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The RRI-Practice is a 3-year project under Horizon 2020. Its aim is to understand the barriers and drivers to the successful implementation of RRI both in European and global contexts; to promote reflection on organisational structures and cultures of research conducting and research funding organisations; and to identify and support best practices to facilitate the uptake of RRI in organisations and research programmes. The project is reviewing RRI related work in 22 research conducting and research funding organisations and will develop RRI Outlooks outlining RRI objectives, targets and indicators for each organisation.

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- Dr Chris Hatherly, Director Science Policy, Australian Academy of Science

Abstract
This report provides an overview of RRI Practice in Australia. It presents results from a review of documentation and observations of evidence of RRI and associated pillars in the Australian national context as well as two research agencies. Namely, the University of Queensland as a research conducting organisation and CSIRO as a research conducting and research funding organisation. Through a series of document analyses, interviews and workshops the report provides evidence of where elements of RRI in Australia exist. It also provides some recommendations for policy makers both in Australia and the EC.
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**List of abbreviations**

AIBN – Australian Institute for Bioengineering and Nanotechnology  
ALA – Atlas of Living Australia  
AICD – Australian Institute of Corporate Directors  
ARC – Australian Research Council  
BEL – Faculty of Business, Economics and Law  
CALD – Cultural and Linguistically Diverse  
CSIRO – Commonwealth Scientific and Industrial Research Organisation  
CSC – Commonwealth Science Council  
DET – Department of Education and Training  
DIIS – Department of Innovation, Industry and Science  
DIISR – Department of Innovation, Industry, Science and Research  
EAIT – Faculty of Engineering, Architecture and Information Technology  
ERA – Excellence in Research for Australia  
EU – European Union  
GERD – Gross Expenditure on Research and Experimental Development  
GISERA – Gas Industry Social and Environment Research Alliance  
HABS – Faculty of Health and Behavioural Sciences  
HASS – Faculty of Humanities and Social Sciences  
HREC – Human Research Ethics Committee  
IBM – Institute for Molecular Bioscience  
IP – Intellectual Property  
MBS – Faculty of Medicine and Biomedical Sciences  
NHMRC – National Health and Medical Research Council  
NIHEWS – National Indigenous Higher Education Workforce Strategy  
NISA – National Innovation and Science Agenda  
NLA – National Library of Australia  
NRP – National Research Priorities  
OECD – Organisation for Economic Co-operation and Development  
PMSEIC – Prime Minister’s Science, Engineering and Innovation Council  
PRO – Public Research Organisation  
QBI – Queensland Brain Institute  
RRI-Practice – Responsible Research and Innovation in Practice  
SAGE – Science in Australia Gender Equity  
SMI – Sustainable Minerals Institute
SMiS – Scientist and Mathematicians in School
SoE – Statement of Expectations
STEM – Science, Technology, Engineering and Mathematics
STEMM – Science, Technology, Engineering, Mathematics and Medicine
SWAN – Scientific Women’s Academic Network
TAFE – Technical and Further Education College
UA – Universities Australia
WGEA – Workplace Gender Equality Agency


1 Executive summary

Responsible research and innovation (RRI) has emerged in recent years, especially in Europe, as a science policy framework. Understanding whether the framework is evident in other countries who also strive to be ‘responsible’ in research and innovation is of interest to the European Commission (EC) who funds research in RRI. It also provides an opportunity to extend the learning around what RRI as a science policy approach can bring to other national research agendas.

This report focuses on Australia and how Australian actors across the Australian science policy landscape are embracing components of responsible innovation, either separately as individuals or collectively at an institutional level. It does this by examining what is taking place at the national level that is relevant to RRI as well as by examining in more detail institutional approaches to RRI in both a research conducting and research funding organisation. The two institutions of study were the University of Queensland and the Commonwealth Scientific and Industrial Research Organisation (CSIRO).

As a subset of the international project RRI Practice, the methodology used for this research was the same across all research partners to allow for comparison of results - the second major stage of the project. Methods included document analyses, interviews and workshops with relevant actors from across the Australian national science and innovation landscape as well as the two institutions. The overall aims included to:

- harvest experiences on how research conducting and research funding/policy organisations work to strengthen RRI related values
- support the systematic development of such work in these organisations
- generate scalable knowledge about good practices for the wider implementation of RRI

While it was found that RRI was not an overt concept in Australia many of the pillars of RRI were evident to varying degrees at both the national and institutional level. In conceptualising RRI, it could be suggested that on the whole, the approach to RRI is relatively ad hoc. However, this does not diminish the importance of ‘Responsible Innovation’ in Australia. Most of the individuals who participated in the research suggested that the elements of RRI are seen as important tools for building public trust in science and technology. The feeling being that they may ultimately lead to greater support for funding of science at both the national and institutional level.

A variety of case studies proffered throughout this report that demonstrate good practices. These provide opportunities for mutual learning - a key objective of this comparative approach to RRI Practice. For example, the Cooperative Research Centre (CRC) program is a tried and tested industry led, merit based funding source that encourages collaboration between industry, research and community. Since its inception in 1990 it has resulted in over 280 collaborations being funded. Similarly, CSIRO has considered more non-traditional forms of measuring societal engagement by developing an Impact Framework and systematic methodology for measuring this and maximising the impact of their research.

While many of the pillars of RRI are evident across the Australian research and innovation landscape the question remains whether an RRI approach will deliver more value than the current ad hoc approach? And if so, how will RRI values be embedded in future research? Given the increasing demands of researchers’ time it is clear that it will have to be simple and easy to use without creating unnecessary burdens on researchers or institutions.
2 Introduction: about the report

Responsible research and innovation (RRI) has emerged in recent years, especially in Europe, as a science policy framework. It seeks to align technological innovation with broader social values, to support institutional decision making in relation to the goals of research and innovation under conditions of uncertainty and ambiguity. RRI also aims to engage the public and other actors across the science and technology landscape to produce ethically acceptable, sustainable and socially desirable research and innovation outcomes – particularly in relation to grand challenges.

von Schomberg (2013, p. 63) defines RRI as:

> A transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view to the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society).

To better understand the application of the RRI Framework across the world the European Commission (EC) funded this project – RRI-Practice. Using dimensions of institutional organisational theory the RRI-Practice project aims to:

- harvest experiences on how research conducting and research funding/policy organisations work to strengthen RRI related values
- support the systematic development of such work in these organisations
- generate scalable knowledge about good practices for the wider implementation of RRI
- use dimensions of institutionalist approaches in organisational theory to clarify challenges and conditions for successful RRI work.

This report focuses on RRI and associated practices in Australia. It first outlines the national research and innovation context and identifies the key societal actors who contribute to ‘Responsible Innovation’ in Australia. The report then focuses on how the principles and pillars of RRI are applied in a research conducting organisation, the University of Queensland, and in Australia’s national research organisation, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) as both a research funding and conducting organisation. The study identifies good practices and reflects on how the RRI Framework is being applied at both the institutional and national level. Good practices are often highlighted in this report through the use of breakout boxes. Through the process a series of suggested ‘Outlooks’ have been developed for each institution based on their application of the RRI concepts. These ‘Outlooks’ can be found in the Appendices for each institution. Finally, the report compares the similarities and differences across Australia and summarises some early recommendations for policy makers relevant to Australian institutions and the EC.
3 Methodology

3.1 Analytic approach

A key component of the RRI-Practice project was to ensure a comparative analysis across countries, therefore a common framework was essential. The development of this framework and analytic approach is detailed in the RRI-Practice project document and therefore not repeated here. The framework was based on institutional theory, inspired by Scott (1987, 2003) and included the following main dimensions:

Table 1: Framework for studying organisations

<table>
<thead>
<tr>
<th>Aspects of organisations</th>
<th>Structural issues</th>
<th>Cultural issues</th>
<th>Interchange dynamics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mandates, legislative frameworks, formal hierarchies</td>
<td>Culture, informal routines, informal reward systems, focus on management</td>
<td>Policy learning, pressures from key stakeholders (owners, the public, etc.)</td>
</tr>
<tr>
<td>Potential drivers for RRI</td>
<td>Active ownership (e.g. the state), legislation that includes social responsibility as a core element of the mandate, formal evaluation criteria adapted to RRI goals</td>
<td>RRI dimensions become mainstreamed, managers start seeing RRI dimensions as an obvious part of their responsibilities, no social acceptance for neglect of the RRI dimensions</td>
<td>Pressure from the media, success stories from organisations considered to set ‘gold standards’ in the field</td>
</tr>
<tr>
<td>Potential barriers to RRI</td>
<td>No formalised pressures to conform to RRI dimensions</td>
<td>Informal incentive systems reward economic output/excellence/etc., effectively marginalising the RRI dimensions</td>
<td>Important stakeholders reward, for instance, excellence and economic performance to a greater extent than RRI related matters</td>
</tr>
</tbody>
</table>

Methods

| Analysis of formal documents | Interviews with employees at different levels in the organisations, focus groups | Media analysis, interviews with top management |

To better reflect the national landscape analysis was undertaken at the national level as well as across to institutions. The University of Queensland as a research conducting organisation and CSIRO as a research funding (and conducting) organisation. For each the analytical approach included a document analysis, one on one interviews of up to one hour and a workshop with a cross section of representatives. Further details for each are listed below.

1 RRI-Practice project description (Part B) available at www.rri-practice.eu
3.2 National mapping

3.2.1 Document analysis, national workshop and interviews

To understand the national landscape for RRI the three main analytical approaches included a document analysis, a national workshop and some one on one telephone interviews of up to one hour in length.

The document analysis involved a systematic review of documents from the major relevant government departments (i.e. DET and DIIS), national research organisations (NHMRC and ARC), parliamentary committees and advisory bodies (Chief Scientist, Chief Economist, Innovation and Science Australia, Inspiring Australia and Productivity Commission), as well as other interested parties (Business Council of Australia). This naturally then led to a snowball approach leading to other documents through linked references. In total, 47 documents were systematically analysed, with countless others contributing to the national case study.

In addition a National Workshop was hosted on the 7th of February, 2017\(^2\). In total 13 participants, alongside the two facilitators from UQ, attended the workshop. Participants were from a range of institutions including research, government, civil society, industry and not for profit organisations. Nine (9) interviews were subsequently undertaken with representatives from a cross section of public and private organisations involved in the Australian science and innovation landscape. This involved funding bodies, industry\(^3\), public authorities, science and innovation influencers, as well as individuals in the research sector.

3.3 The organisational studies

3.3.1 Document studies, interviews, workshops

For both institutions studied - UQ and CSIRO – document analysis was also undertaken. Most of the documents were available on the website which meant it was these documents which formed the major component of the thematic document analysis undertaken for this report. However, some strategic externally facing organisational documents such as annual reports, strategic plans, corporate plans, enterprise agreements and some internal documents were also included in the thematic analysis.

A number of interviews of up to one hour in length were held across both institutions. In UQ, individuals who had responsibilities that were directly aligned to the RRI dimensions and pillars were first approached alongside a number of senior leaders, where possible. Others who had experience within the science and innovation space were also invited to participate. This resulted in 18 interviews across the organisation. In CSIRO, an organisation wide email invitation was sent to groups and organisational units inviting people to participate. In addition, targeted emails were sent to those in leadership positions or to those whose position overlapped with the RRI pillars. In total 15 individuals participated in one on one interviews as part of the data gathering stage. Given the size of both organisations these responses need to be treated with some degree of caution. However, choices of participants was related to their position within the organisation and its relationship to the topic.

To test the information gathered from the interviews and document analysis two workshops were held, one at UQ and one at CSIRO (via a webinar). In both focus groups, participants were purposely invited to reflect the RRI keys and dimensions, provide a broad range of perspectives, as well to

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\(^2\) Workshop was held at CSIRO’s Discovery Centre, Black Mountain, Canberra, Australia

\(^3\) Ranging from the services to financial sector.
represent the organisational structures of both UQ and CSIRO respectively. There were 11 individuals present at the CSIRO webinar and 10 present at the UQ focus group. The workshops were helpful to consolidate the key information collected through the process, cross checking interpretation of the facts and then “ground-truthing” the relevance of the Outlooks to the respective organisations.

4 The context for RRI: the national science policy system

Research and innovation in Australia crosses the private and public sectors, and includes a mix of priority-driven activity focused on commercial imperatives or national priorities, as well as a significant component of investigator-driven and ‘blue-sky’ research. Australia’s overall expenditure on research and development over time tends to sit at the OECD average of around 2% of GDP, of which around one-third (roughly A$10 billion) comprises direct and indirect (i.e., tax incentive) Commonwealth Government support, and the remaining two-thirds comprises a mix of industry, State and Territory Government and philanthropic investment.

At a Commonwealth level, Australia’s science policy system is focused largely on the public component of this investment. Key components include:

- Overarching and entity-specific legislative and regulatory instruments covering research funding councils (the ARC and the NHMRC), sovereign research funds, higher-degree training and university research, Australia’s universities and publicly-funded research agencies, as well as specific legislation and regulation on issues such as gene technology research;
- Governance mechanisms for research and innovation, including the Cabinet-level Commonwealth Science Council and a range of government portfolios, entities such as Innovation and Science Australia and officials such as Australia’s Chief Scientist;
- A suite of overarching research and innovation policy strategies and platforms, including in recent times, the National Innovation and Science Agenda (2015), National Research Priorities (iterations and variations over time), the National Research Infrastructure Roadmap (2017) and Investment Plan (2018), and the Australia 2030: Prosperity through Innovation strategy (2030);
- A small but important international science engagement strategy providing support for bilateral and multilateral research collaboration and exchange (beyond usual researcher-to-researcher collaboration) with strategic country partners;
- A range of research and innovation strategies, programs and initiatives supporting academic and industry research and innovation as well as public outreach and engagement across a variety of government portfolios and non-government entities; and
- General and sector-specific codes of practice for research and innovation.

Beyond this there is also a significant policy focus at Commonwealth Government level on STEM school education, and on promotion and engagement of women and diverse and underrepresented groups in STEM. Actors within the science policy system include policy makers and researchers and innovators themselves, as well as university, industry and not-for-profit research organisations acting individually and in association (through professional societies, peak bodies and alliances) to inform and influence policy decisions affecting Australian government support and priorities for research and innovation.

4.1 General country information

The Commonwealth of Australia, is geographically very large with a relatively small population of 24.1 million inhabitants – of which 67% live in the coastal capital cities. The majority of the population lives on the eastern seaboard across the states of New South Wales (32%), Victoria (25%)
and Queensland (20%) (ABS 2017a). Australia is also culturally and linguistically diverse, with more immigrants than emigrants and around 28.5% of its estimated population born overseas. The United Kingdom (5%) accounts for the largest group of overseas-born residents, followed by New Zealand (2.5%), China (2.2%), India (1.9%), with the Philippines and Vietnam (both 1%) (ABS 2017b) (Refer to Appendix A.1 Population Statistics for national statistics).

Of the 15.7 million people aged between 15 – 64 years of age, over 3 million (nearly 20%) are enrolled in formal education. Of those studying, 43% attend a higher education institution, 28% attend primary or secondary school, 16% attend Technical and Further Education colleges (TAFE) and 13% attend other educational institutions or organisations. One quarter (25%) of people aged between 15-64 years of age, reported their highest educational attainment as Year 11 or below, while 18% report Year 12 or equivalent. A further 18% have attained a Certificate III or IV, 17% hold a Bachelor degree, 2.8% a Graduate diploma or Graduate certificate and 5.5% hold a Postgraduate degree (ABS 2017d). Australia has a relatively low unemployment rate of 5.5% with an estimated 12.1 million people 15 years and over employed. Of these, 67% were employed in full-time positions (ABS 2017c). Almost half (46%) of all those employed usually work between 35 and 44 hours each week. The mean weekly earning in all jobs was €936 ($1,420) for males and €663 ($1,007) for females.

There exists over 2 million actively trading businesses, with the vast proportion (60%) being non-employing businesses⁴. Both medium (20-199 employees) and large (200+ employees) businesses account for only about 5% of total Australian businesses (Swanepoel & Harrison 2015). In their 2016 report, the Office of the Chief Economist identifies that Australia is predominantly seen as an innovation follower, rather than an innovation leader although there are some exceptions (DIIS & Office of the Chief Economist 2016, p.38). With many Australian businesses described as process innovators⁵, they report “a lack of access to skilled personnel as a barrier to innovation. This pertains to all kinds of skills – not just scientific, engineering or technical” (DIIS & Office of the Chief Economist 2016, p. 2).

Statistically, Australia’s Gross Expenditure on Research and Experimental Development (GERD) to Gross Domestic Product (GDP) ratio was 1.88 per cent in 2015-16, which was slightly below the OECD average of 2.36 per cent (OECD 2017). GERD as a percentage of GDP saw strong growth annually up to 2008-09, however since then has been in decline (Refer to Appendix A.2 Research Statistics). This is partially attributed to a significant decrease in business R&D spend as a percentage of GDP over the same period (Innovation and Science Australia 2016). However a reverse in this trend is expected with business R&D forecast to increase from €11.4 ($16.7) billion in 2015-16 to an estimated €28.4 ($42) billion by 2029-30 (Innovation and Science Australia 2017b). The Government R & D tax incentive scheme aims to encourage private entities to invest in R & D by providing tax offsets based on levels of investment (ATO, 2018).

Government grants are also a significant contributor to the higher education sector and research agencies. In 2014–15, the two areas received €2.4 ($3.4) billion and €1.3 ($1.9) billion respectively. The higher education sector spent €7 ($10.1) billion on R&D, over half of which came from general university funds (DIIS & Office of the Chief Economist 2016). This is expected to increase to €11.4 ($16.7) billion annually by 2029-30 (Innovation and Science Australia 2017b).

