1. Setting targets to improve R&D performance

1) **R&D intensity targets.** Has there been a policy discussion in your country about the need of setting a national R&D intensity target? What are the main arguments in favour of not setting such a target in your country? Does this relate to issues regarding indicators (e.g. lack of good metrics on innovation activities of importance to your country, lack of readily available timely indicators, etc.)

The Australian Government has long recognised the importance of supporting R&D and innovation. Proposals for a national R&D intensity target in Australia have been discussed by various stakeholders.

While the Australian Government has not introduced an R&D intensity target, there has been a focus on how to best support R&D and innovation in the context of declining national R&D expenditure. The latest available figures for Australia’s R&D expenditure, GERD as a proportion of GDP decreased from 1.88 per cent in 2015-16 to 1.79 per cent in 2017-18.\(^1\)

Business expenditure on R&D (BERD) is a significant driver of GERD. Australian businesses spent AUD 17.4 billion on R&D in 2017-18, representing a 5 per cent increase in current price terms from 2015-16. (Australia conducts the BERD survey once every two years.) In 2015-16, Australian businesses had spent AUD 16.7 billion on R&D. However, as a proportion of GDP, BERD has continued to decline, decreasing from 1.0 per cent in 2015-16 to 0.9 per cent in 2017-18. This is primarily due to a shift in Australia’s mining sector from an investment to a production phase. Australia’s BERD as a proportion of GDP has been declining since its peak at 1.37 per cent in 2008-09, which coincided with the peak in R&D investment by Australia’s mining sector.

Australia’s experience suggests that GERD levels are influenced predominantly by a country’s industrial mix, and the broader factors that drive business R&D investment in its major industry sectors. Similar findings were made by AlphaBeta (a private economic advisory firm) in its *Australian Business Investment in Innovation* report.

\(^1\) ABS Catalogue 8104.0
This report was commissioned by the Office of Innovation and Science Australia and forms Appendix A to Innovation and Science Australia (ISA)’s report, *Stimulating Business Investment in Innovation* published in February 2020.

In its report, ISA effectively cautioned against focusing too heavily on BERD at the expense of other drivers of innovation and productivity more broadly. ISA concluded that BERD is not a strong predictor of other innovation investment, and that sectors where many firms are actively innovating are more likely to have greater productivity, whether or not they undertake R&D activities. Among its recommendations, ISA suggested that the Government rebalance its policy mix to support business investment in both non-R&D innovation and R&D, specifically with significant additional support for non-R&D innovation for a defined period of between 5-10 years. The Australian Government will take ISA’s report into account in its future R&D and innovation policy deliberations. In the meantime, the Australian Government has proposed a number of reforms to its R&D Tax Incentive (R&DTI). The R&DTI is the principal mechanism to support additional business investment in R&D.

2) **Targets in the past.** Did your country have an R&D target in the past? (If so, please specify the temporal scope, the target and deadline to reach it, and the document setting such target) (e.g. 3% of GDP spent on R&D by 2006, set by the Innovation Strategy adopted in 2002)

No. Australia has not set an R&D target in the past.

3) **Other targets.** Do your innovation strategies or other strategic documents include other quantitative targets to foster innovation (e.g. number of doctoral graduates, top cited publications, patents, proportion of people engaged in research and innovation, international research collaborations)? If so, please provide details on the specific targets, deadlines to achieve them and documents setting them.

No, Australia does not set other quantitative targets to foster innovation.

Some government targets are set for the financial year in the Australian Government’s annual Portfolio Budget Statements. For example, for the 2019-20 financial year, a performance criteria was set for Australian universities to continue to rank highly in research excellence by maintaining Australia’s share of the world’s top 10 per cent most highly-cited research publications above the OECD average.

