes. While the ARC currently does not allow peer reviewers to use artificial intelligence to assist in the assessment of applications, as the technology continues to improve there may be opportunities, as well as risks, for leveraging this technology to streamline processes.

¹⁵ Department of Education, *Australian Universities Accord Final Report*, (2024), <u>www.education.gov.au/australian-universities-accord/resources/final-report</u>.

 ¹⁶ European Research Council, *Starting Grant*, accessed 23 February 2024, <u>erc.europa.eu/apply-grant/starting-grant</u>.
¹⁷ National Science Foundation, *Merit Review Process: Fiscal Year 2020 Digest*, (Figure 15, section IV, p28), <u>https://www.nsf.gov/nsb/publications/2021/merit_review/FY-2020/nsb202145.pdf</u>.

Seeking your feedback

- **4.** What structure and design of the NCGP would:
 - a. best support the NCGP's objectives?
 - b. reduce complexity and deliver grants more efficiently?
 - c. rebalance risk settings to encourage frontier basic research with potentially transformative outcomes?
 - d. set the right balance between different scheme types and duration?
 - e. use peer review in the most effective way?
 - f. leverage the opportunities and manage the risks of using artificial intelligence?

Promoting more collaboration within and across the sector

International Collaboration

Research is a global endeavour with the greatest advances in addressing global challenges achieved through cooperative approaches. Engaging in international research collaboration boosts Australian research through leveraging global research capacity, provides access to 96% of the total global knowledge pool that is generated overseas¹⁸ and increases the impact of Australian research in the international arena.¹⁹ The aim of the NCGP to promote international collaboration is reflected in scheme objectives and assessment criteria and through Chief Investigators being able to apply from, and/or spend a portion of the grant duration, overseas. In recent years 70–80% of NCGP projects indicated they intended to collaborate internationally, most commonly with partners from the United States of America, United Kingdom, Germany, China and Canada. There may be opportunities to consider how the NCGP facilitates international engagement by Australian researchers, which, given potential geopolitical challenges, could be informed by Australia's broad strategic priorities.

Interdisciplinary Research

At the inception of the NCGP it was recognised that 'the important questions for research are not based on disciplines but on issues or problems, demanding multi-disciplinary research solutions'.²⁰ Despite the importance of interdisciplinary research to address complex challenges, the *Australian Government funding arrangements for non-NHMRC research* report noted concerns that 'the current research funding system does not adequately support interdisciplinary and multidisciplinary research'.²¹ Interdisciplinary research applications are accepted under all NCGP schemes (with approximately two-thirds of NCGP proposals self-identifying as involving interdisciplinary research) and assessment processes aim to support their fair and unbiased review.²² There may be opportunities within the NCGP to remove possible disincentives for interdisciplinary proposals and to promote their equitable consideration during the review process.

¹⁸ InCitesTM, Clarivate Analytics (2024), cited in Australian Academy of Science, *President's keynote address: International Science Collaborations in a Contested World National Symposium*, (2023), <u>https://www.science.org.au/news-and-events/news-and-media-releases/presidents-keynote-international-science-collaborations</u>.

¹⁹ Australian Academy of Humanities, *Measuring the Value of International Research Collaboration*, (Department of Industry and Science, 2015), www.humanities.org.au/wp-content/uploads/2017/04/AAH_Measuring-Value-2015.pdf.

²⁰ Kemp, D. *Knowledge and Innovation: A policy statement on research and research training*, (Department of Education, Training and Youth Affairs, 1999), <u>https://www.voced.edu.au/content/ngv%3A41605</u>.

²¹ House of Representative Standing Committee on Employment, Education and Training, *Australian Government Funding Arrangements for non-NHMRC Research*, (Parliament of the Commonwealth of Australia, 2018),

www.aph.gov.au/Parliamentary Business/Committees/House/Employment Education and Training/FundingResearch/Report. ²² ARC, Statement of Support for Interdisciplinary Research, (2018), <u>www.arc.gov.au/about-arc/program-policies/statement-support-interdisciplinary-research</u>.