While Australia “has been successful in generating new ideas and inventions, it has not performed well in the development and commercialisation phases of the innovation cycle” (Cunningham et al. ⁴ Sole proprietorships and partnerships without employees ⁵ Innovations that reduce operating costs or improve efficiency instead of producing a new product for market
2016, p. 21). Although Australia’s overall ranking for innovation inputs is good (10th), the overall ranking for innovation outputs is significantly lower (24th), indicative of a low innovation efficiency ratio score (DIIS & Office of the Chief Economist 2016). By comparison with other OECD countries, Australia’s research translation into innovation problems is explained by the following:

“low collaboration between public sector researchers and business; many public-sector researchers not actively seeking involvement in translation activities; a lack of demand on the part of business, industry and other potential users who are not motivated to engage; a lack of effective intermediaries to facilitate links between public sector researchers and external parties” (Bell et al. 2014, p. 16).

This is mainly attributed to institutional promotions and government research funding being allocated on academic measures such as peer-reviewed papers, rather than industry collaboration or commercialisation metrics. However, with the new impact agenda this appears to be changing.

4.2 Legal and other binding normative frameworks

In relation to RRI principles, the following legal or other binding normative frameworks are applicable within Australia:

- Sex Discrimination Act 1984⁶: Federal Government legislation that prohibits, as far as is possible, the discrimination of people on the grounds of sex, sexual orientation, gender identity, marital or relationship status, intersex status, pregnancy or potential pregnancy, accommodation, breastfeeding or family responsibilities in the areas of work, education, and provision of goods.
- Workplace Gender Equality Act 2012⁷: Employers with 500 or more employees, must have a formal policy or formal strategy in place to enhance gender equality.
- Australian Education Act 2013⁸: Federal Government legislation relating to school education. Places a goal of placing Australia in placing within the top five (5) highest performing countries based on the performance of school students in reading, mathematics and science by 2025.
- Higher Education Support Act 2003⁹: Federal Government legislation outlining objectives to support the highest education system and the distinctive purposes of universities. Specifically requires a higher education system that is characterized by quality, diversity and equity of access that contributes to the development of cultural and intellectual life in Australia.
- Higher Education Funding Act 1988¹⁰: Federal Government legislation describes the funding arrangements for the higher education system.
- Racial Discrimination Act 1975¹¹: Federal Government legislation relating to the elimination of racial and other discrimination making it unlawful to exclude, restrict or preference based on race, colour, descent or national or ethnic origin.
- Primary Industry Research and Development Act 1989¹²: Federal Government legislation to make provisions for the funding and administration of R&D relating to primary industries to increase economic, environmental and social benefits to the community.
- Equal Employment Opportunities Act 1987¹³: Federal Government legislation for the establishment of an authority for the consultation, collection of statistics, policy making and

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monitoring of employment relating to lack of equality of opportunity towards women or person in designated groups.

- The *Australian Code for the Responsible Conduct of Research*, 2018 provides a framework for the responsible conduct of research, developed jointly by the National Health and Medical Research Council, the Australian Research Council and Universities Australia.

The following acts have been in discussion:

- Data Sharing and Release Act: Within an inquiry report, the Productivity Commission (2017) recommended a Data Sharing and Release Act to create systematic institutional and cultural change within Australia to realise the full value of its data, both from the public and private sector.

Universities and other research conducting institutions (including CSIRO) are governed by various institution specific Acts, either at the Federal or State level. For example, state level The University of Queensland Act 1998\(^{14}\) defines the University of Queensland’s (UQ’s) functions as;

a) “to disseminate knowledge and promote scholarship;
b) to provide education at university standards;
c) to provide facilities for, and encourage, study and research;
d) to encourage the advancement and development of knowledge, and its application;
e) to provide courses of study or instruction (at the levels of achievement the senate considers appropriate) to meet the needs of the community;
f) to confer higher education awards;
g) to provide facilities and resources for the wellbeing of the university’s staff, students and other persons undertaking courses at the university;
h) to exploit commercially, for the university’s benefit, a facility or resource of the university, including, for example, study, research or knowledge, or the practical application of study, research or knowledge, belonging to the university, whether alone or with someone else;
i) to perform other functions given to the university under this or another Act.” (Queensland Government 2014, pp. 8-9)

Similarly CSIRO, as an Australian Government corporate entity is governed by federal legislation, namely the Science and Industry Research Act 1949\(^{15}\), which defines CSIRO’s function as;

a) “to carry out scientific research for any of the following purpose:
   i. assisting Australian industry;
   ii. furthering the interests of the Australian community;
   iii. contributing to the achievement of Australian national objectives or the performance of the national and international responsibilities of the Commonwealth;
b) to encourage or facilitate the application or utilization of the results of such research;
   i. to encourage or facilitate the application or utilization of the results of any other scientific research
   ii. to carry our services, and make available facilities, in relation to science;
c) to act as a means of liaison between Australia and other countries in matters connected with scientific research;
d) to train, and to assist in the training of, research workers in the field of science and co-operate with tertiary-education institutions in relation to education in that field;
e) to establish and award fellowships and studentships for research, and to make grants in aid of research, for a purpose referred to in (a);


f) to recognize associations of persons engaged in industry for the purpose of carrying out industrial scientific research and to co-operate with, and make grants to, such associations;
g) to collect, interpret and disseminate information relating to scientific and technical matters;
h) to publish scientific and technical reports, periodicals and papers.” (Australian Government 2014c, pp. 8-9)

Alongside these publicly funded research organisations (PFRO’s), there also exists specific legislation towards national research funding organisations such as the National Health and Medical Research Council (NHMRC) and the Australian Research Council (ARC), which collectively fund almost €1.26 (AUD$2) billion of research annually. Specifically, under the National Health and Medical Research Council Act 1992, the NHMRC is the primary body that pursues activities to raise the standard of individual and public health throughout Australia as well as foster medical research and consider ethical issues relating to health (Australian Government 2014b). Similarly, the ARC under the Australian Research Council Act 2001 was established as a funding body to provide funding for research programs, but also make high quality recommendations and advice to the Minister in relation to which research programs should receive financial assistance (Australian Government 2017a).

4.3 Political and cultural values and discussions related to RRI

As a Commonwealth country the Australian Parliament operates as a bicameral system influenced by the Westminster style, House of Representatives. Politicians are elected to the Federal Parliament at least once every three years, where Parliament holds three tiers - Monarch, Senate and House of Representatives. Each of the States within Australia have their own bicameral Parliaments, with the exception of Queensland and the two Territories, who have unicameral Parliaments and elections occurring on a four-year basis. Voting in Australia has predominantly been a two party competition between Labour and Liberal-National coalition parties. The National Party (closely aligned with the more conservative Liberal party) emerged from Australia’s strong agricultural base and in the past 30 years we have seen the Green Party grow in support alongside multiple other smaller independent parties.

Science and technology is generally pluralistic within Australia, with Departments and agencies with functional responsibilities determining their own needs through a number of actors and institutions (See Appendix A.3). At the Cabinet and Ministerial level, both the House of Representatives and the Senate are informed by the Commonwealth Science Council (CSC)16 and a range of parliamentary committees. Operationally, research policy is supported by:

- **Innovation and Science Australia**: An independent Statutory Board17 responsible for providing strategic whole-of-government advice to the Government on science, research and innovation matters.
- **Coordination Committee on Innovation**: A discussion forum for Australian Government departments and agencies with responsibilities or interests that impact on the national innovation system.
- **The Chief Scientist**: Who provides high-level independent advice to the Prime Minister and other Ministers on matters relating to science, technology and innovation.

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16 Formally Prime Minister’s Science, Engineering and Innovation Council (PMSEIC). Established to ‘bring together the leaders of Australia’s industry, research and government to advise on national priorities for science and research’ (Australian Government 2014a, p. XX)
17 Chaired by Mr Bill Ferris AC, with Australia’s Chief Scientist, Dr Alan Finkel AO, serving as Deputy Chair. Board members are comprised of leading innovators, researchers and private sector practitioners relating to the research and innovation system within Australia.
The key departments with responsibility for research policy and funding are the Department of Industry, Innovation and Science\(^{18}\) (DIIS), Department of Education and Training (DET). There are also a number of other departments which directly influence research policy and funding for different sectors which include the Department of Health with respect to health and medical research (NHMRC, MRFF\(^{19}\)), Department of Defence for the Defence Science and Technology Group, Department of Environment and Energy with respect to environmental research and the Department of Agriculture and Water Resources with respect to agricultural science. The overall research governance framework for Australia is illustrated in Figure 1: Overview of the Australia’s research system governance structure. (Adapted from erawatch 2010).

The DIIS has formal oversight of tax concessions, CSIRO, the National Innovation and Science Agenda, Questacon\(^{20}\) and Inspiring Australia\(^{21}\). The main funding channels for the higher education sector stem from performance-based block grants through DET and project funds awarded competitively by the NHMRC and ARC. Universities also garner research funding through the CRC Program\(^{22}\), Rural R&D Corporations\(^{23}\) and other schemes. For most PFROs and research funding bodies, funding occurs on a tri-annual basis. However, there is perceived to be a lack of diversity in funding as well as a perception of an absence of a strategic innovation approach for funding. This has been attributed to highly ranked peer-reviewed academic journals as the key metric for research quality and subsequent block grant funds to universities (erawatch 2010). Australia’s research organisations also underperform in measures of university and end-user collaboration for research. In response, as part of the National Innovation and Science Agenda (NISA), in 2015 the government announced “greater collaboration between universities, industry and other end-users of research” (Australian Government, ARC & DET 2016, p. 2).

Figure 1: Overview of the Australia’s research system governance structure. (Adapted from erawatch 2010)

To focus public funding on areas relevant to major economic, social and environmental challenges, in 2002, the Australian Government introduced Australia’s first National Research Priorities (NRP) (see Figure 2). Each of the four priorities were elaborated into a set of 17 goals, that provided a clear

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18 Previously the Department of Innovation, Industry, Science and Research (DIISR)
19 MRFF - Medical Research Future Fund
20 The National Science and Technology Centre
21 National strategy for engagement with the science to promote science and science literacy in Australia
22 Supports industry-led collaborations between industry, researchers and the community
23 Co-Investment by the Australian government and primary producers co-invest in R&D for rural industry and community benefits
research focus on the key problems and challenges in each area. Although developed with little prior analysis and consultation, the inclusive nature of the priorities resulted in little controversy. In 2008, following a review of Australia’s national innovation system undertaken by an independent panel (Cutler 2008), the Government introduced five innovation priorities aimed at improving the functioning of the ‘innovation system’. Then following two years of consultations, in 2013 the NRPs were expanded to 15 priorities summarised under 5 ‘societal challenges’, and presented by the then Chief Scientist, Professor Ian Chubb. Subsequently in 2015, the new Government introduced their first National Innovation Science Agenda (NISA) alongside a new set of NRPs with sub-directives for individual departments and agencies. At this time, the NRPs were restructured and simplified (Figure 2), with a shift from goals to research criteria. NISA focused on four key pillars (Culture and Capital, Collaboration, Talent and Skills, and Government as an exemplar) to drive “innovation for jobs and growth” (Australian Government 2015a). Prior to this, Australia was “… one of only three nations in the world which funded research development activities, both within academia and in industry, without basing those investments on an overarching innovation strategy (Commonwealth of Australia 2015, p. 15)”.

However, there has been some criticism directed at NRPs around a lack of ranking of the research priorities areas and them not being prescriptive enough by providing quantitative measurable goals (Productivity Commission 2007, p. 330). There has also been ongoing discussion around the need for them to reflect the growing importance of the Humanities Arts and Social Science (HASS) disciplines and multidisciplinary research that is critical to the national research enterprise (Refer to Appendix B for more information on the national research and innovation priorities as well as the National Innovation Agenda). What has become evident is the growing importance of the NRPs and innovation agendas in changing the terms of the function of Universities in society, their business models, and importantly, demanding the reassessment of the value they deliver to the communities they serve.
5 Aspects of responsibility in national science policy

5.1 The conceptualisations of responsibility in national science policy

Within the national science and innovation system, responsibility can be characterised as being predominantly downstream, institution specific practices that are influenced by upstream NRPs and funding requirements. The Australian Government provides broad oversight in setting and realising the vision for the future of science and innovation (DIIS 2017), while research institutions and researchers are expected to ensure their research conduct and practices reflect the principles, responsibilities and expectations outlined and demanded by funding bodies and the public. The government is seen to be responsible for preparing and equipping Australian society to respond to ever changing circumstances. In this light it wants Australia to be “counted in the top tier of innovation nations, known and respected for it excellence in science, research and commercialization” (Innovation and Science Australia 2017a, p. 3). It does this by investing in education, research and innovation that will generate more benefits than collateral costs; and establishing the policy parameters and funding settings to support positive research workforce outcomes (Cutler 2008; DIISR 2009, 2011; Office of the Chief Scientist 2013). On the other hand, public institutions such as CSIRO and universities, “operate under a social licence that obliges them to discharge their responsibilities in a manner consistent with the public trust placed in them” (Productivity Commission 2017, p. 177), namely, managing concerns or complaints about the conduct of research for which
they are responsible and for investigating concerns, complaints or allegations of breaches of code (NHMRC, ARC & UA 2016; Productivity Commission 2017). This is all seen to flow into innovation, unpinned by a “diversity of internationally competitive industries, enabling todays and future generations to have meaningful work, and a great quality of life, in a fair and inclusive society” (Innovation and Science Australia 2017a, p. 3).

Specifically towards conducting research, the NHMRC, the ARC and Universities Australia (UA), jointly publish the Australian Code for the Responsible Conduct of Research (the “Code”) (NHMRC, ARC & UA 2018) on a decadal basis, which outlines the responsibilities of both research institutions and researchers. The “Code” is a prerequisite for receipt of NHMRC or ARC funding, but also attracts compliance from non-NHMRC and ARC public funding as it has developed processes and policies internally within institutions around ethics and integrity more broadly (Refer to Section 5.3). The “Code” is supported by a series of better practice guides and other supplementary material that provide more detailed, and in some cases discipline-specific guidance on how institutions and researchers can implement the broad principles and responsibilities outlined (NHMRC, ARC & UA 2018).

One downside is that the “Code” is not well adopted outside the publicly funded research community, i.e. in the business sector - except in the case of NHMRC and ARC funded business R&D. Regarding more upstream strategies, it is seen that the lack of policy coherence, fragmentation and short term resource allocation towards science and innovation across all levels of government are key impediments towards defining predominantly downstream practices in relation to responsibilities in the national science and innovation system (Cutler 2008). Although a longer-term outlook is constantly mentioned within Government as being crucial for long term sustainable development as a nation, this is often seen to be superseded by the urgency of present realities such as election cycles and day to day operational activities, leading to often piecemeal activities and actions.

### 5.2 The notion of ‘RRI’ in national science policy discussions

Both within the national workshop and interviews, participants agreed that RRI is not a term that is frequently used in Australia. However, its European implementation was recognized by some Australian researchers as influencing their own research groups’ interests. For example, Questacon and the Office of the Chief Scientist had some familiarity with the term through their international connections. Within the national workshop - given a strong research community representation – notions of RRI naturally gravitated towards research integrity which dominates Australia’s research landscape. However, interviewees from outside of the research sector felt that RRI had notions of Triple Bottom Line, as well as the ethos of planning and delivering benefit or return on investment, alongside recognition of possible repercussions or negative unintended consequences of research and innovation.

“Ideally, the major developers of S&T/R&D/Innovation and the broader community should be involved in RRI, with the government-funded agencies leading the way via a mandate, that becomes standard operating practice, that is followed by corporations who are largely committed to triple-bottom line already, but may not be across the theory of RRI well yet.”

AUS 009

“Looking at what you sent me, I think you are talking about areas such as triple bottom line, social utility rather than purely economic aspect, have we got enough economic return on

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24 Accounting framework that incorporates social, environment and financial factors towards evaluation of business performance and value
what we invested. And that might be a gross simplification, but I’m pretty sure you will explain it a bit more.” AUS 002

Both national workshop participants and interviewees suggested that there often exist discords between organisational and national views on what constitutes RRI. However, regardless of sector, institution or organisation, the notion of “RRI” was deemed to be of great importance for Australia. Reasons provided included international influences and reputation as well as increased accountability by society demanding such importance. Workshop participants felt that researchers were the first port of call when it came to ‘responsible research’ and there was a concern that RRI, depending on its implementation, may place an unnecessary burden of expectation on researchers above what they already do. However, interviewees outside the research sector also held concerns over the relevancy of RRI practice within the broader innovation system, with emphasis on activities more downstream. Although there was recognition that RRI might be useful towards inputs and outputs – therefore towards “responsible research”– however there was concern on whether RRI was relevant towards ‘responsible innovation’ (i.e. outcomes and impact).

“What is the purpose of these pillars, they don’t reflect the Kellogg’s model, so they are not impact based, so why have them at all. To me, some of them are motherhood ones, but they are useful principle subsets within a much larger R&D strategy space.” AUS 002

There is some evidence of conversations around RRI emerging in some pockets of Australian research. For instance, the Brain Dialogue at ARC Centre of Excellence for Integrative Brain Function has utilised an RRI approach to maximise social, economic and scientific benefits of brain research, a first-in-Australia program. There is also AdaptNRM, where RRI has guided their engagement practises. Alongside this, RRI has been mentioned in the context of Smart Farming (Eastwood et al. 2017), social desirability (Weckert, Valdes & Soltanzadeh 2016), Synthetic Biology (Newson 2015), social responsibility of university-industry research centres (Hardie 2017) as well as public engagement (Khanna 2017; Nowak & Paton 2017).