2. **Implementing R&D policies**

4) **Policy initiatives in place.** What are the main policy initiatives implemented in your country with the aim of improving national R&D performance? For each policy initiative, please provide the following details:

The Australian Government supports R&D (and innovation more broadly) by investing in education, science and research, and infrastructure; incentivises business R&D and innovation investment; and removing regulatory obstacles such as restrictions around employee share ownership and access to crowd-sourced equity funding. Expenditure on support programs is published in the Science, Research and Innovation Budget Tables in around September or October each year. These tables show that the Australian Government invested around AUD 9.6 billion in research and development in 2018-19. Around AUD 2.1 billion directly supports business sector R&D, with the remaining funds going towards research in universities and research agencies such as CSIRO, the
DST Group, and Rural R&D Corporations. Further support for science, research and innovation is also provided through Australia’s state and territory governments.

Some of Australia’s largest initiatives include:

<table>
<thead>
<tr>
<th>Name of Policy</th>
<th>Year of adoption</th>
<th>Type of instruments</th>
<th>Policy objective</th>
<th>Amount of funding</th>
<th>Institution in charge</th>
</tr>
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<tbody>
<tr>
<td><strong>R&amp;D Tax Incentive (R&amp;DTI)</strong></td>
<td>2011</td>
<td>Indirect financial support</td>
<td>To support additional business investment in R&amp;D, the program aims to encourage businesses to invest in additional R&amp;D, the R&amp;D they would not otherwise do, and is likely to benefit the wider Australian economy.</td>
<td>N/A</td>
<td>Department of Industry, Science, Energy and Resources</td>
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<tr>
<td><strong>Research Training Program (RTP)</strong></td>
<td>2017</td>
<td>Direct financial support</td>
<td>These programs provide block grants, on a calendar year basis, to higher education providers (HEPs). The RTP provides support both domestic and overseas students undertaking higher degrees by research study, while the RSP supports the systemic cost of university research. Both programs include incentives for collaboration with industry.</td>
<td>More than 500M (EUR per year)</td>
<td>Department of Education</td>
</tr>
<tr>
<td><strong>ARC Linkage Program</strong></td>
<td>2016</td>
<td>Direct financial support</td>
<td>The Linkage Program comprises of schemes aimed at building collaborative research partnerships between researchers in universities and other organisations, The Linkage Program aims to support innovation at all levels, involving end-users from government, not-for-profit organisations and both domestic and international industry.</td>
<td>100M-500M (EUR per year)</td>
<td>Australian Research Council (ARC)</td>
</tr>
<tr>
<td><strong>National Health and Medical Research Council Investigator Grants</strong></td>
<td>2 October 2019, restructured the program in 2018.</td>
<td>Direct financial support</td>
<td>This grant provides the highest-performing researchers at all career stages with funding for their salary (if required) and a significant research support package. It provides the investigator with flexibility to pursue important new research directions as they arise and to form collaborations as needed, rather than being restricted to the scope of a specific research project.</td>
<td>100M-500M (EUR per year)</td>
<td>National Health and Medical Research Council (NHMRC)</td>
</tr>
<tr>
<td><strong>Medical Research Future Fund (MRFF)</strong></td>
<td>2016</td>
<td>Governance – National strategies, agendas, and plans.</td>
<td>The MRFF provides grants of financial assistance to support health and medical research and innovation to improve the health and wellbeing of Australians.</td>
<td>100M-500M (EUR per year)</td>
<td>Department of Health</td>
</tr>
<tr>
<td>Name of Policy</td>
<td>Description</td>
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<tr>
<td><strong>Next Generation Technologies Fund</strong></td>
<td>The Next Generation Technologies Fund focuses on fundamental research and the development of future game-changing concepts that can be further matured and realised into military capability. It is a forward-looking program focussing on research and development in emerging and future technologies for the “future Defence force after next”.</td>
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<tr>
<td><strong>Rural Research and Development for Profit Program</strong></td>
<td>Realise significant productivity and profitability improvements for primary producers through generating knowledge, technologies, products or processes that benefit primary producers; strengthening pathways to extend the results of rural R&amp;D; and establishing industry and research collaborations.</td>
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<td><strong>Defence Innovation Hub</strong></td>
<td>The Defence Innovation Hub is funded at AUD 640 million to 2025–26. It accepts proposals that are ready to enter the engineering and development stages of the innovation process, from concept exploration and technology demonstration to prototyping and integrated capability demonstration and evaluation. The Defence Innovation Hub enables Defence, industry and research institutions to collaborate on innovative technologies that can be delivered as advanced capability for Defence.</td>
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<td><strong>Biomedical Translation Fund (BTF)</strong></td>
<td>The Biomedical Translation Fund will help translate biomedical discoveries into tangible products, services and outcomes to deliver long term health benefits and national economic outcomes. The Biomedical Translation Fund policy objectives are: to invest in promising biomedical discoveries and assist in their commercialisation; and by addressing capital and management constraints, to encourage the development of companies which are commercialising biomedical discoveries.</td>
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### Industry Growth Centres Initiative