Cross-sector collaboration

The Accord Final Report highlighted the opportunity to improve the sharing and application of university research with a range of research end-users (e.g., industry, government, community) and the important role of Government-funded university/end-user collaborative research schemes, including the NCGP Linkage Program, in achieving this.²³ The current success of the Linkage Program is supported by the fact that over 95% of all partner organisations involved in the Linkage Program report their participation to be 'beneficial' or 'very beneficial' in NCGP project final reports. Linkage Program grants from 2023 scheme rounds will support collaborations with 762 partner organisations and leverage \$625 million in cash and in-kind co-contributions from these partners, which demonstrates the partners' investment in the potential positive outcomes from the research. The most common partner organisation type across the Linkage Program for the 2023 rounds was the Australian industry sector (35%). But the program also supported partnerships with other research end-users, including Australian government (24%), international (23%), Australian non-profit (12%) and other (5%) organisations (**Figure 3**).

Figure 3: Proportion of Partner Organisations on Linkage Program grants by organisation type and scheme, 2023



Note: Data presented in organisation participation terms - organisations named on multiple grants will appear more than once.

There may be opportunities to consider if further incentives in the NCGP could promote participation from across different sectors, including start-ups and small and medium enterprises, in high quality collaborative basic and applied research that delivers mutually beneficial outcomes, noting that the NCGP aims to complement, not duplicate, other Government collaborative research programs (see the Aligning with other government research funding programs section below).

Seeking your feedback

5. How can the NCGP best support collaboration between disciplines (between and across HASS and STEM) among researchers (both national and international), across sectors and funding programs?

²³ Department of Education, Australian Universities Accord Final Report, (2024), <u>www.education.gov.au/australian-universities-accord/resources/final-report</u>.

Supporting the researcher pipeline

Support for research students, and early and mid-career researchers in the NCGP

To build the next generation of Australia's research leaders, we need to support and empower a more diverse cohort of EMCRs. The NCGP seeks to support research training and offers ARC-funded higher degree by research (HDR) stipends through most schemes. Questions have arisen about PhD stipend rates and whether current ARC funding provisions provide appropriate support to attract and retain talented HDR students. The broader issue of the minimum rate for PhD stipends, as determined by the Department of Education, was also raised in the Universities Accord²⁴ and the Pathway to Diversity in STEM Review.²⁵ There may be opportunities to consider how the NCGP supports postgraduate research training.

The NCGP seeks to provide opportunities across different career stages, particularly for EMCRs. Forging a research career path can be particularly challenging for early-career researchers (ECRs) because of job insecurity owing to limited sector funding, casualisation of the workforce, managing career interruptions and limited opportunities for mentorship.²⁶ The ARC has a number of mechanisms designed to support this cohort through the NCGP, including 'ring-fenced' fellowships specifically for EMCRs and opportunities for mentorship with world-class research leaders.²⁷ Other research funding agencies promote the submission of applications involving teams of researchers at different career stages through including team diversity and training in the assessment criteria.²⁸

The proportion of all Chief Investigators on NCGP grants for 2023 rounds who were ECRs (0-5 years post-PhD) was 11%, compared to 17%, 19% and 18% for those with a career age of 5–10, 10–15 and 15–20 years, respectively (**Figure 4**). ECR-specific fellowships supported 48% of all ECR Chief Investigators and 93% of all ECR lead Chief Investigators²⁹ on funded NCGP projects in 2023. Less than 20% of Discovery Projects 2024 grants included an ECR as a Chief Investigator.³⁰ This suggests that ECRs may be underrepresented in some schemes and, where team diversity is not promoted in assessment criteria, ECR-specific fellowships are a key method of support. Some ECRs may be disincentivised from being named on Discovery Projects applications because Chief Investigators are not eligible to draw a salary from these grants, which is different to NHMRC's comparable Ideas Grants scheme. Hence, there may be options to provide greater opportunities for ECRs to be supported through the NCGP.

²⁵ Department of Industry, Science and Resources, *Pathway to Diversity in STEM Review final recommendations report*, (2024), www.industry.gov.au/publications/pathway-diversity-stem-review-final-recommendations-report.

²⁹ Lead Chief Investigators are defined by the ARC as the first named Chief Investigator on an application.

²⁴ Department of Education, *Australian Universities Accord Final Report*, (2024), <u>www.education.gov.au/australian-universities-accord/resources/final-report</u>.