5.3 Ethics in the national science system

Ethics within the national science system is largely an internally self-governed process where research conducting institutions primarily draw expectations from national funding bodies through various codes. It is stated that institutions and researchers should “comply and maintain ethical principles of integrity, respect for persons, justice and beneficence” (NHMRC, ARC & UA, 2018).

Research integrity on the other hand holds many interpretations, however the most relevant aspects towards research integrity is that researchers should commit to;

a) “Search for knowledge and understanding
b) Follow recognised principles of research conduct
c) Conduct research honestly
d) Disseminate and communicate results, whether favourable or unfavourable, in that permits scrutiny and contributes to public knowledge and understanding” (NHMRC, ARC & AVCC 2015, p. 10).

Through this, research integrity extends to topics such as research standards, fabrication, falsification, plagiarism, record keeping, supervision, authorship and conflict of interests (ARC 2016c).

In this regard, the Code does not actually provide a holistic view of the requirements for what constitutes ethical research or research integrity, but merely indicates a loose framework in

25 Historical description of societal engagement alone, not the Horizon 2020 description which includes the five pillars.
26 National initiative that aims to support National Resource Management groups in updating their NRM places to include climate adaptation planning.
achieving this. Through this, the Code articulates eight guiding principles of responsive research namely; Honestly, Rigour, Transparent, Fairness, Respect, Recognition, Accountability and Promotion (NHMRC, ARC & UA 2018). Further, ethical conduct is defined as “more than simply doing the right thing, but involve acting in the right spirit, out of an abiding respect and concern for one’s fellow creatures and is orientated to something more fundamental than ethical ‘do’s’ and ‘don’ts’” (NHMRC, ARC & AVCC 2015, p. 3). There also exists specific ethics protocols and procedures towards conducting research with those traditionally recognised as being more marginalised or disadvantaged. For example with Aboriginal and Torres Strait Islander people and/or culture and human research conducted on animals for scientific purposes. Ethics protocols differ slightly between State and Territory jurisdictions due to slight deviations in overall statutory requirements. These relate mostly to the use of information held by state or territory authorities, use of human tissue, guardianship, and illegal and/or unprofessional conduct (NHMRC, ARC & AVCC 2015).

Australia is generally recognised as an ethically sound research conducting nation (Innovation and Science Australia 2017a), in part due to its strong framework and culture of addressing research misconduct and other ethical issues. This framework helps to maintain high-quality research, credibility and community trust (ARC 2016a). As a result, maintaining Australia’s ethical reputation and standards is seen to be very important given diffusion of ethical standards through global competition for innovation as well as increasing public scrutiny. Internally within institutions, both establishment of Research Integrity Advisors and Research Integrity Offices has been recommended to promote a consistent and robust approach to investigating and managing potential breaches of research misconduct (NHMRC, ARC & UA 2018). The emergent position of ethics has evolved over time based on discussions around the need for better privacy and ethics regulations, which had been seen as a key impediment towards the functioning of the innovation system (Productivity Commission 2007). These discussions have been mainly associated with attempts to balance an individual’s right to privacy with the potential benefits to society, particularly in terms of conducting medical research using identifiable information (Productivity Commission 2017). Despite the highly sensitive nature of medical information, individuals are “seen to be willing to share personal data in order to promote health research, particularly if they are well informed about the research and the organisation conducting it, and if they give their permission for the data to be used” (Productivity Commission 2017, p. 123).

There also exists the Australian Code for the Care and Use of Animals for Scientific Purposes which has been in place since 1969 and also regularly revised under the guidance of the NHMRC and other government and research bodies. Implementation of this Code is also through the establishment of special committees. The major aim of these is to ensure that any use of animals for scientific research is justified and managed accordingly.

There exists limited references to explicit barriers towards implementing ethics and integrity, however, several structural barriers have been identified. For example, complexities associated with privacy regulation across jurisdictions and multi-site ethical review processes as key barriers within the ethics process (Productivity Commission 2007). While there have been attempts to introduce privacy legislation with exceptions for the use of identifiable information in health and medical research, further complexities with the Human Research Ethics Committees (HREC) application and approval process is seen to provide further barriers to access (Productivity Commission 2017). As a result, initiatives to streamline the ethical review of multi-site research and the introduction of

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27 Such as the Singaporean and Canadian Code of Ethics, which are seen as best practice models.
28 Relating to multi-site and multi-centre trials face a slow and complex ethical review and approval process.
consistency between jurisdictions on privacy regulation is seen to be beneficial towards better practices which has recently resulted in streamlining ethics applications through an online portal.

5.4 Societal engagement strategies in research

Societal engagement in research is largely approached from the lens of increasing the awareness and understanding of why science and research is critical in developing and sustaining an innovation culture (Inspiring Australia 2010). Although it was found there was “neither inadequate or excessive support for science and innovation” (Productivity Commission 2007, p. 343), it was seen that there would be benefits in changing public support levels. Such engagement initiatives primarily focus on progressing science into society as well involving society or community within research and innovation (Cutler 2008; Inspiring Australia 2011; NHMRC, ARC & UA 2018; Office of the Chief Scientist 2014). Societal engagement has been seen as important for increasing the impact of science uptake more broadly directly impacting on decision making, as well as fostering the public’s ability to critically assess the credibility of scientific information (Inspiring Australia 2011, 2012). Alongside this, notions of ‘technology transfer’, where one party receives and another supplies, are being replaced by the more relationship-based ideas of mutual ‘co-production of knowledge’ and ‘engagement’ with broader society (including business, the public and other stakeholders) (Bell et al. 2014).

Societal engagement is also recognised to happen across both informal and formal networks, leading to commercial opportunities beyond that of other community engagement initiatives (Inspiring Australia 2013c). Although commercialisation of intellectual property held and created by research institutions has been seen in the past to be the main example of industry and community engagement (Inspiring Australia 2011), definitions of societal engagement which align more closely with that of the EU are starting to emerge beyond the conventional commercialisation of research into products for societal benefit. This is due to the breadth of interactions between universities and external parties as well as inclusion of all disciplines, including the HASS (Bell et al. 2015). Consequently, building and retaining community trust in how research is managed, used and understood – both towards societal benefits and risks – is seen to be integral to enabling responsible research practise, where often, a lack of social acceptance is seen to be a fatal flaw within business models, where legal authority does not always command social legitimacy or a social license to operate for research (Innovation and Science Australia 2016; Productivity Commission 2017).

A prime example of the increase in societal engagement is seen in the various citizen science initiatives which have emerged over the past several decades. Tangible benefits of citizen science have been recognised and include:

- **Research community** - increased scale of data collection, new or greater access to resources, access to private lands and information.
- **Citizen scientists** – increased education (either formal or informal) leading to new knowledge and skills, empowerment, friendships and more active lifestyles.
- **Society** - new information for government decision-making, greater interest in science and understanding of scientific principles, greater environmental stewardship and more engaging teaching methods for science and mathematics subjects, whilst helping scientists to understand people’s concerns and aspirations.” (Pecl et al. 2015, p. 4)

In addition to supporting local government initiatives, other impacts have included creating behavioural change or increased awareness of issues and growing informal science education across

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29 For better outcomes from investment “in areas such as education, health, public housing, aged care, the arts, defence, and other areas where government has a significant roles as a funder” (Productivity Commission 2007, p. 350)

30 Science media channels and standards set in government funded research to include public communication
Face-to-face interactions were seen to be the most effective ways to communicate science. The use of mass communication methods such as internet, radio, video, films and TV to reach large audiences to raise community awareness of science issues is also prevalent (Inspiring Australia 2012, 2013b). Both fictional and non-fictional programs like Bondi Vet, RPA, Big Bang Theory and Numb3rs, when done well, were seen to raise awareness of science and provide a more ‘human face’ to expert opinion (Inspiring Australia 2011). Other emerging societal engagement applications include The Conversation, an online media platform where content is sourced solely from the academic and research community. It is categorised as being “Academic Rigour, journalistic flair”, with reported audiences of 5.2 million users across six editions, and a reach of 35 million through creative commons replication (Dickinson 2016). There has also been examples of community engagement by local industries (such as Gladstone Industry Leadership Group) within Australia which use science engagement as a means to dispel myths and create positive operating environments for the region’s businesses (Inspiring Australia 2013c).

Not directly connected with science, the Australian Government has recently developed concepts as “initiatives and plans to improve public participation in the Australian Public Service” (DIIS 2018a, p. II) as part of the Government’s first Open Government National Action Plan. The concepts are the culmination of feedback generated from workshops and presentations with 324 public servants and members of the public. And although orientated towards the public participation with the Australian Public Service, the framework initiatives which came about hold strong transferability into possible public-research engagement. From this, there was 18 initiatives (See Appendix D: Open Government National Action Plan Commitment 5.2: Concepts for the list of initiatives) were recommended, which were then consequently placed on the Departments website for comment and rating.

However, there are barriers to societal engagement. The falling participation rates in ‘science’ subjects to its lowest level in 20 years makes it harder to reach the broader population already distancing itself from the value of science (Office of the Chief Scientist 2014). Engagement has also been characterised as a double-edged sword if it leads to increased public mistrust and confusion. Polarised topics such as climate change detract scientists from proactively engaging as they report feeling unable to deal with questions about government policy (Inspiring Australia 2011) by journalists reporting with often little or no training in science to support them (Inspiring Australia 2010). Complicating this is the plethora of uniquely different cultures throughout regional Australia which creates issues for central policy making or advice which does not always translate into effective outcomes for individuals on the ground (Inspiring Australia 2013b). The previous Excellence in Research for Australia (ERA) program rewarded research on its quality and outputs and failed to recognise activities with a direct impact on industry, government and community clients. As a consequence, in the pursuit of ERA recognition, researchers avoided many forms of societal engagement, which might have compromised Australia’s innovation dividend (DIIS & Office of the Chief Economist 2016). In response to this, the ARC is developing a new engagement and impact assessment that will assess the engagement of university researchers with end-users, and “assess the benefits of Australia’s investment in university research by showing how universities are translating their research into economic, social, environmental and other impacts” (ARC 2016a, p. 2).

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31 Due to geographical vastness of Australia, there exists often unique cultures, based on deep local knowledge, which “are often at the mercy of political and economic decisions taken by people or markets thousands of kilometres away, which may not always fit with the ‘rules’ and conditions of these locations” (Inspiring Australia 2013b, p. 4). Hence, “a great deal of the science engagement activity is ‘metro-centric’, catering primarily to capital city residents clustered along the coast” (Inspiring Australia 2010, p. 20)
One well known research funding initiative which exemplifies an engagement with industry and science is the Co-operative Research Centre program, detailed in the overview below.

### Cooperative Research Centre (CRC) Program

The CRC program is a tried and tested industry led, merit based funding source that encourages collaboration between industry, research and community. Since its inception in 1990, €3.08 ($4.4) billion in funding has been committed by the CRC Program, with additional €9.6 ($13.8) billion in cash and in-kind contributions from participants. Resulting in over 280 collaborations being funded. Its success has become widely known with other countries adopting the model to fund research.

The program has delivered benefits such as directly contributing to improving skills and expanding research capacity; increasing innovation in business, government, research and the community sector; and boosting Australia’s domestic and international collaborations.

Over the life of the program there have been 1,936 patent applications, and 12,684 patents held, including patents in Australia and overseas. A total of 36,434 journal articles and 43,838 end-user reports have been published from CRC research. It also plays a vital role in providing industry-relevant research training with over 3,600 PhD graduates. Of which, 87% of those graduates finding employment with end-users or other industry organisations.

Its success has led to multiple research institutions using this as a mechanism for accessing research funds over a longer term.


### 5.5 Gender equality and diversity strategies in the science system

Recognising the gross under-representation of women and Indigenous Australians in science, there has been a strong push to encourage greater participation by women and Indigenous Australians in the workforce – particularly within science, technology, engineering, mathematics and medicine (STEMM) (ARC 2016a; Australian Government 2015b; Prinsley, Beavis & Clifford-Hordacre 2016). This is based on evidence that Australia is not effectively harnessing the contribution of these key groups, despite strong evidence of the benefits of diversity within the workforce (DIISR 2011; Innovation and Science Australia 2016). Impediments include the acknowledged presence of inequities within educational attainment, inflexibility of research support structures and cultures and the impact of cost, quality and availability of childcare (DIISR 2011, Prinsley, Beavis & Clifford-Hordacre 2016, CEDA 2015). The importance of gender inequality was recognised in the most recent Australian Government budget with the allocation of funds (AUD$4.5M) “to encourage more girls and women to study and undertake STEM careers (Minister for Jobs and Innovation, 2018).”

Additionally, the ARC has made explicit policy to ensure their funds go to the best researchers, irrespective of gender. The ARC (2016b) believes that achieving gender balance in the research workforce is critical to ensuring all researchers have the opportunity to contribute to Australia’s research and innovation goals. Further, the ARC encourages all eligible organisations to work towards achieving the Workplace Gender Equality Agency (WGEA) Employer of Choice for Gender Equality32 or other best practise for gender equality programs. This compliments a number of other activities that exist within Australia in relation to gender equality. For example, the Male Champions of Change for STEM group which gathers high-profile influential men striving to achieve STEM gender equality within organisations and communities (Prinsley, Beavis & Clifford-Hordacre 2016).

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32 Only twelve of the 42 Australian universities currently hold this citation (Jarboe 2016).
The Science in Australia Gender Equity (SAGE)\textsuperscript{33} Pilot of the Athena SWAN initiative intends to reward STEM institutions for monitoring through use of data, self-reflection and organisational planning to reduce gender inequality. Within a Gender Equity Forum in 2014, it was seen that ultimately the Athena SWAN program would eventually link research funding to participation in the program. However, it was acknowledged that doing this too early had potential to undermine what was required for establishing the program. Despite this, research funders – such as the ARC and NHMRC - noted at the forum how Australia “could at some point choose to implement a similar policy, with the NHMRC indicating that research organisations must take progress on gender equity if they are to continue receiving NHMRC funding” (Australian Government, Chief Scientist & AAS 2015, p. 20). This initiative follows strong cross-sector leadership in the university sector as part of a broader national focus, such as the Australian Government establishing a gender diversity target of 50% in Australian Government Board positions, as well as the Australian Institute of Company Directors (AICD) holding a 30% target of female directors by 2018 (Jarboe 2016).

Improvements to Indigenous employment is through a National Indigenous Higher Education Workforce Strategy (NIHEWS). This national strategy aims to help universities improve their Aboriginal and Torres Strait Islander employment strategies, with a particular emphasis on academic staff (Commonwealth of Australia 2011). The NIHEWS provides useful guidance for universities on core objectives and related actions to achieve their overall aim ‘to bring the number and dispersion of Indigenous employees within the higher education sector to population parity of 2.2% within 10 years’ (Australian Government 2012b, p. 134). However, recognising the relatively low remuneration provided within the higher education sector, the strategy recommended that universities look to unconventional kinds of incentives as well as highlighting non-financial rewards which the higher education sector provides. This has resulted in many universities providing tailored support and opportunities for final-year students, postgraduate research students and Aboriginal and Torres Strait Islander alumni to “grow their own”.

5.6 Open access and open science strategies in the national science system

Open access and open science within the national science system primarily revolves around the responsibility of researchers in disseminating a full and transparent account of their research as broadly as possible to their fellow colleagues, the media and the wider community (ARC 2015, 2016a; Cutler 2008; DIISR 2017; Inspiring Australia 2011; NHMRC, ARC & UA 2018; Productivity Commission 2007, 2016a, 2016b, 2016c, 2017). Although there have been some encouraging developments in Australia regarding open access\textsuperscript{34}, there remains significant concerns over gaps in many types of data - particularly in the health sector – but also around publishing and curating information online in more machine-readable formats (Productivity Commission 2016a). Overall it is seen that breakthroughs in technologies have facilitated and enabled open access, but also increased utilization initiatives by facilitating shared research infrastructure and increased utilization rates of expensive equipment (Australian Government & DET 2015; DIISR 2009; Productivity Commission 2016b, 2016c).

The Government acknowledges that open access can lead to new products and services which may possibly transform everyday life and lead to greater economic benefit (Innovation and Science Australia 2016; Productivity Commission 2017). The Government has also stated that it should be an exemplar for open access but also reiterated the need for the “research community to put its house in order when it comes to data sharing” (Productivity Commission 2016a, p. 22). That is, “just as

\textsuperscript{33} Australian Academy of Science and Australian Academy of Technology and Engineering initiative to address internal gender equity policies as well as external factors that impact women in STEMM.

\textsuperscript{34} The notion of public release rather than the EU concept of open access is probably more fitting local interpretation of the term
government data custodians should consider that they hold data not solely for their own purposes but in the public interest on behalf of citizens, so too should the data of publicly funded research be available beyond the initial researchers” (Productivity Commission 2017, p. 28). This is irrespective of the NHMRC and ARC, since 2005 and 2013 respectively, having formal policies in place which require any publications arising from research which they contributed funding to, to be freely accessible\textsuperscript{35} to the public within 12 months of publication (Australian Government & DET 2015). Interviewees also noted how the ARC and NHMRC pushed back on hybrid journals\textsuperscript{36} by not allowing the inclusion of open access publishing costs within grants, because most universities inevitably have their own repositories to facilitate publishing open access. However, it was also noted how this has unintendedly restricted any grant derived research from publishing in gold open source journals, which was seen to negatively affect the open access movement given the limitations of dissemination through green open access.