**Name of Policy:** Industry Growth Centres Initiative  
**Year of adoption:** 2014  
**Type of instrument:** Governance, Collaborative infrastructures (soft and physical), and direct financial support.  
**Policy objective:** The Industry Growth Centres Initiative (the Initiative) is helping Australia to be more internationally competitive by enabling industry sectors to build stronger futures for themselves. It aims to build capability and stronger industry systems through a collaborative, industry-led approach.  
**Amount of funding:** 20M-50M (EUR per year)  
**Institution in charge:** Department of Industry, Science, Energy and Resources (DISER)

### National Health and Medical Research Council (NHMRC) Synergy Grants

**Name of Policy:** National Health and Medical Research Council (NHMRC) Synergy Grants  
**Year of adoption:** 2019  
**Type of instrument:** Direct financial support  
**Policy objective:** The expected outcomes of Synergy Grants are: multidisciplinary research that addresses major problems in all areas of human health and medical research, from discovery to translation, and highly collaborative teams of diverse researchers including by gender, career stage and cultural background, working together to address major problems in human health.  
**Amount of funding:** 20M-50M (EUR per year)  
**Institution in charge:** National Health and Medical Research Council (NHMRC)

### Growing Australia’s Space Industry – Partnership with NASA

**Name of Policy:** Growing Australia’s Space Industry – Partnership with NASA  
**Year of adoption:** 2019  
**Type of instrument:** Direct financial support and Governance.  
**Policy objective:** Growing Australia’s Space Industry is an AUD 150 million investment for Australian businesses and researchers to join NASA’s plan to return to the Moon and on to Mars, and to support related activities.  
**Amount of funding:** 5M-20M (EUR per year)  
**Institution in charge:** Australian Space Agency

### International Space Investment (ISI)

**Name of Policy:** International Space Investment (ISI)  
**Year of adoption:** 2018  
**Type of instrument:** Direct financial support  
**Policy objective:** The International Space Investment provides AUD 15 million to strategic space projects that grow the Australian space industry and build collaboration with international space agencies.  
**Amount of funding:** 1M-5M (EUR per year)  
**Institution in charge:** Australian Space Agency

Other initiatives Australia currently has to enhance national R&D performance include:

- CSIRO-SME Connect  
- CSIRO Innovation Fund  
- Rural R&D Corporations (RDCs)  
- The National Primary Industries Research, Development & Extension Framework  
- Advanced Manufacturing Fund (AMF)  
- Business Research and Innovation Initiative (BRII)  
- Cooperative Research Centres (CRC) Program  
- Global Innovation Strategy (GIS)
5) **Successful policies.** What policies have been most successful (currently or in the past) in driving R&D performance? What are considered the main factors of success? (These may be a mix of policy and other contextual factors). Please provide qualitative and quantitative evidence when possible.

Australian government agencies generally consider a policy or program to be successful if it meets the following criteria:

**Measures of success:**

- The program meets its stated policy objectives.
- The program meets its stated key outcomes.
- The program aligns with the government’s rules and guidelines, as well as, the government’s objectives in relations to research and innovation.
- The assessment process of the program (e.g. in grant programs) comply with the guidelines stated in the policy or measure.
- The responsible agency has implemented effective monitoring, assurance, evaluation, and reporting arrangements for the program.