²⁶ Katherine Christian, Carolyn Johnstone, Jo-ann Larkins, Wendy Wright, Michael R Doran, *Research Culture: A survey of early-career researchers in Australia*, (eLife 10:e60613, 2021), <u>elifesciences.org/articles/60613</u>.

²⁷ ARC, *Early Career Researchers Statement of Support*, accessed 18 December 2023, <u>www.arc.gov.au/about-arc/program-policies/early-career-researchers-statement-support</u>.

²⁸ For example, NHMRC's <u>Synergy Grants</u> scheme requires applicants to establish and demonstrate how the team of CIs will contribute to the capacity building, mentoring, career development and diversity (including in terms of career stage) of the research workforce.

³⁰ Noting that the NCGP provides significant support to unnamed postdoctoral researchers through salary and project funding, many of whom are likely to be ECRs.

Figure 4: Proportion of all Chief Investigators (CIs) on funded NCGP grants by career age, 2023



Note: Data is presented in person participation terms – researchers named on multiple grants will appear more than once.

Improving access for underrepresented groups

The Pathway to Diversity in STEM Review³¹ highlights the role that research funders have in supporting a diverse research sector. This NCGP Policy Review is seeking to explore how the NCGP can best support a strong and diverse research sector, including by identifying and addressing potential barriers for the participation and success of researchers in the program (the below section further explores advancing Indigenous researchers through the NCGP). In doing so, the review may present a range of opportunities to draw on the findings of the Pathway to Diversity in STEM Review.

The NCGP currently employs several mechanisms to support equity, particularly assessment design that promotes fairness and limits the potential for bias. For example, the focus on Research Opportunity and Performance Evidence (ROPE)³² when assessing investigator capability enables research achievements to be evaluated in the context of diverse career and life experiences. Improvements to the operation of ROPE have recently been implemented to streamline content provided by researchers, limit unconscious bias and protect personal and confidential information. Measures that could further promote the diversity of researchers funded through the NCGP include applicant anonymisation, or semi-anonymisation,³³ and partial randomisation of grant selection.³⁴

The participation of women in the NCGP

One underrepresented cohort in the NCGP, particularly at senior levels, is women researchers who have constituted around one third of Chief Investigators on funded projects in recent years (**Figure 5**). A recent independent analysis found that the under-representation of women researchers in NCGP schemes reflected their under-representation in the research workforce and thus in the applicant pool. The success rates are typically higher for women than men in most NCGP schemes, although the raw numbers of funded projects asymmetrically favour males due to their higher application rates.³⁵ However, the underrepresentation of women researchers in the NCGP remains an important issue as it means we are not making the most of Australia's research and innovation talent pool.

³¹ Department of Industry, Science and Resources, *Pathway to Diversity in STEM Review final recommendations report*, (2024), www.industry.gov.au/publications/pathway-diversity-stem-review-final-recommendations-report.

³² Australian Research Council, *Research Opportunity and Performance Evidence (ROPE)*, (2023), <u>https://www.arc.gov.au/about-arc/program-policies/research-opportunity-and-performance-evidence-rope-statement</u>.

³³ Kingsley, I., Ho, N., Chan, A. B., Harvey-Smith, L., & Williams, L. A. *Evaluating the cross-disciplinary utility of anonymizing applications for scientific equipment in the Australian research sector*, (Office of the Women in STEM Ambassador, 2023), <u>womeninstem.org.au/anonymised-review-study/</u>.

³⁴ Bendiscioli, Sandra; Firpo, Teo; Bravo-Biosca, Albert; Czibor, Eszter; Garfinkel, Michele; Stafford, Tom; et al, *The experimental research funder's* handbook (2nd edition), (Research on Research Institute, 2022), <u>https://doi.org/10.6084/m9.figshare.19459328.v4</u>.

³⁵ Kingsley, I., Slavich, E., Harvey-Smith, L., Johnston, E. L., & Williams, L. A, *Gender differences in Australian research grant awards, applications, amounts, and workforce participation*, (Office of the Women in STEM Ambassador, 2023), <u>womeninstem.org.au/grants-by-gender/</u>.