The main barriers to such a slow uptake of open access stem from cultural aspects of Australian businesses and universities in negotiating access to university-held intellectual property. There is a colloquial saying that “the public pays twice when universities license patent inventions based on research that has already been publicly funded” (Productivity Commission 2016c, p. 472). Conversely, openness of knowledge and potential reuse by others has been seen to reduce the likelihood of substantial business support for research (Cutler 2008; Office of the Chief Scientist 2013; Productivity Commission 2016c). There is also some legal uncertainty about the use of patents for research, causing complex inter-relationships among parties with respect to copyright interests (Productivity Commission 2007). Further complicated by the additional costs for open access, uncertainty of standards around which datasets should be released and the format in which they are released. For example, decision on the appropriate degree of de-identification, processing and cleaning has yet to be developed within Australia (Productivity Commission 2016a, 2016b). It has been suggested that all of the above create administrative barriers towards open access.

In addition, the current norm within Australia is to allocate ownership of IP to institutions. However, institutional ownership of IP may not align with public interest and research commercialisation in that this promotes and encourages risk-averse behaviour to the detriment of innovation. Institutional ownership of IP also means that any “costs and benefits that are external to the relevant institution may not be taken into account” (Productivity Commission 2016c, p. 477). The Australian federal system with its different tiers of government has also been criticised for creating fragmentation and duplication of data which is already subject to complex legislative and administrative regimes. This includes more than 500 secrecy provisions across the Commonwealth’s Statute book\textsuperscript{37} relating to open access (Productivity Commission 2016a, 2017). This is further complicated by researchers being sole data custodians, therefore holding a perceived monopoly over the ability to derive publications using the data that is often part of an ongoing research program (Productivity Commission 2016a). This context of strong data infrastructure hampered by under-utilisation and fragmented data practises is reflected in the World Wide Web Foundation’s assessment of Australia in its ‘Open Data Barometer’ where Australia scores 5\textsuperscript{th} in the world, but is driven by its high ‘readiness’\textsuperscript{38} score\textsuperscript{39}, but

\textsuperscript{35} Green open-access i.e. peer approved manuscript on institutional repositories
\textsuperscript{36} Where institutions pay a subscription to a publisher, and then the researcher pays for gold open access, even though green open access routes are available through institutional repositories.
\textsuperscript{37} Term used to describe all the legislation that exists within that jurisdiction.
\textsuperscript{38} Includes factors such as Government Policies, Government Action, Citizens and Civil Rights and Entrepreneurs and Business towards the readiness of ‘Open Data’ within Australia.
\textsuperscript{39} Australia continually scores well in the categories of Government Policies (81/100), Government Action (94/100) and Citizen and Civil Rights (84/100), but lower in Entrepreneurs and Business (72/100).
mixed results within ‘Implementation’ and ‘Impact’ scores compared to other nations within the top 10 (The World Wide Web Foundation 2017).

There has been several best practices that have arisen, the most prominent is the provision of providing facilities for the safe, secure storage and management of research data, records and primary materials and, where possible and appropriate, allowing access and reference to these by interested parties (Cutler 2008; NHMRC, ARC & UA 2018). In this regard, the Australian Government, most of the States and Territories (with the exception of Tasmania and the Northern Territory) and universities have designated open data websites or repositories, providing multiple platforms for open data discovery and release (Productivity Commission 2007, 2016a). To date, over 28,000 Australian Government datasets have been made open and accessible, with thousands more released by States and Territories. It has been noted that there is still a need for balance in this area to first instil trust and acceptance of data systems within the community and then to empower citizens, government, industries and researchers to use and share data to help boost innovation. There was some commentary that governments were seen to generally not publish data that people ‘really want and need’ (Innovation and Science Australia 2017b).

Other best practices in relation to Intellectual Property (IP) concerns include exceptions for research from infringement when making experimental use of patented IP (Productivity Commission 2007, 2016c), as well as the development of tools such as East Access IP® (Australian Government & DET 2015). This compliments several Government initiatives to promote increased IP collaboration, such as the Government’s IP Open Data® (IPGOD) and SourceIP® portals, which hope to facilitate innovation and commercialisation by providing information relating to IP from a number of sources. Most critically, these services also come with accompanying information explaining the data which are tailored and matched to the individual firms along with “information about their size, technology, and geographical location” (Australian Government 2017b, n.p.). There has also been consideration to the potential for a ‘use it or lose it’ regime for IP arising from public funding. ‘Use it or lose it’ would not require universities to relinquish control but would require universities to make the IP arising from publicly funded projects openly accessible to potential end users within a specific timeframe of the project’s completion, unless the university has taken steps to commercialise the IP.

However, while attractive as a global policy setting, a review by the Australian Government and the Department of Education and Training (2015) concluded that universities are already moving in that direction and that such a policy would be difficult to implement. Other practical examples include the National Library of Australia (NLA) developing ‘Trove’ – a metadata aggregator, content repository and platform – which collated nearly 500 million resources including research specific journal articles, reports, reviews, working papers, conference items and data from newspapers, magazines and scholarly journal titles alongside other unconventional audio-visual content, maps and gazettes from “thousands of organisations around the world and makes it available to the public through a website and API. There were almost 21 million visits to Trove in 2015-16, and developers and researchers are making use of its API® to create spin-off tools” (McKinsey & Company 2017, p. 79). To this end, Trove

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40 International network of 26 universities and research institutes which aims to facilitate collaboration by offering a simplified one-page contract for IP.

41 First complete and open national Intellectual Property (IP) register that links IP rights to business numbers in a simple data format. It holds over 100 years of records comprising patents, trade marks, designs and plant breeder’s rights held by IP Australia are now publicly and freely available. It also freely accessible through the Governments open access data portal data.gov.au.

42 Source IP is an IP Australia initiative to facilitate innovation and commercialisation by providing a means for public sector patent holders to signal their licensing intent and promote their key areas of technology within a single platform. Source IP is currently displaying patents filed by the Australian public research organisations listed under ‘Research Organisations’.

43 Application program interface
is seen to “help make publicly funded and often open access research discoverable and accessible to a non-academic audience” (NLA 2017, n.p.).

5.7 Science communication and engagement as integrated in research

Although responsibility for primary and secondary school education falls mainly to the States and Territories, Australia has a strong commitment towards science education, where within federal legislation there is a goal of “Australia being placed, by 2025, in the top 5 highest performing countries based on the performance of school students in reading, mathematics and science” (Australian Government 2013, p. 3). This starts with ensuring that Australian student outcomes in core disciplines are on par with leading countries. It also means “equipping students with the skills and knowledge crucial to future jobs, such as STEM skills and 21st century skills, which include hypothesis-driven problem solving, digital skills, entrepreneurialism, creative thinking and interpersonal skills” (Innovation and Science Australia 2017b, p. 27).

Science education is more broadly approached through STEM, as this is seen to lay the foundation for a STEM literate community given the growing societal dependence on science and technology (Australian Government 2015a; DIIS 2017; DIISR 2009; Education Council 2015; Innovation and Science Australia 2017a; Inspiring Australia 2010, 2011, 2012, 2013a, 2013b, 2013c; Office of the Chief Scientist 2012, 2013). As part of this, scientists are seen to have a duty in contributing to the teaching of science and mathematics to the youth of Australia by preparing them for an ever-changing workplace that requires STEM derived skills and knowledge needed to participate in the digital economy and in the process of building science and innovation in Australia (Business Council of Australia 2014; CEDA 2015; Innovation and Science Australia 2016). More recently, there has also been calls for developing a greater breadth of skills beyond STEM, including problem solving, critical thinking, teamwork, collaboration, communication and creativity (Cunningham et al. 2016). This is all seen to increase student performance, engagement and future university enrolments in science as well as acting as an enabler for innovation by equipping students to be successful entrepreneurs with a diverse set of skills (Australian Government 2015a; Productivity Commission 2007). While it is recognised that not everyone needs a highly specialised set of science skills, it is seen that “everyone does need general science literacy of some kind to make informed decisions about their health, their finances, their career and their lifestyle” (DIIS 2017, p. 12). But student choices are determined by a complex interplay of identity and other factors such as the nature of school science and the societal position and role of science. As such, secondary school sciences are seen to face three particular challenges: “(1) finding a balance between developing the pool of future scientists and promoting science literacy; (2) better engaging students in science through suitable curriculum and pedagogical changes; and (3) better supporting science teachers in their central role of delivering science education in Australia” (Office of the Chief Scientist 2012, p. 56).

In relation to science education, there is consensus that Australian science is in good health, but with some issues surrounding time and resource constraints that lead to limitations in confidence and training of teachers. There is a concern over the lack of STEM educated teachers, with very few high-performing STEM students aspiring to becoming teachers. This has resulted in too many teachers bypassing STEM altogether and teaching ‘out of field’ becoming a new norm (Inspiring Australia 2010; Office of the Chief Scientist 2014; Productivity Commission 2007; Weldon 2016). This is coupled with commonly mentioned barriers of inflexible pay levels and structures not providing positive price signals for teaching, perceived poor career pathways, excessive use of short term contract employment and a burgeoning non-research workload (Inspiring Australia 2013a;

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44 The goal itself is not necessarily legislated, but merely a position goal for the country.  
45 Teaching in a subject area for which the teacher has not specialized during their higher education study (Weldon 2016)
Productivity Commission 2007). There also exists stereotypical and inaccurate cultural paradigms and perceptions of scientists, such as being geeky, difficult, boring and just plain irrelevant (Inspiring Australia 2010, 2011). Other concerns include the expanding menu of courses creating increased competition among subjects vying for curriculum share (Office of the Chief Scientist 2012).

For effective policy towards science education, several best practices have been identified, however, it is seen that longer term funding certainty coupled with bi-partisan support is paramount towards providing assurance for science initiatives to address science education priorities (Cutler 2008; DIISR 2009; Productivity Commission 2007). Alongside these macro-level directions, notable policy directions include:

- Minimization of non-research workloads as well as increased academic freedom consistent with the strategic interests of the institution (Productivity Commission 2007).
- Better rewards for science teachers, and late career pathways into teaching for scientists (Cutler 2008).
- Youth targeted programs, such as science clubs, young scientist on the web, and science internships, as well as brokering between the needs of the school sector and the ability of the research community to provide resources to support learning (Inspiring Australia 2010).
- Assigning champions from a variety of sectors including business, education, media and research combined with a coordinator to help maintain momentum to bring champions together to report on progress and forge further linkages with other programs (Inspiring Australia 2011).
- Ensuring that secondary mathematics and science is taught by qualified subject specialists, as well as introducing computer coding as a compulsory subject as part of the national curriculum (Business Council of Australia 2014).
- Not prohibiting people from disadvantaged backgrounds from participating in tertiary education – if appropriate loans are available to them (CEDA 2015).

There also exists numerous public-private partnerships within Australia that have a focus on science education. One example is Questacon, Australia’s National Science and Technology Centre that has a moving ‘Science Circus’ sponsored by Shell. The ‘Science Circus’ uses science graduates and masters students to “take exciting and engaging science programs to thousands of school children, teachers and community members in regional Australia” (Inspiring Australia 2013c, p. 10). Much of the success of the Circus can be attributed to the science communicators who engage about the sciences to a wider range of audiences, from kids, teacher and senior citizens (DIISR 2017; Office of the Chief Scientist 2013). Other public-private partnerships include the co-funding of Sci-Tech, a premier science education centre in Western Australia which is funded by companies including Rio Tinto, BHP Billiton, Woodside in conjunction with the West Australian Government. The initiative aims to motivate students to be interested in science from an early age by employing “bright, enthusiastic people who know how to connect to people and make science come alive” (Inspiring Australia 2013c, p. 24). Specifically, the Aboriginal Education Program within Sci-Tech has been acknowledged for its numerous positive impacts, garnering international recognition in 2012 with the Leading Edge Award for Visitor Experience from the US-based Association of Science and Technology Centre (Inspiring Australia 2013c). This complements a number of decentralized science education centres that provide important in-situ hubs or even mobile hubs for community-science educations.
5.8 Incorporation of AIRR dimensions into science policy discussions

5.8.1 Diversity and inclusion

From a macro perspective, Australia approaches inclusion from the lens of a tool to balance disruptive growth but also as an enabler of sustainable growth strategies by empowering low productivity entrepreneurs and firms to boost their economic performance as well as financially improving the welfare of marginalised groups through employment. More specifically, inclusion is primarily associated with culturally, socially and linguistically diverse communities (CALD) (Inspiring Australia 2010, 2013a). It also makes strong mention of research ensuring that the benefits, risks and the concept of wealth are also articulated and incorporated within the community as a form of inclusiveness as research has often been seen to only focus on politicians and decision makers (Office of the Chief Scientist 2013; Productivity Commission 2007). Diversity on the other hand was much more specific and recognised as being critical for innovative organisations. This was based on the realisation that much innovation happens at the intersection of different disciplines and ways of thinking about problems that promotes creativity and innovation (Cunningham et al. 2016; Cutler 2008; Inspiring Australia 2013a; McGagh et al. 2016).

Overall, both diversity and inclusion are strong undertones within Australian culture more broadly. This is a reflection of broader societal value systems, as Australia is often classified as an immigrant and multi-cultural nation where diversity and inclusion have provided the backbone for international linkages, both economically and socially, and this has naturally diffused into most aspects of the Australian way of life. However, it is also noted that while it generates a diversity of ideas, it can also create potential conflict within teams and organisations (Cunningham et al. 2016). Other barriers include the lack of role models, support networks and financial assistance for some groups such as Indigenous people and women towards promoting diversity (McGagh et al. 2016). Consequently, it was seen that promoting authentic role models and advertising that everyone has the potential to succeed would help to counteract these stereotypes (Prinsley, Beavis & Clifford-Hordacre 2016).

5.8.2 Anticipation and reflexivity

From a research perspective, anticipation is primarily associated with anticipating both the positive and negative effects of research (Australian Government 2012a; NHMRC, ARC & AVCC 2015; Office of the Chief Scientist 2013; Productivity Commission 2007). Anticipation was also used in reference to future workforce requirements, the impacts of disruptive technology as well the impact of releasing data, which are seen to require anticipatory practises (CEDA 2015; DIISR 2011; Innovation and Science Australia 2017a; Productivity Commission 2016b, 2017). Broadly speaking, although anticipation is a common risk management tool used within Australia, there is also recognition of the limitations of such subjective judgements due to the temporal challenges associated with anticipation.

Conversely, there was no true reference to reflexivity within national documents. There were however references of drawing knowledge from previous experiences, which although does not explicitly mention reflexivity, can be interpreted as holding a similar meaning. In this light, Australia has a strong culture of drawing knowledge from previous experiences, although Australia is a relatively young country on the international scale, it has gone through some turbulent and disruptive times, all of which have demanded that present day decisions should account for the challenges experienced in previous years. Due to limited occurrences of both terms within reports,

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46 Whether in the form of skills, gender, sexual, disability, socio-economic background, non-English speaking background, identity, age, ethnicity, race and culture

47 Consistent public disclosure and position within organisations holding women in the same breath and ability as men.
there was no reference to barriers existing. However, there was some mention of best practice, namely that researchers should anticipate future uncertainties by preparing an ethically defensible plan to describe the management of disclosure or non-disclosure of information that might affect future research effects (NHMRC, ARC & AVCC 2015).

On the national scale, although anticipation and reflexivity are covered by a wide range of organisations, the most relevant from a research perspective, is the Australian Council of Learned Academies (ACOLA). ACOLA connects the four independent Learned Academies\(^{48}\) to inform national policy\(^{49}\) and to develop innovation solutions to complex problems and emerging national needs. As part of this, ACOLA undertakes anticipatory research for the national benefits through undertaking “Horizon Scanning”\(^{50}\) activities which results in reports to “*present independent and timely analyses to guide decision-makers through the decade ahead*” (ACOLA 2018, n.p.).

5.8.3 Openness and transparency

Both openness and transparency are primarily associated with research methodologies, declaring potential conflicts of interests, institutional processes, dissemination of findings, replicability of the science, evaluation processes and measurement of risks and impacts (Australian Government 2012a, 2015a; Inspiring Australia 2011; NHMRC, ARC & AVCC 2015; NHMRC, ARC & UA 2018, 2016; Office of the Chief Scientist 2013; Productivity Commission 2007). In this manner, it is seen that openness around the whole of life research process leads to transparency of an institution that is accountable to a multitude of complexly interlinked stakeholders. It was seen that technology has been fundamental and an ubiquitous enabler promoting governments and corporations alike to be more accountable to the public, but also between themselves, promoting a positive feedback spiral leading to improved policy outcomes as well as benefits to firm innovativeness and performance (Cutler 2008; Productivity Commission 2016b, 2017). Overall, Australia tends to be an open and transparent nation due to a deep Westminster inspired heritage and also being a young nation has been able to leap-frog certain historical tendencies of other nations. A lack of national leadership contributing to piecemeal bureaucratic processes for data sharing and release was seen as a major barrier to openness and transparency. However, the practise of institutions ensuring accurate records are maintained, disclosing information about methods and equipment, as well as tasking independent bodies to conduct major evaluations were seen as common practises towards openness and transparency (Australian Government 2012a; NHMRC, ARC & UA 2016; Productivity Commission 2007).