Below are two examples of successful programs and the outcomes they have achieved.

**Examples of Successful Programs:**

**Cooperative Research Centres (CRC)**

The CRC Program provides financial support to encourage more collaborations between researchers and industry in specific fields. The program commenced in 1990 and is considered to be a long-standing and successful program that achieves its policy objectives. It delivers strong outcomes to contribute to Australia’s business-research R&D expenditure and business-research collaboration. Success of the program measured through key outcomes (as at January 2020):

- Over the life of the program, AUD 4.8 billion of Government funding has supported the establishment of 225 CRCs and 111 CRC Projects (CRC-P). Participants have committed a further AUD 14.9 billion in cash and in-kind contributions. 139 spin-off companies have emerged out of the program. 31,859 commercialisation agreements signed. 118,171 publications produced. Over 4,000 PhD graduates supported. 5,274 former students employed by end-users. CRCs and CRC-Ps have resulted in 36,063 collaborations, of which 11,050
collaborations provided Australian companies with international exposure across 115 different countries and 25,013 occurred within Australia.

- Impact studies of the program indicated it is delivering strong net positive economic benefits for Australia, exceeding its costs by a factors of 3.1.

**Global Innovation Strategy (GIS)**

The GIS is part of the National Innovation and Science Agenda (NISA), a long-term approach of 24 complementary measures to encourage innovation across the economy, and has been successful in driving R&D performance.

Evaluations of the initiative have found that the Strategy has been well implemented and performance metrics indicate positive outcomes have been achieved. From the initial launch of the program in 2016, until the end of December 2017, the leveraged grant funding exceeded expectations and minimum requirements.

The Strategy comprises of four separate programs: Global Connections Fund (GCF), Global Innovation Linkages (GIL), Regional Collaborations Programme (RCP), and Landing Pads. GCF grants allow participants to implement their ideas as research-industry collaboration, which is helping to drive R&D performance. Grants allow the opportunity to identify additional collaborative partnerships, and increase the likelihood of working with other international partners in the future.

The first round of GCF exit surveys reported the following key findings:

- 62 per cent of respondents reported that they had identified additional collaborative partners or individuals and/or developed additional business or research opportunities.
- 90 per cent of respondents reported the program had led to healthy and growing collaborations and increased the likelihood of working with other international partners in the future.
- 53 per cent of respondents reported they had applied for a provisional patent, or that one may be developed in the future.

Additionally, over two rounds, the global partners from the GCF bridging grants have made cash or in-kind contributions totalling 156 per cent of the Australian Government’s investment. In the first round alone, GIL global partners made cash or in-kind contributions totalling 161 per cent of the Australian Government’s investment and for RCP it was 108 per cent.

6) **Unsuccessful policies.** Are there any examples of policies implemented in the past in your country to increase R&D levels that did not reach the intended objectives? What were the factors that hindered their success? Please provide qualitative and quantitative evidence when possible.

No unsuccessful policies were reported by any of the Australian government agencies. However, some programs did identify areas which could be improved. Sometimes polices which are implemented have unintended consequences. This could result in the policies not being able to reach its intended objectives.

An example of this is the Research and Development Tax Incentive (R&DTI). The 2016 Review of the program showed that the program falls short of meeting its stated objectives of additionality and spillovers. The Review found a number of areas where
improvements could be sought to increase the effectiveness and integrity of the program. Based on best estimates of additionality and spillovers, the review found that the program could be better targeted.

In response to the Review, the Government announced reforms to the R&DTI as part of the 2018-19 Budget. The reforms aimed to ensure the program better meets its policy objectives while improving its sustainability, integrity, and administration. Legislation introduced on 20 September 2018 was considered by the Senate Economics Legislation Committee, which recommended the Senate defer consideration until further analysis of the reforms could be conducted.

The Government agreed to refine the legislation and introduced the Treasury Laws Amendment (Research and Development Tax Incentive) Bill 2019 into Parliament on 5 December 2019. The Bill was passed by the House of Representatives, and was referred to the Senate Economics Legislation Committee for inquiry and report by 30 April 2020. The reporting date for the inquiry was later extended to 7 August 2020. The Government will consider the outcomes from the report once it is released.