Figure 5: Proportion of Chief Investigators on NCGP applications that are women and success rates by gender and year, 2012–2023



Other research funding agencies employ additional measures to drive further gender equity, such as requiring equal representation of women amongst researchers on applications from each institution (e.g., Science Foundation Ireland) or amongst fellowship grantees (NHMRC Investigator Grants). Hence, there may also be opportunities to further promote gender equity within the NCGP.

Seeking your feedback

6. How can the NCGP promote a strong and diverse research sector, including through supporting research training and opportunities for early career researchers, women researchers and other under-represented groups?

Supporting Indigenous Australian research and researchers

Advancing support for Indigenous Australian research and researchers

The ARC Review found the need to both expand, embed and promote Indigenous Australian research and knowledge systems in higher education and grow Australia's pipeline of Indigenous researchers to deliver impactful, transformative outcomes.³⁶ Under all NCGP schemes the ARC aims to support both research relating to Indigenous studies (which may or may not be conducted by an Indigenous researcher) and Indigenous researchers (who may or may not be undertaking research in Indigenous studies).³⁷

Targeted support is available through the Discovery Indigenous scheme, which exclusively funds projects led by or involving an Indigenous Australian researcher(s), offers Discovery Australian Aboriginal and Torres Strait Island Awards (DAATSIAs) for Indigenous researchers (including for EMCRs) and project funding that can be used for the salaries of Indigenous EMCRs, HDRs and honours students. The participation rate of Indigenous researchers as Chief Investigators on NCGP grants in recent years (1.4% in 2022, **Figure 6**) has been similar to the proportion of academic staff at Australian universities who are Indigenous (1.3% in 2022).³⁸ However, Indigenous academics are underrepresented compared to their representation in the overall Australian population and an important part of advancing Indigenous Australian researchers will be growing the pipeline of Indigenous researchers.



Figure 6: Proportion of Indigenous Chief Investigators on NCGP grants and success rates by year, 2018–2023

Note: Indigenous status is a non-mandatory data field, so it is unknown for some Chief Investigators, with the proportion of unknown data only dropping below 30% in 2021. Those with an unknown status are included in the calculation of the proportion of Indigenous researchers but are excluded from the calculation of non-Indigenous researcher success rate.

To increase the pipeline of Indigenous researchers at Australian universities, the ARC Review has called for increased investment in postdoctoral fellowships for Indigenous researchers. Between 2021 and

³⁶ Sheil, Margaret; Dodds, Susan and Hutchinson, Mark. *Trusting Australia's Ability: Review of the Australian Research Council Act 2001 Final Report* (Department of Education, 2023), <u>www.education.gov.au/higher-education-reviews-and-consultations/resources/trusting-australias-ability-review-australian-research-council-act-2001</u>.

³⁷ ARC, Aboriginal and Torres Strait Islander Researchers and Research Statement, accessed 18 December 2023, <u>www.arc.gov.au/about-arc/program-policies/aboriginal-and-torres-strait-islander-researchers-and-research/aboriginal-and-torres-strait-islander-researchers-and-research/aboriginal-and-torres-strait-islander-researchers-and-research-statement</u>.

³⁸ Department of Education, *Higher Education Statistics –Staff data* [data set], (2022), accessed 8 December 2023, www.education.gov.au/higher-education-statistics/staff-data/selected-higher-education-statistics-2022-staff-data.

2023, each year 2 to 3 fellowships (DAATSIAs) have been awarded to Indigenous researchers in the Discovery Indigenous scheme, with a success rate of 20%. This indicates that there may be the opportunity to support more Indigenous researchers through DAATSIAs or similar fellowships. In terms of Indigenous researcher training, for the 2022 Discovery Indigenous round, 6 of the 9 funded projects requested a stipend for an Indigenous HDR student. However, data is not available on how many other Indigenous research students were supported through other NCGP grants.

Other research funders have implemented measures to further their support for Indigenous research. NHMRC maintains a longstanding commitment to expend at least 5% of its annual funding on Aboriginal and Torres Strait Islander health research, partly through structural priority funding for high-scoring Indigenous research applications.³⁹ To ensure that Indigenous research is a priority for communities, the Canadian funding councils require Indigenous research applications to include evidence of support from affected or invested communities. However, this may increase administrative burden, which has been identified as a barrier to enhanced levels of involvement of Indigenous community organisations in NCGP grants.⁴⁰ In Aotearoa New Zealand, Vision Mātauranga is a policy about innovation, opportunity and the creation of knowledge that highlights the potential contribution of Māori knowledge, resources and people.⁴¹ Within the Marsden Fund, if relevant, Vision Mātauranga is included as an assessment criterion and its themes must be addressed through a statement in proposals.⁴² Taking these issues into account, as well as the *AIATSIS Code of Ethics for Aboriginal and Torres Strait Islander Research*, ⁴³ there may be opportunities to improve support for Indigenous research, researchers and research students in the NCGP.