5.8.4 Responsiveness and adaptation

Within the national discourse adaptation was conceptualised as part of the broader innovation system while responsiveness was conceptualised as part of cultural and workforce factors. Although distinctly different in official definition, responsiveness and adaptation were commonly placed in similar meaning and context with anticipation and reflexivity. For instance, national documents – in particular the ones specifically focused on Australian Innovation - frequently mention how Australia as a nation must adapt to forthcoming unprecedented disruptive change as a means to ensure the prosperity of our nation continues. For instance, ACOLA notes in its Horizon Scanning Series that “*change that is driven by developments in science and technology, and challenges by our capacity to adapt in the present and prepare for the future*” (ACOLA 2018, n.p.). Innovation, with a strong undertone focused on STEMM innovation, was seen to be an enabler of adaptability, contributing to Australian competitiveness through adaptation of the 98% of innovation ideas that are generated by

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\(^{48}\) Humanities, Science, Social Science and Technology and Engineering.

\(^{49}\) Often commissioned by the Commonwealth Science Council and Australia’s Chief Scientist which would feed into Cabinet.

\(^{50}\) Current Horizon Scanning Series currently includes Energy Storage, Precision Medicine and Synthetic Biology.
the rest of the world (Australian Government 2012a; CEDA 2015; Cutler 2008; Innovation and Science Australia 2016; Office of the Chief Scientist 2014). The way that responsiveness is approached within Australia was suggested that if education is not culturally responsive, then it becomes irrelevant to those it endeavours to inform (Inspiring Australia 2013a). For example, if vocational education and training (VET)\(^{51}\) and higher education systems are not sufficiently responsive, a skills and capabilities mismatch may be created (Business Council of Australia 2014). As a result, it was felt that building flexibility and responsiveness into Australia’s research workforce policy and funding policy would be important.

\(^{51}\) Broad classification for qualification for all types of employment for the workforce not offered by universities. Includes TAFE, but also private providers, community organisations, industry skill centres, and commercial and enterprise training providers.
6 Organizational reviews and outlooks: University of Queensland

6.1 Mapping of the organisation

Like many large organisations, the internal governance of the University of Queensland (UQ) is complex with many organisational units. Operationally, the day to day activities of the University are determined by the University of Queensland Act 1998, the Statutes at UQ and the Senate Rules. The 22-member Senate is led by a Chancellor who is elected by the Senate itself. Under the University of Queensland Act 1998, the Senate is granted wide powers to “appoint staff, manage and control University affairs and property, and manage and control finances to promote the University’s interests” (UQ 2017i, n.p.). The Vice-Chancellor is the University’s Chief Executive Officer and responsible to the Senate for the overall direction of strategic planning, finance and external affairs. The Vice-Chancellor is support by an Executive to whom most of the University's organisational units report. Alongside this, there is an Academic Board, which is the University’s senior academic advisory Board and comprised of all senior leaders across the University along with elected representatives (UQ 2017i, n.p.). The Board formulates policy on academic matters including new programs, teaching, learning and assessment, research, promotions, student academic matters, prizes and scholarships. Both the Senate and Academic Board are accompanied by a number of committees to ensure University policy and administrative work is accomplished efficiently.

As of April 2018 the university had 52,331 students of which 15,431 were international students. Of the total student number there are 35,861 undergraduate and 16,470 postgraduate students. The university’s total revenue (2016) was $1751.1million with research income comprising $368 million, while total expenses (2016) were 1766.6 million (UQ, 2018b, n.p.)

Institutionally, the University’s Strategic Plan is the key document that articulates the University’s cycle of planning and accountability. It is guided by the University’s “vision, mission and values and articulates the University’s focus through a set of strategic objectives which describe where UQ wants to be in four years while strategies outline what it will do to achieve those objectives” (UQ 2017n, n.p.). Underpinning the Strategic Plan is a set of Key Performance Indicator Scorecards which set out the University’s key performance indicators and targets towards the plan under the three pillars of Learning, Discovery and Engagement. The entirety of the University employees is responsible to deliver collectively towards the University’s objective. This is done through University and Organisational Operational Plans which identify initiatives and activities that will have University-wide, Faculty and Institute specific impact towards achieving and delivering on the strategic objectives. Accountability is ensured with operational plans annually reporting against the initiatives outlined through the operational planning process.

Although it is acknowledged that there is a strong governance framework in place at UQ, it is often characterised that interlinkages between individual components within the University are fragmented and under-utilised. This can be attributed to the historical tendency of “Sandstone Universities” which includes UQ - both with Faculties and Schools being geographically distant to each other on campus, but also lacking a historical culture of interdisciplinary and multidisciplinary interaction between them. This is further complicated by the streamlining of professional staff and

52 Comprising of three official members, eight members appointed by the Governor-In-Council who is acting with the advice of the Executive Council and Government, eight members elected by the staff, students and graduates of the University, and three additional members appointed by the Senate.

53 Comprising of Provost and Senior Vice-President, Deputy Vice-Chancellors (Academic, External Engagement, Research), Pro Vice-Chancellors (Advancement, Indigenous Engagement, Teaching and Learning), Chief Operating Office and President of the Academic Board. Each provides advice on policy and administrative matters relating to his or her area of responsibility.

54 An informal group of the Australia’s oldest tertiary education institutions with buildings constructed of sandstone.
processes within the University, creating further vertical and horizontal fragmentation of previously Faculty and Institute specific human capital.

6.2 Aspects of responsibility in organisational policy and practice

6.2.1 The conceptualisations of responsibility in the organisation

UQ has explicitly noted its vision is knowledge leadership for a better world, with the mission of “positively influencing society by engaging in the pursuit of excellence through the creation, preservation, transfer and application of knowledge”55 (UQ 2017g, p. 18). But, as a research institution developed in State statute, UQ is required by law to be consistent with the principles of the Public Sector Act 1994 of Queensland within its Code of Conduct (UQ 2017a). As a result, the ethical principles the University requires staff members to comply with in the performance of their roles at the University are: “Integrity and Impartiality; Promoting the public good; A commitment to the system of government; and Accountability and Transparency” (UQ 2017a, n.p.). Each ethical principle is underpinned by several values that describe the behaviour demonstrating the relevant principles (See Appendix E.4 Ethical Principles). To support staff in understanding how the Code of Conduct applies to them, the University has introduced online courses, which include assessment components that are mandatory for all continuing and fixed-term staff, with casual staff strongly encouraged to complete the courses as well. Such training requirements are also consistent with the University’s obligations under the Public Sector Act 1994. Alongside those ethical principles, UQ has also adopted56 the Queensland Public Service (QPS) values, which have been revised to fit the University. They include: Supporting our People (Customer First), Creativity and Independent thinking (Ideas into Action), Pursuit of Excellence (Unleash Potential), Honesty and Accountability (Be Courageous) and Mutual Respect and Diversity (Empower People) to guide its behaviour and way it does business (Refer to Appendix E.4 Ethical Principles for more detail).

The University has developed several strategic objectives, defined around the three pillars of Learning, Discovery and Engagement, along with a group of enablers (people and culture, resources and governance) that provide critical support to these pillars. Examining funding obligations, UQ must also comply with the responsibilities outlined for institutions and researchers by the Australian Code for the Responsible Conduct of Research57 which include:

- **Institutional responsibilities are to:** Promote the responsible conduct of research; Establish good governance and management practises; Train Staff; Promote mentoring; Ensure a safe research environment
- **Researcher responsibilities are to:** Maintain high standards of responsible research; Report research responsibly; Respect research participants; Respect animals used in research; Respect the environment; and Report research misconduct” (NHMRC, ARC & UA 2018)

In this regard, although UQ is influenced by several responsibility frameworks from various entities at both State and Federal levels, similarities between most of the responsibilities allows for minimal conflicts for both UQ as well as individual researchers. However it is noted that while some of the responsibilities are broad58, most interviewees naturally gravitated towards responsibilities which were more directly involved within their day to day operations. Although there was some criticism of

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55 As the current Strategic Plan expires at the end of 2017, UQ has commenced to develop the University’s new strategic direction and plan for 2018 and beyond.
56 Values have been slightly altered in wording to better fit the University, but are essentially the same.
57 Currently the Code is being renewed. Draft Code expands the existing responsibilities of both institutions and researcher to 12 new responsibilities for institutions and 16 new responsibilities for researchers. See Error! Reference source not found. for more information.
58 Ranging from pursuit of excellence which might be discipline based to creativity and independent thinking which often isn’t incorporated in some disciplines.
some aspects of the responsibilities across the organisation, it was generally seen that they were
important and that UQ performs well in this regard.

With the exception of a few individual participants in leadership positions, RRI was very much an
unfamiliar and unheard of concept or framework within UQ. This is despite the national interviews
suggesting there are already a few researchers and centers in UQ involved with RRI through
international links. For example, the ARC Centre of Excellence for Engineering Quantum Systems.
There was unanimous agreement that the concept of RRI was very important for UQ and Australia
more broadly.

“That’s a real mixture of words I’m afraid. But, if I think about it logically, it’s really about
thinking about what it is you are innovating, what it is that you want to bring that also has
some responsibilities attached to it. Whether that is social responsibilities or perhaps ethical
responsibilities.” UQ 003

“It’s interesting, I really don’t know. It really depends what you mean by the word
responsible.” UQ 004

Although it was recognized as being important, there was confusion on what ‘responsible research
and innovation’ might or does look like for the university setting. There was further confusion and
difference of opinions on both the individual research and innovation components, as well as how
the linkages between them really look like from a responsibility perspective. However, from these
conversations, there emerged a stronger imperative for participants to flag perceived irresponsible
behavior, and wider questions as to whether researchers have lost social responsibility. Therefore,
although there seemed to be some confusion about RRI there was individual reflection on its
meaning to researchers.

6.2.2 Ethics in the organisation

Within the University of Queensland, both the institution and its staff are seen to occupy positions of
trust within broader society. Consequently, the University demands that integrity and impartiality is
paramount to maintain public confidence in the University. This is explicitly noted within the
University’s Code of Conduct, which states that staff should commit and act in accordance to the
highest ethical standards (UQ 2017a). Researchers are required to conduct their research in
compliance with the national research “Code”, any legislative obligations, University policies, and in
accordance with the professional standards of the relevant discipline. The University has both a
Human Research Ethics Committee and an Animal Research Ethics Committee, which helps
researchers to comply with the respective national guidelines (UQ 2017c). Alongside these
nationally derived obligations, internally the University has developed protocols in relation to
handling complaints of research misconduct and has specific criteria for such misconduct59 (UQ
2017d). UQ also has a

“...research integrity advisor network across the university, that allows people to talk to
someone who will listen and take them seriously, and assess the situation and if necessary
prosecute the case” UQ.002.

Operationally, interviews noted how ethics within UQ and Australia has changed over the last two
decades. That is, in the 90’s, ethics was not considered in such a formal sense in some disciplines.
While protocols existed for those conducting human and animal research it was not openly discussed
nor did it look externally to how its research might be perceived from an ethical standpoint. In the

59 Mainly related to the collection of data, publication of results, authorship, disclosure of conflicts of interest as well as obtaining ethics
approvals.
last five years research integrity has become a national issue across the research landscape, driven in part by increased awareness by the public but also a stronger emphasis from funding agencies. As a result, there have been significant institutional improvements within UQ towards ethics particularly around the requirements for researchers to ensure they submit ethics applications for consideration by ethics committees for any research involving human and/or animal subjects. Interviewees noted however that there still exists a lack of conversations on campus about broader questions on how researchers naturally perceive what it means to be an ethical researcher.

“But, in the five years I have been at UQ, I’m aware that what we think of formally as research integrity is becoming a bigger issue nationally. And research integrity is the umbrella that includes animal and human ethics, bio-safety, authorship practise, the way we conduct our research in an ethical framework. I think people are more aware of it, there is certainly more emphasis from the funding agencies, but in terms of how people naturally think about things or broader conversations on campus about what does it mean to be an ethical researcher? I don’t think we have those conversations.” UQ 002

There were also concerns expressed that there should be better engagement with the “Code”, as it is perceived that many researchers would not have read the “Code” or have strong understanding of it, with it commonly being associated with a “fill in a form” process as well as a hindrance in some circumstances (UQ003; UQ 007) To alleviate this, interviewees noted that there should be more education and communication of best practices to promote improved standards of behaviour. There are a number of online and face to face training opportunities offered throughout the year to staff on the topic of research integrity and “Understanding the Responsible Conduct of Research”. That said, it was also noted that:

“…. (UQ) doesn’t just want everyone doing the right thing because they are afraid of doing the wrong thing, but rather, because they want to, or the compliance is just bouncing and directing them into the right direction. (UQ) doesn’t want a rules based environment, it wants (researchers) to do the right thing because it creates the right environment.” UQ 002

Thereby suggesting that it should be culturally driven with institutional oversight. More broadly, it was seen that:

“If (UQ’s) complaints (relating to ethical misconduct) are going down, because people are understanding better what they need to do or what is not acceptable, that’s a good outcome.” UQ 002

This was all seen to promote and reinforce UQ’s responsibility of being a trusted place, so that outputs from the university such as publications or student degrees, are widely accepted as being ethical but also respected by society and the broader community.

6.2.3 Societal engagement strategies in the organisation

Societal engagement within UQ can be classified as “engagement and collaboration with the community, industry, government and other research innovators (as) a critical success factor in (UQ’s) capacity to meet the rapidly changing needs of society. They help (UQ) stay abreast of local and global challenges, understand external priorities and expectations, and ensure (UQ’s) teaching and research remain relevant” (UQ 2018, p. 16). From an institutional perspective, such engagement is mostly associated with managing and improving the financial, operational and reputational risks that the University is exposed to. To this end, “while UQ’s research performance is exceedingly strong across a range of disciplines, (UQ) must add value through stronger external partnerships and networks that interweave ideas, expertise and resources from across the world” (UQ 2018, p. 4). This
is expected to come through a “One UQ Culture”, which tries to instil a “environment that is inclusive and collaborative to ensure that we work together in pursuit of (UQ’s) strategic objectives. Universities must reflect wider society -working within and for our broader community” (UQ 2018, p. 8).

Institutionally, one example of societal engagement has been the recent UQ Master Plan (UQ 2017h), which focuses on the development plans and use for the university campus. As part of this, UQ held active consultation and engagement with students, staff, residents, local business owners, sporting groups, government and cultural groups about the proposed project outcomes. Community and stakeholder priorities and perspectives were collected through a program of activities “designed to elicit responses both at key milestones and through the master planning process” (UQ 2017h, p. 10). At each key milestone, feedback was used to inform and refine the next stage of the Master Plan Development.

From a research and operational perspective, there exists several engagement activities across the University to improve the present and future student experience as well as to undertake genuine community engagement relating to university operations and/or research areas. UQ has appointed a Deputy Vice-Chancellor for External Engagement, as well as having engagement officers within the various Faculties and Institutes. Such institutional structural drivers within UQ, suggest a subtle cultural driver for societal engagement as part of conducting responsible research. However, there is no formal requirement for this. However, awareness of the need to engage is growing, particularly with the changing focus on impacts and the need for partnering with a range of external stakeholders.

“I think our partnerships in the future will be based much more on alignment of values than simple transactions. So, the test will be for us, when do we stop working with someone because they do something that our values do not align with? Could it be that we don’t view that they’re being responsible in how they go about doing what they do?” UQ 006

One practical example of societal engagement – which also includes the pillars of science education and open access - is The Queensland Brain Institute (QBI) at UQ. QBI has partnered with international publishing group Nature Research to produce an open-access, online journal dedicated to the science of learning: npj Science of Learning. The initiative has a community site which serves the wider public, including teachers, students, parents and policymakers, to discuss how to enhance learning in schools. Experts engage with the public through opinion articles and question and answer sessions. Teachers can share their insights into effective classroom practices, and the latest research is explained in everyday language. More recently, along with the Science of Learning Research Centre, QBI has partnered with edX, MIT, Microsoft and the University of Michigan to create a Microsoft K-12 Education Leadership Series MOOC to “improve education worldwide by providing school leaders and teachers with the latest research, technologies and proven approaches to learning design” (UQ 2017o, n.p.). Other non-conventional societal engagement practises includes academic’s participating in Reddit Ask Me Anything (AMA), local talk back radio shows and in-house produced podcasts. This accompanies a number of more conventional societal engagement initiatives that the Institute engages in such as paying for a small magazine to be placed in the Australian Financial Review, Australia’s leading financial newspaper. Hosting open days, conducting Institute tours as well as regular public forums. While proactively driven from the Institute it reinforces expectations from public funders and philanthropic donors which have become an important component of the Institute’s funding.
While UQ keeps a number of statistics to track their engagement with alumni, philanthropic engagement and visits to the university, it was suggested that there may be a lack of record keeping for research projects across UQ that are involved in societal engagement activities. From an institutional perspective, it was also seen that the University, and researchers more generally, have done a poor job of societal engagement on many topics. It was suggested that this happens on a more ad hoc basis rather than a strategic approach to engagement.

“It varies dramatically. I think universities, the struggle for universities is they could become quite an echo box. Depends what you mean by societal? ... 60% of the population do no attend university. What efforts do we make to reach out and tell them why we do is important and why it needs to be done.” UQ 004

However, it has been recognised that the growing requirement for measurement and reporting of research impacts, alongside greater accountability from society, is bringing pressure to change this ad hoc approach to engagement.

“What’s clear is that universities are on a trajectory of greater engagement, they have to be more externally orientated, and as a result of that, there are conversations that need to occur between organisations that have different philosophies, different approaches…. So, we have been absolutely awful at being able to communicate what it is we do in universities and how important it is. And we are arrogant, we think that the people that don’t get it are stupid, but we’re just not explaining it well.” UQ 007

6.2.4 Gender equality and diversity strategies in the organisation

The University notes that ensuring equity and diversity in employment and education can help to achieve the University’s objectives of “innovation, effective use of human resources and ultimately benefiting the creative and intellectual life of the University and the broader community” (UQ 2017b, n.p.). UQ has a number of School and Faculty committees, including a Senate Committee specifically for Equity, Diversity and the Status of Women. These committees address the policy and governance requirements for equity and diversity issues rather than gender issues alone.