Another example is the Australian Research Council (ARC)’s Administration of the National Competitive Grants Program (NCGP). In the performance audit report published by the Australian National Audit Office (ANAO) in 2019, it found that overall the program was effective. However, the report found that the program’s performance indicators and monitoring and assurance arrangements should be strengthened. Most of the ARC’s key performance indicators (KPIs) are relevant, but not all are reliable and do not include any efficiency measures.

Its assurance arrangements could be more risk-based to provide greater assurance that administering organisations comply with grant agreement requirements and the program is achieving its objectives.

Most other programs implemented to increase R&D have reported they are on track, successful, or are yet to be evaluated. However, some common factors which programs have reported as hindering the programs’ success includes:

- Lack of available funding.
- High volume of quality candidates meaning application success rates where low deterring potential candidates from applying for the program.

7) Implementation challenges. What have been the main challenges when implementing policies aimed at increasing R&D performance? Please provide details.

There are a few main challenges when implementing policies aimed at increasing R&D performance. These include:

1. Generating public awareness of programs to encourage uptake and the submission of high quality applications.
   - For general programs – Spreading awareness of the programs across research and industry to ensure widespread uptake.
   - For targeted programs – Ensuring adequate targeting of communications and marketing to specific audiences to ensure awareness of the program and to encourage high quality applications.

2. General challenge in getting business to engage effectively with the research sector.
3. Often, researchers, government agencies, and the private sector work to different timeframes. This creates challenges when engaging with and facilitating interactions between different sectors.

4. Changing Global Market R&D landscape: Changes to current and emerging trends including changes to global markets, international competition, technological disruption, evolving industry structures, and supply chains are an ongoing challenge. Many programs are amended over time to stay relevant and adaptive to market trends. To minimise impact of program changes to stakeholders, some programs have implemented transitional arrangements to allow industry to adjust to the new program.

5. Administration of Program: Some programs, such as the Global Innovation Strategy (GIS), experienced challenges due to its complex delivery model which includes multiple agencies and policy teams.

6. Resources:
   - Due to limited funding, some high quality applicants for high demand programs were unsuccessful in gaining funding.
   - Ensuring agency resources and procedures are adequate to effectively manage the size and complexity of the program.

7. Logistics: Many programs listed logistical challenge as one of its key implementation challenge. This results from having programs which span across different geographical locations and industry sectors. Some of the logistical challenges faced by programs include difficulties in providing timely support, advice, and test equipment. Additionally, other challenges include increased costs, increased complexity in time management, and having to deal with different industry cultures.

8. Other:
   - Some programs, such as the SBAS Testbed, experienced regulatory issues due to the implementation of projects across Australia and other countries which resulted in some project slippage.
   - Australia’s federal structure can also add complexity, with different programs with overlapping objectives offered at different levels of government.

8) The role of policy and other factors. To what extent was the evolution of R&D performance in your country driven by policy or by other contextual factors? Please provide details and quantitative evidence where possible, and specifying which factors (e.g. human resources, sectoral industrial profiles, lack of large research intensive firms, public budget constraints) particularly supported or hindered R&D investments. Please also refer to any evaluation conducted to assess the impact of policy instruments on R&D intensity.

As noted in the response to Question 1, Australia’s R&D performance is predominantly driven by its industrial mix and the broader factors that drive R&D in its major industry sectors. In particular, the cyclical nature of the mining sector has had a significant impact on Australia’s levels of BERD intensity, and subsequently GERD intensity, over time. This conclusion is supported by AlphaBeta’s report, Australian Business...
Investment in Innovation, which forms Appendix A to Innovation and Science Australia’s (ISA’s) report, Stimulating Business Investment in Innovation published in February 2020.

9) **Policy lessons.** What are the main policy lessons learned during the implementation of policies for increasing R&D performance? (e.g. high or low effectiveness of specific policy measures, how to take into account specific country conditions)

Most programs implemented by the Australian government to enhance R&D performance are regularly evaluated to ensure the program is achieving its core objective and is the best use of taxpayer’s money. The lessons learned can be separated into two categories – successes and potential improvements.