Seeking your feedback

- 7. Are there aspects of the NCGP that could be strengthened or redeveloped to advance support for:
 - a. Indigenous Australian research, incorporating Indigenous knowledge and knowledge systems (where appropriate)?
 - b. Indigenous researchers, irrespective of their areas of research?

 ³⁹ NHMRC, Annual Report 2022-23, accessed March 6 2024, <u>https://www.nhmrc.gov.au/about-us/publications/annual-report-2022-23</u>.
⁴⁰ Sheil, Margaret; Dodds, Susan and Hutchinson, Mark. *Trusting Australia's Ability: Review of the Australian*

Research Council Act 2001 Final Report (Department of Education, 2023), <u>www.education.gov.au/higher-education-reviews-and-</u> consultations/resources/trusting-australias-ability-review-australian-research-council-act-2001.

⁴¹ Ministry of Business, Innovation and Employment, *Vision Mātauranga*, accessed 16 February 2024, <u>https://www.mbie.govt.nz/science-and-technology/science-and-innovation/agencies-policies-and-budget-initiatives/vision-matauranga-policy/</u>.

⁴² Royal Society Te Apārangi, *Vision Mātauranga*, accessed 16 February 2024, <u>https://www.royalsociety.org.nz/what-we-do/funds-and-opportunities/marsden/marsden-fund-application-process/submitting-a-proposal/vision-matauranga/</u>.

⁴³ Australian Institute of Aboriginal and Torres Strait Islander Studies, *AIATSIS Code of Ethics for Aboriginal and Torres Strait Islander Research* (2020), <u>https://aiatsis.gov.au/research/ethical-research</u>.

Aligning with other government research funding programs

The objectives and design of the NCGP need to be considered in the context of other government funding programs. While there may be some overlap in the aims and types of research activities funded by different government programs, complementarity between programs is likely to promote clarity and efficiency. At the inception of the NCGP there was an awareness of the importance of ensuring a balance of research activities within the context of other government funding programs.

The Accord Final Report recognises concerns in the research sector that applied research and experimental development with shorter-term outcomes are being prioritised ahead of long-term support for basic research.⁴⁴ This is supported by data showing that the proportion of total higher education expenditure on R&D for basic research decreased from more than 60% in 1994 to 37% in 2020.⁴⁵ As the engine room for advances in knowledge across all fields, Australia has a national interest in investing in basic research. The ARC Review report highlights the vital role for basic research in underpinning the research pipeline, including commercial developments.⁴⁶ It also states the NCGP's enduring role 'to provide grant funding for that very best, curiosity-driven research' across disciplines, which is unique amongst government investments in non-medical research. The NCGP currently can support basic and applied research across all its schemes. However, the Discovery Program tends to support a higher proportion of basic research and the Linkage Program tends to support more applied research. In recent years, at least 40% of NCGP funding has been allocated to the Linkage Program. Some stakeholders have called for a minimum of 60% of NCGP funding be allocated to the Discovery Program.⁴⁷

Ultimately, questions about how the ARC balances support for basic and applied research need to be considered in the context of a) support for high-calibre basic research that contributes to the advancement of knowledge; and b) how the ARC, alongside other government funding programs, helps the movement of research along the development pipeline. There are currently several Australian Government funding programs that support research that is co-designed and performed collaboratively between university and industry researchers. These programs include the Cooperative Research Centres (CRC) Program, which fosters high quality research partnerships between industry entities and research organisations with a focus on Government priorities.⁴⁸ There is also Australia's Economic Accelerator, which supports universities to undertake proof-of-concept or proof-of-scale projects in partnership with industry to support the translation and commercialisation of research aligned with national research priorities.⁴⁹ A point of difference for the Linkage Program is the ability to partner on more early stage basic and applied research and for universities to partner exclusively with non-industry entities. Acknowledging the unique role of the ARC in supporting basic and applied research, but not experimental development, there may be opportunities to build better connections and strengthen the NCGP's links to the wider network of government research funding.