UQ’s Workplace Diversity and Inclusion area has identified six key focus areas of equity and diversity in relation to staff. These include: Aboriginal and Torres Strait Islander employment; gender - mainly women in STEM; LGBTIQ+61; disability; cultural and linguistic diversity; and families in the workplace (UQ014). Towards these focus areas, the University’s Strategic Plan and corresponding operational

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61 Lesbian, gay, bisexual, transgender, intersex, asexual, and queer/questioning
plans[^62] are the key documents that outline the University’s operational priorities towards equity, diversity and inclusion. However, some interviews noted that there still exists a lack of women in senior roles, with large variability between the different disciplines.

Although there currently does not exist any explicit targets towards gender in the Enterprise Bargaining Agreement, there does exist Key Performance Indicator’s for women in operational plans. These include increasing the percentage of women academic staff at Level D (Associate Professor) and E (Professor) and Professional staff at HEW 10 and above with targets of 33%, 23.5% and 50% respectively for 2017[^63]. For diversity, UQ has both a base and aspirational target of 1.4% and 2.8% respectively for Aboriginal and Torres Strait Islander employment across the University. Faculties and Institutes hold yearly reviews to evaluate their contribution towards these institution wide targets (See Appendix E.5 Gender and Diversity Statistics). To help achieve these targets there are a number of career progression training activities for women academics which include coaching and mentoring based programs as well as other initiatives that provide small amounts of money to support women to have time to develop their promotion applications. However it is recognised that these are piecemeal and do not create the required deep seated cultural change.

As part of their deeper, strategic commitment to creating change in this area, UQ is in the second cohort of the UK’s SAGE Athena SWAN two year pilot. There are three cohorts, with the first cohort submitting their application for Bronze award and action plan in March 2018. UQ, like all Group of 8 universities, will submit their application for Bronze in March, 2019 and this will include a comprehensive action plan, for implementation between 2019 and 2023. The roll out requires a self-assessment team[^64] led by academics, which has strategic oversight of all SAGE initiatives.

> “The strength of SAGE in my opinion is that it’s started that national conversation and it’s got everybody on board. ... But, the actual real change, sustainable change will not come from SAGE itself, but it will come from the momentum it’s building and that’s more sustainable. So, UQ in particular, we are not even thinking or looking at Bronze, we’re looking at what comes in Silver and Gold, and making sure we have that foundation for real change, regardless of whether SAGE exists past 2019.” UQ014

Alongside this, the Vice-Chancellor of UQ, Professor Peter Høj is a Male Champion of Change which is a group of Australia’s most senior male leaders whose focus “is on working together to achieve a significant and sustainable improvement in the unacceptably low levels of women in leadership” (Male Champions of Change 2017, n.p.). UQ also promotes a number of other diversity related initiatives such as “Wear it Purple Day” where staff and students are encouraged to wear something purple of they agree “you have the right to be proud of who you are. Who you love and how you define yourself does not change that” and “Equal Pay Day” which is expressing support for men and women to earn equal pay (UQ 2016, 2017p). UQ also is developing a gender pay-equity toolkit to ensure that pay is considered fairly and equitably.

UQ has a long standing (15 years) Ally Network program and was the second university in Australia to establish such a program. The program has been recognised by “Pride and Diversity” the only

[^62]: Each faculty and institute within UQ has their own Operational Plans and Progress Report which outlines their progress as well as actions towards achieving their Strategic Plan obligations.

[^63]: Beyond 2017, new indicators will be presented as part of the forthcoming Strategic Plan for 2018-2021

[^64]: The self-assessment team has 24 members and is Chaired by the Deputy Vice Chancellor Research. The self-assessment team is comprised of a ratio of 48% men to women. Selection for the team was a mix of role based positions (i.e. Pro Vice Chancellor Indigenous Engagement, Executive Dean representation etc.) as well as through an expression of interest with the final positions representing a mix of academic levels, people with and without children, part-time workers and so on (UQ 014). Under the self-assessment team there are six working parties of 6 – 7 members, one of which is a communication and engagement working party to get the message out and engage the university community about the initiative.
national not-for-profit organisation that looks at LGBTI employment inclusion. They develop an annual workplace equality index (AWEI) which requires institutions to undertake a complete audit of the organisation through a LGBTI lens and submit it to them. UQ was named in the top 10 employers in Australia for LGBTI workplace inclusion in that index and in the last two years they have received Bronze awards which positions UQ in the top 5 Australian universities (UQ014).

UQ has also established an Aboriginal and Torres Strait Islander (ATSI) Employment Committee as well as an Indigenous Employment Coordinator and is set to develop a Reconciliation Action Plan this year. They have two key programs for first people employment which includes a trainee program of 6 – 10 trainees who can be school leavers or people re-entering the workforce. Individual trainees are employed at HEW 1 and complete a Diploma of Business. The trainees are then allocated to different work areas across the university as part of their development. The intent is for the trainee to complete the program in 12 months, with the hope that they will continue to a sustained employment position. The other program is a graduate pilot program which is open to any Aboriginal or Torres Strait Islander person that has graduated in the last 5 years from any universities (with UQ graduates being given priority). The program is aimed at two cohorts of 6 graduates each that will be recruited and rotated on 6 month rotations across the university with the intent of transitioning into ongoing appointments.

All of these initiatives towards gender and diversity stem from strong support by all UQ staff towards both priorities as well as the performance indicators associated with them. For instance, in a 2014 staff survey (N=821), at least 90% of staff surveyed agreed or strongly agreed on improving the recruitment, retention and career progression of women (90.5%); valuing the diversity of sexualities and gender identities amongst its staff and students (91.97%); and to providing a more accessible institution for all staff and students including people with disabilities (96.43%) (UQ 2014b). Similarly, the majority of staff (87-89%) also agreed with the key performance indicators for increasing proportion of women in senior positions. In open ended questions, respondents also identified support towards cultural diversity, family and carer responsibilities and flexible work, disability and age (valuing older employees and students) as additional priorities UQ could work towards (Refer to Appendix E.6 Staff Consultation on Equity, Diversity and Inclusion).

Targeted organisational development initiatives also exist to help support specific teams or groups to achieve identified goals or work through particular issues relating to gender and/or diversity. In 2016, this included workshops supporting staff to positively influence culture and supporting teams undergoing change. These staff development programs provided 938 in-house courses to 9,484 participants in 2016. There is also a strong focus to align course offerings with the University’s strategic direction.

6.2.5 Open access and open science strategies in the organisation

The University has a requirement that all publications arising from research by UQ staff or students – irrespective of their work location - to be openly available via UQ’s institutional repository, UQ eSpace (UQ 2017f). UQ states that publications should be made available as soon as possible but open access compliance requirements of funding bodies can vary significantly. Therefore, all UQ authors are contractually bound to comply with the relevant open access policies of their funding contracts65. Where contractual obligations exist, an explanatory note must be attached to the bibliographic metadata of the research within UQ eSpace. Such a policy position stems from the view that the University is adhering to open-access policies of state, national and international granting bodies as well as ensuring that the results of research are “made available to the public, industry and

65 Which might also extend to the underlying/supporting data within a publication being openly accessible as well
researcher worldwide, for the benefit of society” (UQ 2017f, n.p.). It was recognised that there currently exists institutional drivers for open access through:

“UQ becoming a trusted provider of data and known as being responsible, which inevitably means making your data open and reproducible” UQ 001b

It was also noted how the culture around open access is slowly being disrupted:

“So, there is a massive cultural thing, but you find this new generation of researchers coming through, who have grown up with all the online stuff going on. They’re just used to everything being out there open and online. If you can’t get it, then it’s not real, right? There is this whole new generation of people who are coming through who are used to working in the open, and find it quite odd to publish in a closed journal. They find that really restrictive, and they haven’t got the peer support from their supervisor on how to do it, because the supervisor is used to the old system.” UQ 001b

Operationally, interviewees expressed a number of challenges about open access, particularly with industry funded research where they may insist on not making the data open access. There were also concerns over the lack of understanding between green and gold access routes for publishing. This was judged to hurt the financial position of the university, with UQ paying large sums for subscriptions to journal publishers while researchers were being asked to pay to make their publications open access. Concerns over researchers’ lack of understanding around open access were also expressed in the interviews.

“So, there is a bit of a difference, putting it on ResearchGate. You are going to get in trouble, you are going to get a pull down notice. If you put it in UQ e-space, you are not going to get in trouble. But we do get the occasional pull down notice.” UQ 001b

It was noted however that across Australia different open access policies exist which meant different types of data and publications were being stored on different university databases. More broadly, interviewees noted:

“I can see the benefits of open peer-review, I can see the benefits of disrupting the scholarly communication model completely, flipping that on its head. I talk to many academics who are really confused, because they live in their little academic world, and they’re like we’ve got these awesome results, and I’m going to have to write a paper about it because that’s the only way to communicate the results. Actually, they just need a bit of breaking out of there, they only think it’s true if you have published it in a journal. That’s the way they think, which is quite frustrating.” UQ 001b

To help facilitate academics understanding of the processes surrounding open access, more recently the University has developed a library guide\(^{66}\). The guide uses videos, information and decision trees to help researchers navigate through prospective journals and more critically evaluate the journal requirements which might impact funding obligations and/or publishing preferences. A key instrument through this all is seen to be the ORCID digital identifier so that the university can streamline metadata processes.

6.2.6 Science communication and engagement as integrated in research

Although a prominent theme within the University in the form of on-campus tertiary science education, outside of this, science education is not a prominent mission direction of UQ. Even when

\(^{66}\) https://guides.library.uq.edu.au/for-researchers/open-access/open-access-publishing
there is external science education by the University, it is often a secondary outcome of strategic actions by UQ to influence future student choices, increase societal engagement or diversification into other educational channels for its main on-campus science teaching arm.

However, UQ is the primary partner of Wonder of Science, which promotes STEM culture in Queensland schools by immersing “years 5-9 students in challenging inquiry-based science investigations fully aligned to the Australian Curriculum” (Wonder of Science 2017, n.p.). UQ also has a High School Outreach program, which is run by the School of Biological Science in collaboration with the ConocoPhillips Science Experience, to help “students in years 9-12 have the opportunity to discover what studying science is like at UQ and how science is applied in industry and everyday life” (UQ 2017), n.p.). The program has seen thousands of students from Queensland and northern New South Wales attend and enjoy the event over the past eleven years. The success of the program is demonstrated in it being awarded the federal Excellence in Science Education award from then Minister for Education and Training in 2007 (UQ 2007).

One of the most interesting pieces of science education has been UQ partnering with MasterChef finalist Ben Milbourne, to produce a new ‘pop science’ television series, Food Lab by Ben Milbourne, which began airing in 2017. The show is filmed at UQ with “UQ scientists being interviewed to explain the scientific principles being explored through cooking” (UQ 2017g, p. 38). The TV show aims to address Australia’s engagement with STEM, inspiring future students to pursue careers in science as well as being aligned with Australia’s STEM Strategy 2025 initiative and the national science curriculum (UQ 2017k). Each episode of the online series is “accompanied by supporting materials and resources for teachers and students including lesson plans, student activities, experiments, investigations, discussion topics and research tasks” (UQ 2017l, n.p.). Season 1 attracted an average national reach of 149,000 views per episode, and is currently scheduled for a 65 episode Season 2 renewal on the SBS Food Network. UQ is also reviewing off-shore distributions of both Seasons.

Through Open Days, school visits or campus tours, UQ utilises such programs to gauge and interest the community in the research and study options available at UQ. Although the primary purpose of these initiatives is to influence future student choices of their tertiary education, there also exists flow on effects which includes informal science education. In 2017 nearly 25,000 guests attended UQ’s various open days, as well as 1,100 secondary students from 96 schools attending the Careers that Shape the World, an annual event at UQ St Lucia, where students in their final years (Years 11 and 12) are introduced to a variety of career possibilities arising from studying at UQ (UQ 2017g).

This compliments a number of other science education initiatives such as University’s Enhanced Studies Program (ESP), where almost 250 Year 12 students complete a first year university subject – which includes science related subjects – to help boost their critical thinking and knowledge of science (UQ 2017g, p. 46). UQ also offers various Science Camps run by different UQ research groups. The camps offer field and laboratory based education programs developed by researchers who work directly with teachers to develop an educational program that fits the curriculum of senior high school students. UQ has also supported and is active across the programs being offered through the edX platform.

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67 Other secondary partners include the Queensland University of Technology, Queensland Government, Australian Academy of Technology and Engineering, Queensland Trust for Nature, Engineers Australia, Bechtel and Arrow Energy.

68 Australian reality competitive cooking game show based on the original British MasterChef.

69 The world’s leading consortium of Massive Open Online Courses (MOOCs), jointly founded by Harvard University and Massachusetts Institute of Technology (MIT).
6.2.7 Incorporation of AIRR dimensions into policies

**Anticipation and reflexivity**

Both anticipation and reflexivity are not mentioned within any UQ institutional documents or policies. However, there are strong undertones which could be interpreted as both anticipatory and reflexive. For instance, in the most recent Strategic Plan, the Vice-Chancellor of UQ, Professor Peter Høj wrote “the pertinent question is not ‘will’ large-scale change transform global higher education, but instead the question is ‘when’ and – very importantly – ‘how’” (UQ 2017m, p. 5). Acknowledging this, the Vice-Chancellor states that the University must be “agile enough to address new challenges, while maintaining its focus on augmenting UQ’s tradition of excellence” (UQ 2017m, p. 5). Such an ethos of anticipation and reflexivity has then been translated into the University’s three pillars of; learning, discovery and engagement (UQ 2017n, n.p.). In this regard, although the University does not necessarily utilise the RRI dimension wording, the ethos of such dimensions is prominent throughout the University. As a teaching and research institution the move by the university to be part of EdX platform demonstrates overt anticipation of changes in the delivery modes of teaching central to the sustainability of the University.

Drivers include the requirement for impact assessment from funding organisations as well as industry research partners who are looking for more examples of the impact of research investment. The university has had to respond by gathering impact stories from across Faculties and Institutes. The university has been proactive in this area by participating in the first trial round of the impact assessment (2017). The university has just completed the second round of this process, gathering more stories from a range of areas across the university. The ethics approval process requires anticipation and reflection of the impact of the research process both on human and animal subjects as well as consideration of the likely broader outcomes arising from the research so becomes a driver in itself.

A key barrier however remains the time it may take to demonstrate true impact from some research outputs. Similarly, because UQ is a teaching and research organisation there is competition for many academics to balance teaching and research requirements which can mean resources can become constrained. With the requirements for impact only recently emerging more formally in Australia there is also a barrier in that not all researchers understand how to articulate the impact of their research nor do all have the skills or capability to do this. In relation to ethics approval processes, if researchers view the approval process merely as a compliance requirement rather than using the process to assist them in assessing the overall impact and potential likely or unintended consequences of their research it could be a barrier to their ability to be anticipatory and reflexive.

While there exists limited temporal considerations towards these dimensions in some parts of the University, overall there is a strong cultural aptitude to be both reflexive and anticipatory, due to some appreciation of the benefits of such practises. The move to form strategic alliances with similar international research institutions is an indicator of UQ’s motivation to embrace this. Sharing of the impact stories developed for the 2018 round will also build awareness of the need for impact assessment. Training will be required to ensure researchers understand how to anticipate the impacts of their research, both intended and unintended.

**Openness and transparency**

Within UQ, both openness and transparency are prominent dimensions within policies. So much so, that UQ has both an organisational value70 as well as an ethical principle71 dedicated towards

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70 Which is derived from Queensland Public Service values.
71 Which is derived from state Public Sector Ethics Act 1994.
transparency. Transparency is strongly correlated to a commitment of accountability, and through this, integrity and ethical standards. UQ, states that if its own governance structures are transparent, for all stakeholders to observe this helps the university to be more trusted in the way that it operates. Operationally, researchers hold the obligation to declare actual, potential and perceived conflicts of interest in an open and transparent manner. UQ staff are also required to “perform their duties to the best of their ability with proper diligence, care and attention and be accountable for their actions and decisions” (UQ 2017a, n.p.).

Openness is referenced in relation to open and honest communication with staff, students and the broader public, with an emphasis on voicing rational debate and alternative points of view. Openness also has strong links to the University’s open access and open data policy, aiming to “increase return on public investment, promote open inquiry and debate, and enable innovative use of data that may not have been foreseen by researchers at the time of its creation” (UQ 2017e, n.p.). The CRC program also encourages open collaboration across multiple institutions. The university encourages their researchers to actively engage in CRC bids when there are credible industry partners and concrete research needs to be undertaken. The collaborative nature of these encourages an open and transparent approach to research beyond the walls of the institution.

Although no explicit barriers or drivers for either openness or transparency are mentioned directly, there are strong institutional undertones to promote the culture in a desired direction, evidenced in both institutional policies, frameworks, and operational procedures. For example, the enterprise bargaining process is a clear driver which demands the university to be open in its dealings on this matter. The university shares the progress of this process with all employees as it is undertaken. Similarly the Code of Conduct and the values the university upholds clearly demonstrates a requirement that drives and upholds openness and transparency. All researchers are encouraged to share their publications through their electronic researcher profiles which supports an open and transparent response. Similarly, the development of the Research Data Management portal means it is much easier for researchers to collaborate more openly with researchers across the institution and externally. There is also an underlying societal demand for research institutions like UQ to be accountable which supports the need for the implementation of such open and transparent support tools.