**Lessons learned – Successes**

- The use of an Expression of Interest process for programs such as the Satellite Based Augmentation System Test-bed Program, was particularly successful in helping to identify new and unanticipated projects, applications and innovations.
- The engagement of other relevant agencies can help increase the success of programs, as these agencies are able to further promote the programs through their networks, both domestically and internationally. The engagement of other agencies can also provide a significant value-add by engaging and providing access to their experienced networks.
- For programs such as the National Health and Medical Research Council Development Grants where applications were assessed on multiple criteria, requiring applicants to submit a specialised business case for the criterion with the heaviest weighting has been successful at helping assessors to identify applications that best match the objectives of the program.
- Some other programs found that refocussing the programs to be more industry-led and outcomes focused has helped the programs better meet its objectives. By listening to the views of internal and external stakeholders, steps can be undertaken to improve the programs and improve efficiency. It can also encourage more businesses to engage with the programs and leverage more investment by industry into research.

**Lessons learned – Potential Improvements**

- Tightening eligibility criteria could help raise application success rates.
- Better collaboration and program structures can improve processes and reduce red tape.
- Better targeting of the program to ensure the objectives of the program are being met.
- Taking proactive actions to encourage applications to the program especially for lesser known programs with high social benefits. An example is the National Health and Medical Research Council (NHMRC) Partnership Projects Scheme, where organisations that are normally not able to access funding through most NHMRC funding mechanisms are highly valued as partners in the scheme and can help improve the health of Australians.
Increasing investment into programs can help broaden their scope and encourage more R&D, which helps Australia to remain competitive.

Where a program involves levy payments, the program should involve levy-payers in priority-setting, and make it clear what outcomes the levy payments will be used to achieve.

3. Innovation disparities (module 1 of the project)

10) Innovation disparities. Which distributional aspects (i.e. social, sectoral and/or geographical disparities) has received more innovation policy attention in your country? What evidence are you using to explore the geographical and sectoral distribution of R&D performance in your country? Please provide the reference and link to that evidence where possible.

In Australia, the vast distance between major cities and regional and rural centres can be a challenge for knowledge flow and cluster development, which are important factors in fostering innovation.

As agriculture and resources dominate Australia’s regional economies, programs which support R&D and innovation in regional areas tend to target these industries. These include: the Incubator Support Program, the Food and Agribusiness Industry Growth Centre and funding for agricultural Research and Development Corporations.

There is also a strong level of support for Northern Australia, through a dedicated Northern Australia agenda.

The Office of the Chief Economist at the Australian Department of Industry, Science, Energy and Resources has produced a research paper “Australian geography of innovative entrepreneurship”, and interactive Innovation Map which identifies the location of innovation activities (R&D expenditure, patent and trademark applicant counts) and business creation (new businesses) across Australia over time. The Australian Innovation System Monitor is another resource that explores the impact of innovation on business, industry and national performance. The monitor also outlines challenges and future opportunities for Australian innovation.

11) Territorial disparities. Are territorial inequalities in innovation performance explicitly addressed by policies discussed in question 4 or other policies aimed at improving R&D performance? (e.g. measures to promote the distribution of R&D expenditures across regions; measures targeted at less innovative regions) Please explain how these policies promote inclusiveness and provide quantitative evidence of results/impacts achieved where available.

As above.

12) Sectoral disparities. Are sectoral disparities in innovation performance explicitly addressed by policies discussed in question 4 or other policies aimed at improving R&D performance? (e.g. measures to promote the distribution of R&D expenditures across sectors; measures targeted at less innovative firms or sectors) Please explain how these policies promote inclusiveness and provide quantitative evidence of results/impacts achieved where available.