⁴⁴ Department of Education, Australian Universities Accord Final Report, (2024), <u>www.education.gov.au/australian-universities-</u> <u>accord/resources/final-report.</u>

⁴⁵Australian Bureau of Statistics, *Research and Experimental Development, Higher Education Organisations, Australia 2020* [data set], (2022), accessed 9 November 2023, <u>www.abs.gov.au/statistics/industry/technology-and-innovation/research-and-experimental-development-higher-education-organisations-australia/latest-release</u>.

⁴⁶ Sheil, Margaret; Dodds, Susan and Hutchinson, Mark. *Trusting Australia's Ability: Review of the Australian Research Council Act 2001 Final Report* (Department of Education, 2023), <u>www.education.gov.au/higher-education-reviews-and-consultations/resources/trusting-australias-ability-review-australian-research-council-act-2001</u>.

⁴⁷ Science and Technology Australia, *Submission to the Review of the ARC Consultation Paper*, (2022), <u>www.education.gov.au/higher-education-</u> reviews-and-consultations/consultations/review-australian-research-council-act-2001-submissions/submission/16164.

⁴⁸ Department of Industry, Science and Resources, *Cooperative Research Centres (CRC) Grants – Round 25*, accessed 16 February 2024, <u>https://business.gov.au/Grants-and-Programs/Cooperative-Research-Centres-CRC-Grants</u>.

⁴⁹ Department of Education, *Australia's Economic Accelerator*, accessed 16 February 2024, <u>https://www.education.gov.au/australias-economic-accelerator</u>.

Seeking your feedback

- 8. In the context of other government funding for research and development:
 - a. How should the NCGP promote an appropriate balance of basic and applied research?
 - b. How can the NCGP improve its connectedness to the research ecosystem to help progress the research it funds further along the pipeline towards translation and impact?

Supporting national priorities

Investment in publicly funded research is expected to generate knowledge that can help address societal needs, and that leads to a range of social, economic, environmental and cultural benefits to the community. Therefore, it is important to structure investment in research that balances building on our sovereign strengths, and addressing critical weaknesses, with supporting a broad-base of curiosity-driven research that may become a priority in the future (e.g., advances in mRNA that enabled the rapid development of an effective COVID-19 vaccine⁵⁰).

The Government has announced national priorities and policies that are relevant to research, including the National Science and Research Priorities (NSRPs) currently being revitalised to shape the long-term vision of Australia's science and research system and to align investment and performance of science and research to optimise benefits for all Australians.⁵¹ In addition, there are the 7 Government-identified priority areas targeted through the National Reconstruction Fund (NRF)⁵² and the List of Critical Technologies in National Interest.⁵³

For most NCGP schemes it is not an eligibility requirement for applications to align with an Australian Government policy or priority area.⁵⁴ The exception is the Industrial Transformation Research Program where proposals must address one of the specified priorities, which currently align with the priority funding areas under the NRF. In addition, the Minister has directed the ARC to ensure that 70% of the Linkage Program aligns with the NRF priority areas.⁵⁵ While not an eligibility requirement, the ARC collects data on whether applications are aligned to Government priorities and the assessment criteria for most schemes incorporate consideration of the proposed research's potential contribution to Australian Government priority areas.

Within the NCGP, the Special Research Initiatives scheme has been a mechanism through which to provide funding for new and emerging fields of research and build capacity in strategically important areas. Other research funding agencies often structure their grant programs so that alongside funding for investigator-led research there is a capacity for the research funding agency to support priority/mission-driven research. For example, the European Commission's Horizon Europe program is split into 3 pillars: one for curiosity-driven basic research and infrastructure, the second for mission-driven research and the third for innovation (including within the business sector).⁵⁶

Seeking your feedback

9. How should the NCGP be structured to best support and deliver on national research priorities, as they evolve over time?

⁵⁰ Barrett, P Hansen, N, Natal, J Noureldin, D, *Why Basic Science Matters for Economic Growth: Public investment in basic research will pay for itself*, (International Monetary Fund, 2021), www.imf.org/en/Blogs/Articles/2021/10/06/blog-ch3-weo-why-basic-science-matters-for-economic-growth.