As with all research organisations, there are some areas which express concerns about protecting the intellectual property of some research particularly when it is of a sensitive nature. Commercial in confidence contracts with industry partners may also require this. Such requirements can become a natural barrier to being open and transparent. Another barrier exists where researchers may not align or become engaged with the strategic plan which is developed with the senior leaders of the university or choose not to share their research outcomes through the available online platforms.

The university already has a strong governance structure in place with the Senate and also the decision making processes of the senior management group within the university. These activities are shared in bi-annual presentations (face to face in person and through webinars) to all staff by the Vice Chancellor. All are made available on-line afterwards for those who cannot attend. Annual reports are compiled and made widely available through UQ’s website for both the University and research Institutes. Faculties and Institutes also all have their own communication staff which work with researchers to publish results in a range of media.

This is an area which can possibly be further developed with more staff training and building of their confidence in understanding how to share the results of their research through different media including the university’s own UQ news. Faculties and Institutes also offer a number of seminars throughout the year and many of these are open to the public. Similarly, UQ’s successful
participation in CRC bids form a component of openness and transparency as the focus of these is on collaboration with a range of industry and other research institutions.

**Responsiveness and adaptation**

While both these terms are not explicit in most UQ policies, one might argue the changing policy landscape surrounding research and tertiary education requires the university to be responsive and adaptive on an ongoing basis. The major policy changes such as a move towards an impact agenda, block funding grants and so forth all have the potential to seriously impact how universities operate. Similarly, the changing cultural landscape around where international students are sourced and who

As the same time, staff are encouraged to exhibit appropriate behaviours and interaction with others (courteous and responsive) as part of the duties of their position, where a collegial working environment is particularly encouraged. Adaptation on the other hand, as a concept is not mentioned with UQ policies.

### 6.3 Reflection on Review findings, Outlooks developed and ways forward

#### 6.3.1 The integrated or fragmented nature of different responsibility related dimensions

There is no doubt UQ sets out to be responsible in its approach to research and innovation. Committed to ongoing improvement key strengths include:

- Commitment through the SAGE Athena SWAN process for improving gender and diversity outcomes across the university, including specific goals and targets to improve balance across the university.
- Strong adherence to the national guidelines for the responsible conduct of research with established ethics panels and approval processes integrated across the University, including commitment for providing a safe environment for work.
- An organisational commitment to open access providing guidance and support for researchers in their choice of publishing, as well as data management portals to support publication of data and commitment through researcher profiles for sharing publications.
- As a higher education institution the UQ is committed to science education and STEM through various related faculties.
- Although there are some pockets of societal engagement at UQ this is possibly one of the weakest areas and has room for improvement but will need commitment for a more integrated approach to this pillar
- AIRR dimensions are also not evidenced in a coherent format however, again there is evidence in some parts of UQ’s strategy which suggests a level of reflexive and adaptive practice.

#### 6.3.2 Common barriers or drivers

Are there common barriers or drivers identified across the RRI aspects?

- The presence of senior leaders and researchers within different faculties, institutes and centres who have an understanding of the pillars of RRI are more likely to demonstrate evidence of a commitment to at least some of the pillars. They therefore become a natural driver of RRI practices in their local groups.
- Barriers to implementation appears to be a lack of time and resources for anything that sits outside the day to day functions of different individuals and groups.
6.3.3 Final reflections and plan for follow-up

There remains some skepticism at higher levels of the organisation about fully integrating RRI pillars as a separate or dedicated approach. As discussed above there are several pillars that are a strong focus and it is likely these will see the most progress over the coming years. We have planned a two day RRI workshop (September 5 – 6, 2018) to raise awareness and discussion about the relevance of RRI-Practice for UQ.
7 Organisational reviews and outlooks: CSIRO research funder

7.1 Mapping of the organisation

Established in 1926, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) is Australia’s largest research and development organisation. It operates under the provisions of the Science and Industry Research (SIR) Act 1949, with an annual budget of approximately $1.3 billion and over 5000 employees located across 59 locations. In its most recent annual report CSIRO describes its purpose: “to provide innovative scientific and technology solutions to national challenges and opportunities to benefit industry, the environment and the community, through scientific research and capability development, services and advice (DIIS, 2018b p.118).”

CSIRO is structured into multidisciplinary teams formed across twelve Business Units (BUs) (Figure 3). These BUs are aligned with the Government’s Science and Research Priorities as well as industry sector Growth Centres72. Reporting to an Executive Team (ET) of seven, the BUs reflect the lines of business in which CSIRO engages including:

- **Impact Science** (8) – which focus on the most significant challenges facing the nation (Agriculture and Food, Health and Biosecurity, Data61, Energy, Land and Water, Manufacturing, Mineral Resources, and Oceans and Atmosphere);
- **National Facilities and Collections** (3) – managing Australia’s infrastructure and biological collections;73
- **CSIRO Services** (1) – commercial, customer-centric products and services for industry, government, and the community, including education, publishing, infrastructure technologies, Small and Medium Enterprise engagement and CSIRO Futures.

The direction of CSIRO is set by the Minister74, the Board75, the Chief Executive76 and the ET. The Board and ET are assisted by a number of committees77 which help to ensure the quality and efficiency of decision making (refer Appendix F.6). CSIRO has a vision to be “Australia’s innovation catalyst, collaborating to boost Australia’s innovation performance” and a mission to “Create benefit for Australia through impactful science and innovation” (CSIRO 2015b, p. 2). While the ET lead CSIRO’s operations, ultimately “governance, performance and accountability of CSIRO’s operations, including the use and management of public resources is set out by the Public Governance, Performance and Accountability (PGPA) Act 2013 and related rules” (CSIRO 2017n, p. 3). In meeting the requirements of the PGPA Act, CSIRO’s Corporate Plan is its primary annual planning document, which “maps the path from the work we perform every day to fulfilling our vision to become Australia’s innovation catalyst (CSIRO 2017n, p. 3)”.

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72 Federal government funded industry-led centres driving innovation, productivity and competitiveness by focusing on areas of competitive strength and strategic priority Commonwealth of Australia 2018, n.p.)
73 These include: Astronomy and Space Science; Australian Animal Health Laboratory; National Research Collections Australia; Marine National Facility; National Computing Infrastructure.
74 Through a Statement of Expectations (SoE), which outlines the vision, mission, priorities, functions, future vision as well as required outcomes and operations of CSIRO as stated by the Minister for Industry and Science. (CSIRO 2015h, n.p.)
75 Consisting of the Chief Executive and not fewer than 7 and not more than 9 other members. All board members – excluding the Chief Executive – are appointed by the Governor-General of the Commonwealth Australia who represents the monarch of Australia – Elizabeth II, Queen of Australia – but is appointed by the Prime Minister of Australia. The Board is responsible to the Australian Government for the overall strategy, governance and performance of CSIRO.
76 Appointed by the Board, who must consult with the Minister before appointing a person as Chief Executive. Chief Executive is responsible for conducting the affairs of CSIRO in accordance with the strategy, plans and policies approved by the CSIRO Board.
77 The “Science, Strategy, Investment, and Impact Committee (SICOM), supports the ET in directing and controlling CSIRO’s strategic science, capability, capital, support, and impact planning, investment and performance management” and the “Major Transactions Committee (MTC), supports the ET in CSIRO’s involvement in major transactions, related matters and investment” (CSIRO 2017e, p. 30).
One distinguishing feature of CSIRO is its applied science focus with a strong emphasis on partnership and industry collaborations. Over the years, CSIRO has developed a number of strategic alliances with several major Australian and international organisations. One example of this is their 28-year relationship with Boeing which has led to a range of new research positions, PhDs and technological breakthroughs.

Fundamental to this is CSIRO’s focus on its strategic actions and capabilities which set the culture of the organisation. The strategic actions include:

- **Customer first**: Creating deeper innovation relationships with our customers and prioritising the highest value investments;
- **Collaboration hub**: Integrating the best solutions for our customers, increasing our flexibility and enhancing Australia’s innovation performance;
- **Global outlook, national benefit**: Delivering connectivity to the global science, technology and innovation frontier as well accessing new markets for Australian innovation;
- **Breakthrough Innovation**: Increasing our connectivity to help reinvent existing industries and create new industries for Australia and deliver public good;
- **Excellent science**: Create breakthrough technology and knowledge and be a trusted advisor for Australia;
- **Diversity, trust and respect**: Fully enable and support the innovative capacity of our creative people and teams to take risks and deliver to customers;
- **Health, safety and environment**: Enhance staff safety and wellbeing and to further our aspirations towards zero harm; and

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78 Over "1,800 private industry customers, including 500 major Australian companies, more than 1,200 Australian small-to-medium enterprises (SMEs), and a large number of overseas corporations (CSIRO 2016b, p. 6)".
• **Deliver on Commitments**: Enhance our agility, financial sustainability and capacity to respond at the speed of business  *(CSIRO 2015b, p. 10)*

7.2 Aspects of responsibility in organisational policy and practice

7.2.1 The conceptualisations of responsibility in the organisation

CSIRO’s largest single funding source is from federal government appropriation, along with a mix of funding derived from other government entities (local, state and national) and the private sector. The ratio of funds is approximately 60% (government sector) to 40% (private sector). This means CSIRO’s stakeholders are numerous and diverse, resulting in highly complex and wide reaching perceptions of responsibilities across the organisation. Overall, interviewees were most inclined to associate responsibility to the government and the Australian people due to the organisation being the “national research agency” *(CSIRO 001, 005, 007, 010, 011)*. With the exception of a few individual researchers within the social sciences and links to Europe, RRI was typically unfamiliar as a concept or framework within CSIRO. That said, there was broad agreement among the interviewees that the concept of RRI was critically important for CSIRO and Australia more broadly.

Although CSIRO ranks 20th in the Reuters top 25 global innovators list for government *(DIIS & Office of the Chief Economist 2016)*, like many science and research institutions across Australia, CSIRO is under increasing pressure from government and other stakeholders to improve its performance and accountability of research outcomes. In Ernst and Young’s *(EY) Review of CSIRO’s Science Prioritisation and Implementation Process (2016)*, consultations with CSIRO staff noted they were increasingly expected to demonstrate improved impact planning, and monitoring and evaluation (M&E) systems of triple-bottom-line impact. To facilitate these changing responsibilities, CSIRO had introduced a revised science planning and budgeting process to ensure financial sustainability and strategically aligned investment decisions *(EY 2016)*. The EY report summarised the Science Prioritisation and Implementation (SPI) process into the three stages including:

- **“Science Prioritisation: the application of the investment decision framework and six investment criteria to make investment decisions in relation to R&D priorities (Refer to Appendix F.2)**
- **Implication Assessment**: socialise and test preliminary decisions with Business Units (BUS) and their key stakeholders; undertake a risk assessment of preliminary decisions; revise decisions based on feedback and assessment; and communicate preliminary decisions to the Board; and
- **Delivery**: Develop clear implementation and change plans, communicate decisions and implement decisions.” *(EY 2016, p. 3)*

The review concluded that the initial SPI process had failed to prescribe responsibility and supporting frameworks for communication of decisions. From this, a number of recommendations arose to improve the process, all of which have been adopted by CSIRO *(See Appendix F.2)*.

At the enterprise level, CSIRO is guided by legislation that defines its role as well as its legal obligations. Adherence to these laws forms the foundations of the organisation’s decision making, behaviour and functions. In addition, the CSIRO Service Charter *(CSIRO Service Charter)* sets out the principles of service that the organisation aims to deliver to their customers along with their Public Research Agency Charter, which provides guidance to CSIRO and its researchers when engaging in public debate. The organisation also provides policies, principles and procedures, which cover science and delivery, people, governance, risk and health, safety, environmental sustainability and the community. The

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79 The Science Prioritisation and Implementation (SPI process) *(EY 2016)*
Code of Conduct extends beyond only thinking of our ethical responsibilities and also includes the following 10 areas:

1. General Conduct
2. Scientific Conduct
3. Communication and Publication
4. Health, Safety and Environment
5. Conflicts of Interest
6. Confidentiality and Privacy
7. Managing Information and Intellectual Property
8. Using and Protecting CSIRO Information and Resources
9. Making Commitments on Behalf of CSIRO
10. Staff Responsibilities of Line Managers.

As the national research organisation CSIRO has a unique organisational culture based on its mission and the staff it employs. For many within CSIRO, their identity is closely tied to their work and is often an important expression of their values. Most CSIRO scientists view their work as being critical to delivering public good. Interviewees noted a tension within CSIRO between conducting public good and private sector research. This dichotomy was reflected in the quote from one interviewee below:

“I think CSIRO is in a conflict within itself, because it wants to do public good research, but it also wants to make money and commercialise to justify itself. So, we are always in conflict, and it’s been like that ever since I got here.” CSIRO 003

Such a dichotomy was seen to emerge through different interpretations of the responsibilities of CSIRO under the SIR Act and the perceived responsibilities of the agency as a “trusted advisor”. Although it was noted these interpretations created a tension internally, this tension was seen to be beneficial for CSIRO over the longer term as it allowed for constructive self-reflection and discussion within the organisation.

Finally, all interviewees related responsibility to maintaining the trust of the public in CSIRO’s science. This was seen to stem from the changing expectations from a variety of actors such as funders, government, industry, and also the general public as reflected in the quote below by one interviewee:

“Things have changed, people really do have expectations that have increased, not just of industry, not just of government, but I think maybe also of science to a degree. I don’t think science captures the public imagination always in the same way. So, what does drive social acceptance of so many different things. What makes people trust something?” CSIRO 007

One exception over the last 4-5 years, is where concern was expressed over jobs cuts resulting from budget restrictions (Turney 2016). At the time, the issue attracted significant media, public and Parliamentary interest, including through a number of hearings by a Senate Committee. The issue was complicated by several of the job cuts occurring within high profile areas such as Oceans and Atmosphere. For example, the evidence provided through Senate Estimates showed that from 30 June, 2016 to 31 March 2017 the number of full time equivalent (FTE) staff dropped from 386 to 343 with 33 FTEs being climate science staff.

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7.2.2 Ethics in the organisation

Research ethics and integrity within CSIRO is an explicit guiding principle of the organisation. CSIRO’s Code of Conduct\(^8\)\(^2\) states that “decisions and interactions should embrace scientific excellence by working together ethically and with integrity in everything that the organisation does” (CSIRO 2015d, n.p.). Ethics and/or acting in an ethical manner stems from “Australia expecting CSIRO to conduct its activities ethically and with integrity” (CSIRO 2016c, p. 3).

Operationally, CSIRO holds procedures in Ethical Conduct in Human Research, and on the Care and Use of Animals for Scientific Purposes. CSIRO’s ethical practices comply with national codes and relevant State and Federal legislative requirements.

CSIRO operates five animal research ethics and two human research ethics committees. The first of the human research ethics committee is for health and medical research and the second for social and other interdisciplinary research. The ethics framework outlines the resources, processes, professional development and training available for CSIRO staff (See Appendix F.4 Ethics Framework). This detailed framework for ethics assists researchers by providing them with a “safety net” for conducting new and novel research without being fearful of negative unintended consequences due to the amount of foresight involved through the research ethics process.

CSIRO aims to facilitate high quality research that “adheres to principles of merit and integrity, beneficence and respect, and minimises any risk of harm to participants” (CSIRO 2017h, p. 1). The organisation also sees its role as contributing to the ongoing development of national and international standards in relation to the ethical conduct of human research. Of those interviewed, it appears that CSIRO’s ethics frameworks were well understood. However, there was some discussion around how ethical frameworks are understood at the individual level, beyond compliance with organisational standards, demonstrated in the quote from one interview below:

“...ethics is challenging, in the sense of, who’s ethics are you talking about? Because they’re often our own, rather than related to where one’s priorities for ethics might be. That’s very difficult when we’re dealing with cross-cultural and across belief systems. On the international sphere, this is challenging.” CSIRO 012

The researchers interviewed noted how the inclusive nature of the ethics approval process promoted objective and constructive criticism of project methodologies. This promoted a dynamic two-way dialogue between ethics representatives and researchers. Such dialogue was seen to be helpful by those working as researchers as well as those representing industry partners who later become part of the research process through funding research. It was suggested that from this process grew a mutual understanding and respect between researchers and ethics committees, helping each to appreciate and incorporate the other’s roles and objectives.

When discussing indicators for ethics, documenting specific goals for ethics was difficult, except for those relating to the processes for ethical conduct of research. In the focus group there emerged discussion around the current narrow frame of ethics that exists in CSIRO around minimising harm and preventing unethical behaviour. This was in contrast to broader considerations that emerged when reflecting on what is ‘responsible research’? Questions included: Who decides what research is done? Who owns the risks? Who is responsible if things go wrong? Some participants suggested there was a lack of conversation across the organisation about such broader ethical considerations.

\(^8\)\(^2\) Explains the conduct and behaviour expected of CSIRO and everyone working in CSIRO and reflects CSIRO’s role, legal obligations, policies, principles and procedures.
but acknowledged that they may not be privy to such conversations in their roles. However, it emerged that there was potential benefit in ensuring support role functions were also trained and made aware of ethical obligations.

The interviewees also recognised that constraints on the organisation might exist which are explicitly or implicitly ethical in nature. CSIRO has deemed that these ethical constraints must not be accepted without the specific approval of the Chief Executive, who should consult the Board on sensitive matters (CSIRO 2015f). For the purposes of the policy, it states that ethical constraints are those based on the “moral, religious, political or philosophical considerations of the other party” (CSIRO 2015f, n.p.). The policy further outlines that ethical constraints must not be accepted by a delegate without approval even if it would not directly affect work intended to be done under the relevant contract, grant or other arrangement.