Australia provides support for business R&D through the R&D Tax Incentive, which is a broad-based, demand driven program that is accessible to all industry sectors. It is Australia’s largest program for supporting business R&D. Other programs for
addressing sectoral disparities include the government’s Entrepreneur’s Programme, which is a structured program supporting businesses to innovate, compete and grow. This program provides support for businesses across all industries, including those who do not traditionally have a high level of R&D expenditures.

The Australian Government’s Cooperative Research Centres (CRC) and Industry Growth Centre programs aim to address some of the sectoral disparity in R&D performance. The CRC program helps industry to partner with the research sector to collaboratively solve industry-identified issues. Industry Growth Centres are industry-led initiatives that aim to drive innovation, productivity and competitiveness. These programs invest in sectors of lower R&D expenditures, relative to gross value added (GVA). Sectors that are supported include the construction, utilities and agriculture industries.

13) **Other country characteristics.** How are other specific characteristics of the country (e.g. sectoral structure, R&D strengths) taken into account when designing innovation policies aimed at improving R&D performance? (E.g. measures targeting specific research areas or industry sectors, etc.)

The Australian Government’s support for innovation recognises the role of R&D in driving productivity and providing benefits to the Australian community. Improving R&D is important to ensure Australia maximises its strengths and natural advantages while positioning Australian industries for future opportunities. Australia is a culturally diverse nation with a highly skilled workforce and one of the strongest performing economies in the world. Over the past 50 years, Australia has developed a diversified economy with strengths in the mining and agricultural sectors, as well as, in manufacturing and services. It has also become increasingly economically integrated with the countries of East Asia.

As previously noted, Australia predominantly supports business investment in R&D through an indirect tax incentive that broad-demand-driven. In addition, the Government continues to focus direct support on Australia’s advanced manufacturing and resource industries, which are traditionally areas of R&D strength. A number of programs have been implemented, and others changed to ensure that these industries are supported as they undergo transition in the broader economy. These include the Advanced Manufacturing Fund; rounds dedicated to critical minerals in the Cooperative Research Centre Projects (CRC-P) initiative; and the Industry Growth Centres initiative, which include dedicated centres focussed on advanced manufacturing, mining and resources.

Australia has burgeoning financial and professional services industries, and the Government is supporting these industries through increased support for cyber security research and innovation. These industries rely on secure computer systems and networks; further research in this field is supported through a Cyber Security CRC and the AustCyber Industry Growth Centre. Australia also has a focus on innovation in waste and recycling; space; and natural disaster resilience, due to the specific challenges and opportunities faced by the Australian economy. Each of these areas have a specific Cooperative Research Centre (CRC) dedicated to help solve industry-identified issues: the Fight Food Waste CRC; the SmartSat CRC, and Bushfire and Natural Hazards CRC. There has also been CRC-P rounds dedicated to plastic waste and recycling.

Australia has a strong higher education sector, which drives a significant proportion of Australia’s R&D expenditure. A number of the Australian Government’s innovation
policies are designed to leverage this expertise to improve collaboration between businesses and the research sector to drive better commercialisation of research. This includes programs such as the Australian Research Council’s Linkage Program and the Cooperative Research Centre program. Australia also has strong publicly-funded research organisations, including the Commonwealth Science and Industrial Research Organisation (CSIRO), the Defence Science and Technology Group (DST), the Australian Nuclear Science and Technology Organisation (ANSTO), and the Australian Renewable Energy Agency (ARENA). The Australian Government also provides specific support for R&D in the health and agriculture sectors through mechanisms like Rural Research Development Corporations, the National Health and Medical Research Council (NHMRC), and the Medical Research Future Fund (MRFF).

4. R&D policies in the digital age (module 2 of the project)

14) **Policy strategies.** Do current R&D and innovation policy debates and/or policy strategies in your country address the opportunities and challenges of digital and AI-driven innovation? Please provide details regarding current debates in your country or how those have been integrated in innovation strategies.

Australia currently does not have an AI strategy. However, in the 2018-19 Budget, the Australian Government invested AUD 29.9 million to build capability in and support the responsible development of artificial intelligence in Australia through Cooperative Research Centre Projects and PhD Scholarships that focused on AI-related topics.