⁵¹ Department of Industry, Science and Resources, *Revitalising Australia's vision for science and research*, accessed 12 December 2023, <u>https://www.industry.gov.au/science-technology-and-innovation/revitalising-australias-vision-science-and-research</u>.

⁵² National Reconstruction Fund Corporation, *Our Priority Areas*, accessed 12 December 2023, <u>https://www.nrf.gov.au/what-we-do/our-priority-areas</u>.

⁵³ Department of Industry, Science and Resources, *List of Critical Technologies in the National Interest*, accessed 12 December 2023, https://www.industry.gov.au/publications/list-critical-technologies-national-interest.

⁵⁴ ARC, *Science and Research Priorities*, accessed 8 December 2023, <u>www.arc.gov.au/funding-research/apply-funding/grant-application/science-and-research-priorities</u>.

⁵⁵ ARC, Statement of Expectations 2022, accessed 5 March 2024, <u>https://www.arc.gov.au/about-arc/our-organisation/statement-expectations-</u>2022.

⁵⁶ European Commission, *Horizon Europe*, accessed 8 December 2023, <u>research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en</u>.

Policy Review of the National Competitive Grants Program

Terms of Reference

Purpose of the review

A strong research sector generating world-leading, impactful research is vital for Australia's future productivity and prosperity. As the primary Commonwealth funder of fundamental and applied research in Australian universities through the National Competitive Grants Program (NCGP), the Australian Research Council (ARC) plays a central role in the national innovation and research system.

Following the independent review of the ARC, the Australian Government is amending the *Australian Research Council Act 2001* to reform and strengthen the ARC to drive world-class Australian research, now and into the future. The Review builds on these reforms by examining the NCGP to ensure it continues to deliver economic, social, environmental, and cultural benefits for all Australians by funding excellent pure basic, strategic basic and applied research.

Key areas for review

Purpose and impact of ARC research grants

- The purpose and objectives of the NCGP and its capacity to support ground-breaking research, including how the program:
 - o supports fundamental research in Australian universities
 - promotes research collaboration, translation and impact to generate economic, environmental, social and cultural benefits for Australia
 - aligns to the ARC's defined role and purpose set out in the Objects of the Australian Research Council Amendment (Review Response) Bill 2023.

Program structure and design

- The design and structure of the NCGP in the context of international best practice to ensure it:
 - o limits administrative burden and is easy for researchers to understand and interact with
 - promotes strong research outcomes by encouraging collaboration across disciplines, universities, and with a diverse range of local, national, and international research partners and end-users
 - supports the collection and communication of research outcomes and impacts to demonstrate the value of public funding and investment.

Alignment with other government research funding programs

 In line with the ARC's unique role in supporting pure basic, strategic basic and applied research, consider opportunities to better align ARC and other government research funding programs to strengthen Australia's research and innovation ecosystems, including through the promotion of university-led and industry co-designed research.

Strong and diverse research sector

• The role and impact of the NCGP in promoting a strong and diverse research sector, including by identifying and addressing potential barriers for the participation and success of researchers and industry partners and end-users in the program.

Advancing support for Indigenous Australian research and researchers

- The capacity of NCGP to promote, embed and support Indigenous research and knowledge systems in Australia's research sector, including through initiatives to:
 - promote Indigenous academic leadership in shaping and producing knowledge of benefit to the community, and
 - strengthen the pipeline of emerging Indigenous researchers.

National priorities for research

- The capacity of NCGP to support the revitalised National Science and Research Priorities, the National Reconstruction Fund, and other relevant government priorities, including through:
 - focused and scaled investment to address emerging and significant research opportunities and complex problems facing Australia.

Administration and timings

The Review is being undertaken jointly by the Australian Research Council and the Department of Education. It is supported by a steering group, made up of members with expertise from Australian universities, industry, and government sectors.

The Review will undertake consultations with stakeholders across the higher education research sector, industry and other end-users of research, in the first half of 2024. A discussion paper to inform the consultation process will be issued on the ARC website and submissions will be invited.

Following the conclusion of the consultation process, a final report will be delivered to the Minister through the ARC Board in the second half of 2024.