Australia recognises that developing global ethical standards and norms around the development and use of AI is fundamental if nations and peoples are to benefit from this emerging technology. In May 2019, Australia committed to the OECD’s Principles on Artificial Intelligence that aim to ensure nations are responsible stewards of trustworthy AI. Australia reinforced this commitment at the G20 in June 2019 when member states adopted human-centred AI principles.

In November 2019, the Australian Government released a set of AI ethics principles to help guide businesses and governments seeking to design, develop, deploy and operate AI in Australia. The principles are aspirational and intended to provide organisations with a signpost as to how AI should be developed and used in Australia. The principles are voluntary and intended to complement existing AI-related regulations.

The eight principles are: Human, social and environmental wellbeing, Human-centred values, Fairness, Privacy protection and security, Reliability and safety, Transparency and explainability, Contestability, Accountability.


15) **Policy initiatives.** Have specific policy initiatives to foster R&D been created or adjusted in view of changes in research and innovation practices brought about by digital technologies (e.g. higher importance of data, servitisation dynamics, etc)? Please provide details of those changes, making reference to the specific policies concerned.

Digital technologies have made little changes to the way Australia’s R&D policy initiatives are developed and implemented.
One major change is the development and funding of AI specific R&D policy initiatives which include:

- AUD 25 million for Cooperative Research Centre (CRC) Projects with a specific focus on AI.
- AUD 1.4 million for AI-focussed PhD scholarships.
- AUD 1.5 million for the development of online resources for teaching AI in schools. This includes:
  - Digital Technologies Hub
  - National Learning Library
  - AI in Schools program
- AUD 0.36 million for development of an AI Technology Roadmap and AUD 0.51 million for development of an AI Ethics framework.
- AUD 0.1 million with matching funding from industry to develop an AI Standards Roadmap.

Additional programs have been implemented to support digital technologies in a range of industries. These include:

- **CSIRO Innovation Fund**
  
  The CSIRO Innovation Fund, managed by Main Sequence Ventures, is a $242 million venture capital fund to invest in new spin-off companies, and existing startups and SMEs, which are developing technology from, or having ongoing research connections with, CSIRO, universities and other publicly funded research agencies.

- **Rural R&D for Profit Program**
  
  Rural R&D for Profit is a $200 million competitive grants program providing grants to rural research and development corporations (RDCs) for collaborative research that enhances farm-gate profitability and supports the continued innovation of Australia’s primary industries.

- **Defence Innovation Hub**
  
  The Defence Innovation Hub is funded at $640 million to 2025-26. It accepts proposals that are ready to enter the engineering and development stages of the innovation process, from concept exploration and technology demonstration to prototyping and integrated capability demonstration and evaluation. The Defence Innovation Hub enables Defence, industry and research institutions to collaborate on innovative technologies that can be delivered as advanced capability for Defence.

- **Cooperative Research Centres (CRC) Program**
  
  The CRCs program supports collaboration between research and industry. Announced in the 2018-19 Budget, the Australian Government committed $25 million in additional funding for the CRC program to support additional CRC Projects with a specific focus on artificial intelligence (AI).

- **Industry 4.0 Testlabs for Australia Pilot Program**
A pilot program that provides $6 million in matched funding to establish six Industry 4.0 testlabs at six Australian universities.

- **Industry Growth Centres Initiative**

  The Industry Growth Initiative aims to drive innovation, productivity, and competitiveness by providing funding for Growth Centres in six sectors of competitive strength and strategic priority in the Australian economy: Advanced Manufacturing; Cyber Security; Food and Agribusiness; Medical Technologies and Pharmaceuticals; Mining Equipment, Technology and Services (METS); and Oil, Gas and Energy Resources.

Although, digital technologies have not affected many of Australia’s R&D initiatives to date, changes in digital technology may be considered in the design and implementation of any future initiatives.

16) **New targets.** Do the abovementioned digital/AI-related innovation strategies or initiatives include quantitative targets? If so, please provide details on the specific targets and years of adoption, deadlines to achieve them and documents setting them.

N/A