In support of these functions a Board Audit and Risk Committee exists to assist CSIRO and the Board to manage risks by reviewing CSIRO’s risk framework and undertaking various audits of processes (refer Appendix F.3).

Currently CSIRO has metrics for ethics in the form of number of new projects each year (245 in 2016-17) and number of existing projects which are provided ongoing monitoring and support (435 active projects) which are potentially the most appropriate indicators for the outlooks (CSIRO 2017b, p. 80).

7.2.3 Societal engagement strategies in organisation

Societal engagement is deeply engrained within CSIRO’s structure and policies as the organisation adopts a wider view of the term – taking all stakeholders of society into consideration (i.e. industry, innovation system entities, and community/citizens), at the local, national and international scales. Defining “societal engagement” from a “citizen” only perspective limits an organisation’s ability to incorporate diverse contributions from various actors within society. CSIRO has specific policies within its Code of Conduct to encourage engagement in the “open exchange of scientific information” and to “participate in discussion and debate in areas of expertise” (CSIRO 2016c, p. 5).

More broadly, CSIRO also has specific goals and targets for creating deeper innovation relationships with its customers and has built deep connections and relationships with many national and global industries over many years. This has resulted in a series of mutual commitments to form major strategic alliances investing in long-term research and innovation for addressing large-scale challenges and generating value. Government engagement is also important to CSIRO’s approach to societal engagement and building greater understanding of the challenges facing Australia. CSIRO undertakes regular meetings with Ministers, Parliamentarians and senior staff from relevant government departments to provide scientific information and advice to inform policy development and program implementation and evaluation.

A core component of CSIRO’s Strategy 2020 is the Collaboration Hub strategic pillar, which identifies a number of activities for strengthening engagement and collaboration with universities and other publicly funded research agencies (nationally and internationally). This includes initiatives around mobility and exchange of people, more efficient sharing of property and infrastructure resources, and overall engagement in education for the future of science. A case study conducted by the Collaboration Hub Team clearly articulates the benefits that have occurred as a result of long term partnering with universities. A number of recommendations arose from the case study including the benefit of the co-design partnership model that can help operations to be adaptive to improve outcomes and measure impact (CSIRO 2017o).

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83 Actions which might affect the current or future ability of CSIRO to perform its functions and limit its capability to create benefits for Australia.

84 Tropical Landscapes Joint Venture (TLJV)
Strategy 2020 also includes a strategic pillar – Global Outlook, National Benefit. The aim of this pillar is “to deliver connectivity to the global science, technology and innovation frontier as well as access new markets for Australian innovation”. Extensive international engagement activities are core to the initiatives underpinning this pillar. These activities range from identifying and targeting global challenges and science partnerships, through to delivering solutions through various impact pathways. The purpose for extending the organisation’s societal engagement efforts internationally is to ensure Australia remains an active global participant in addressing issues that affect all citizens of the world. Including international perspectives on CSIRO activities also provides opportunities to assist with defining strategic direction, delineating the scope and contributing to peer review of science, and involving end-user beneficiaries in all stages of solution development.

CSIRO notes that when dealing with communities (i.e. Australian citizens), their views must also be taken into consideration to inform decision-making. This includes the respectful consideration of cultural sensitivities and the traditional rights of Indigenous people, which historically have been marginalised across many parts of Australia’s culture. CSIRO is committed to overcoming the gap between Indigenous and non-Indigenous Australians through targeted research that draws on the involvement, knowledge and expertise of Indigenous communities. This is best represented by the CSIRO’s Reconciliation Action Plan (RAP) which outlines the actions the organisation will undertake to improve the awareness and understanding of the culture, customs, history and achievements of Aboriginal and Torres Strait Islander peoples.

The organisation aims to find new ways to balance the interests and rights of industry, community and government stakeholders and to bring together science, Indigenous and local knowledge, for sustainable stewardship of landscapes and seascapes. In order to promote and recognise the achievements of CSIRO Officers in relation to Aboriginal and Torres Strait Islander engagement, participation, service delivery and research services, the organisation awards the annual Aboriginal and Torres Strait Islander Engagement Study Award and the Aboriginal and Torres Strait Islander Impact Excellence Medal.

In addition, the organisation is active in providing opportunities to contribute to the continual development of the CSIRO Strategy. For example, the organisation held an internal crowd sourcing exercise, which invited all employees to contribute ideas where they felt the priority science focus or new ideas for innovation should be. In total, this solicited more than 7,000 ideas which, over a series of additional activities, were refined and prioritised. The Chief Executive then took the top ideas to test them with their key stakeholders across government, industry and other key stakeholder groups. All of this contributed to the continual direction setting of the organisation. Another key initiative conducted by the organisation are the “CSIRO Connect” events. These events have been conducted over the past two years, with different focuses but with a common objective to engage staff across the organisation in order to discuss and contribute their thoughts on where CSIRO should be heading and what they need to do to get there.

Despite this, one interviewee expressed that, overall, they felt CSIRO held a narrow scope of societal engagement which tended to be more one-way rather than a dialogue.

“To me, societal engagement is really about allowing voices which are not generally heard in the research dimension to be heard, and that means the public and communities that are either involved or affected by research. It means NGO, it means those actors in the larger

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innovation ecosystem that are not generally solicited. You know, we communicate with all of them, but it's generally a one-way street.” CSIRO 002

Yet there are examples of effective two-way engagement processes emerging from the organisation. An example of societal engagement which CSIRO has turned into a commercial product is the service called Reflexivity. Another example is the Gas Industry Social and Environment Research Alliance (GISERA)87. The governance structure of GISERA is designed to provide for and protect research independence and transparency of research outputs.

Reflexivity

Reflexivity provides community members with a way to be heard by resource companies that work in their communities (CSIRO 2017k). It also allows companies to “gain an understanding about what their communities think about them and why. Such a process provides a clear opportunity for building trust in the relationships between parties. Reflexivity goes beyond a simple summary of community insights, it builds upon knowledge gained from Australian and global communities through thousands of research hours conducted by CSIRO over the past decade”(CSIRO 2017k, n.p.).

It provides a foundation for a company and community to understand how the impacts and benefits of mining and infrastructure, and the relationship between industry, government and society, affect the ‘social licence to operate’. A notable example is Rio Tinto, which has engaged CSIRO to implement the service in their mining operations.

GISERA

GISERA is a collaboration between CSIRO, Commonwealth and State governments and industry, established to undertake publicly-reported independent research. The purpose of GISERA is to “encourage a better understanding and perspective of the effects of the natural gas industry on Australia’s society, economy and environment” (CSIRO & GISERA 2017, p. 1).

GISERA aims to achieve credibility, trust and respect from all stakeholders through the open and transparent conduct and communication of its research and related activities. Since 2011, there has been “over 344 engagements with a wide range of stakeholders through forums such as workshops, seminars, conferences and technical briefings have been provided across mainland Australia” (CSIRO & GISERA 2017, p. 2). Within this process, GISERA aspires to be inclusive of both advocates and opponents of CSG and shale gas within its communication and engagement.

One other interviewee expressed a concern as to whether CSIRO is considered relevant to the youth of Australia today.

“CSIRO does regular checks with the community about their perception and knowledge about CSIRO. We are trusted, trusted up with Red Cross, it’s a really high trust level. The thing that really worries me about that, most people, and particularly the young people, can’t name what CSIRO does or what we have done for Australia. And that is a very dangerous place to be.” CSIRO 006

In 2016, 90% of Australians were aware of CSIRO, with 75% holding a positive view of the organisation. Since 2015, CSIRO has transitioned to conducting the industry benchmark Net 87 GISERA - https://www.csiro.au/en/Research/EF/Areas/Oil-gas-and-fuels/Onshore-gas/Environmental-impacts?ref=/CSIRO/Website/Do-business/Collaborative-research/Alliance-partners/GISERA
Promoter Score (NPS) methodology\textsuperscript{88}, where they scored +11 and then +34 for 2017/18 (CSIRO 2017d). The latter score exceeds the goal of +20 by 2019-20, and demonstrates recognition of the importance of societal engagement for building awareness of the brand.

In order to connect Australians with CSIRO, the organisation uses various channels to reach the population. This has included opening sites to the public, through Discovery Centres\textsuperscript{89}, which offers interactive journeys through CSIRO and Australian science history using exhibitions, showcases and activities. The public are also invited to visit CSIRO telescope facilities, including the Parkes Observatory Visitors Centre, Australia Telescope Compact Array, and the Canberra Space Centre.

Additionally, CSIRO has considered more non-traditional forms of measuring societal engagement. One example is evidence of the delivery of impact as a consequence of societal engagement. This partly emerged in response to the Australian National Audit Office (ANAO) 2009 review which found CSIRO did not have a systematic way of measuring the impact created from their activities. In response, CSIRO established an “Impact 2020” project in 2010 to design how impacts can be planned, monitored and measured (ANAO, 2009). Since then, Impact 2020 has developed and formalised an Impact Framework and systematic methodology for achieving this (refer Figure 4).

![Figure 4: Impact Framework (CSIRO 2016d, n.p.)](image)

CSIRO’s intent is to increase the adoption and impact of core research outputs by growing economic, social, environmental benefits of its research activities. This is underlined by a broader structural driver for CSIRO staff to develop impact pathways to maximise the potential impact of their research and other activities, including through societal engagement. Interviewees noted how a cultural driver for impact is emerging as an extension of community engagement, accountability and transparency.

An example of engagement includes CSIRO’s innovation and entrepreneurship program called ‘ON’\textsuperscript{90}. The “ON Accelerator” or “ON Prime” activities have been engaging with a range of actors from

\textsuperscript{88} Management tool to gauge loyalty of customer relationships that has been widely adopted by two thirds of Fortune 1000 companies. NPS can range from -100 (everybody is a detractor or as high as +100 (everybody is a promoter, with positive value felt to be good, and a NPS of +50 being excellent. (Reichheld 2003)

\textsuperscript{89} Discover Centre in Canberra - https://www.csiro.au/en/Education/Community-engagement/Discovery-Centre

\textsuperscript{90} ON Program - http://oninnovation.com.au
industry and research to fast track the development of new science and technology. Similarly there were a number of case study examples offered around community engagement through the social sciences which reflected the importance of societal engagement for CSIRO.

In the focus group (n=11), participants’ summarised three ways to classify societal engagement in the research process. The first related to engagement undertaken prior to any research being undertaken where the decisions focused on whether there was a social licence to perform the research; the second occurred during the research process when the community was engaged in the data collection in some way; and, the third was in assessing the impact of the research and considering who benefits and how these benefits are communicated.

7.2.4 Gender equality and diversity strategies in the organisation

There is no doubt that equality and diversity are strong drivers of CSIRO culture and strategy (CSIRO 2015e). Supported in the Minister’s SoE which tasks CSIRO to “support women in STEM and closing the gap in Aboriginal and Torres Strait Islander achievement and employment in STEM” (CSIRO 2017b, p. 28). A “Diversity and Inclusion Plan” was developed and renewed during 2011-12 for implementation over the 2012-15 strategy period. Subsequently, through the 2020 Strategy (2015b), CSIRO continues this agenda by promoting inclusion and diversity, of both gender and culture, as a key driver of innovation.

Such initiatives are also supported within CSIRO’s Code of Conduct which has policies for supporting and encouraging the environment and workforce to be more inclusive and diverse (CSIRO 2016c). Overall, representation of women in middle-to-senior leadership roles (science-specific and enterprise-support roles) increased from 29% in 2016 to 31% in 2017. The female leadership representation in science-specific roles improved from 21% in the previous year to 25%. Similarly the percentage of leaders reporting a non-English speaking background increased from 17% to 18%. To continue to meets its diversity and inclusion objectives, “reference groups and plans have been established across all Business Units to provide clear blueprints on what is to be achieved and how (CSIRO) will embed processes to ensure successful implementation”(CSIRO 2017b).

However, it was evident in the interviews (n=13) there was concern over gender equality within CSIRO reflected in the quote from one interviewee below.

“There is a big push in the organisation to increase diversity. And diversity inclusion is a big thing for CSIRO. I guess I’m not seeing it in the recruitment yet, but I do believe they are actively looking to employ women in senior roles.” CSIRO 006

It was observed that while there are higher levels of female leaders in support roles, at least five interviewees noted a lack of female representation at higher levels of leadership. There was an emphasis placed on the 2014 internal restructuring which produced zero female representation in leadership roles across the third level within the structure.

In response to concerns expressed across the organisation about poor levels of female representation and low staff morale found in their all staff survey in 2016, CSIRO developed a “Cultural Alignment Program”. The aim was to build a comprehensive view of CSIRO’s current culture and future needs. This resulted in an extensive internal engagement program, with almost 3,500 staff consulted to assess exactly where employees were at and to proactively bring them along on the journey for improving representation of diversity at all levels. CSIRO began developing a “Diversity and Inclusion Plan” for 2016-19 and noted the following within their annual report:
• “Implementation of enhanced recruitment and selection processes to support greater gender and Cultural and Linguistically Diverse (CALD) outcomes within leadership roles throughout the Integrated Reform Program;
• Setting of targets across Group and Team Leader appointments (20% women, 20% CALD)” (CSIRO 2016b)

Within the same year, CSIRO also signed to become an inaugural member - along with 15 universities and 4 other research institutes - of the “Science in Australia Gender Equity (SAGE)91” pilot of the Athena SWAN Charter for improving gender equity in STEM. In March 2018, CSIRO and the other 19 organisations involved in the first cohort of the program submitted their applications for bronze accreditation after two years of preparation. As part of this accreditation, CSIRO was required to “collect, analyse and present their data on gender equity policies and practises in STEMM; identify gaps and opportunities for improvement; and, most importantly, develop concrete plans for advancement” (CSIRO 2017e, p. 17). Complementing this process, there has also been extensive engagement through focus groups92, roundtables and a road show93 across the organisation in an attempt to better understand the real concerns and raise awareness of SAGE. The efforts made across the organisation seem to be having an impact best reflected in the quote below by one of those interviewed:

“I feel there is a turning around occurring not SAGE as a ticking the box exercise, but SAGE as we do not want to be talking about SAGE in a year’s time because it’s done, and I mean that in a positive light, not a negative light.” CSIRO 015

CSIRO has developed KPIs and metrics around diversity and inclusion. For example, CSIRO intends to increase the number of shortlisted female applicants for leadership positions (CSOF 6-9) from >30% in 2017-2018 to >40% in 2019-20 and beyond. Alongside this, CSIRO has introduced a new KPI around morale, with a metric of achieving an 80% staff engagement score when measured through the staff survey. In addition, interviewees noted how Larry Marshall, the Chief Executive, is a Male Champion for Change94, which aims to elevate gender equality as an issue of importance.

All (n=15) of those interviewed showed unanimous support for greater gender equality – especially in leadership roles within CSIRO.

“To me, it isn’t a question if it is a 50/50 split, the question is that we go out and hire the best people for the job, and that we get a good pool of gender, religion, race, whatever it is in that pool, because we’re giving everyone a fair go.” CSIRO 004

“But there’s certainly been recognition around decision-making is always improved by having greater gender and diversity in that decision making, better innovate outcomes and so on. It’s been a conscientious strategy to really improve our gender and diversity and inclusiveness.” CSIRO 011

Interviewees also expressed the views that CSIRO would be best placed actively helping women through leadership training, as well by addressing barriers of academic career progression and managing work schedules which are often seen to be at odds with managing family commitments. In

92 Including focus groups run by the Chief Executive himself.
93 Either in person, or via web conferences for more remote locations, 2 hour workshop which includes a presentation as well as panel Q&A which includes respective senior leaders present.
an effort to achieve this, CSIRO has implemented an initiative called “Balance95”, which states that if any staff member desires to work more flexibly, the default answer is yes, unless there is a good business reason to not permit the request. This demonstrates that both structural and interchange drivers and barriers exist, as well as strong cultural drivers for gender equality. It was noted that there has been a high level of commitment in this area with significant engagement across the organisation to address the issues that have emerged and the extensive list of indicators found in Appendix F.5.

Since 2007, CSIRO has had an Indigenous Engagement Strategy which aims to increase Indigenous participation in CSIRO’s research and development agenda. More recently, CSIRO has committed to increasing the recruitment and retention of Aboriginal and Torres Strait Islander peoples in their workforce. They are currently reviewing and implementing strategies to meet the Commonwealth Government employment target of 3% of workforce identifying as Aboriginal and Torres Strait Islander by December 2018 (CSIRO 2014a). To achieve this CSIRO offers a number of career options designed specifically for Indigenous Australians, from traineeships and cadetships, through to specifically identified Aboriginal and Torres Strait Islander positions such as Liaison and Education Professionals (CSIRO 2015g). As at September 2017, Aboriginal and Torres Strait Islander people represent 1.9% of CSIRO employees. Of these, 19 are cadets, 21 are trainees and 64 are research, technical and administrative services staff.

CSIRO recognises that Aboriginal and Torres Strait Islander peoples have made and will continue to make extraordinary contributions to all aspects of Australian life including culture, economy and science. The Office of Indigenous Engagement (OIE) provides support and advice to CSIRO staff in developing and maintaining engagement with Aboriginal and Torres Strait Islander people and/or communities and companies. There are currently three Indigenous Engagement Working Groups and networks which include:

- Indigenous Engagement Implementation Committee – tasked with ensuring the Indigenous Engagement strategy and Reconciliation Action Plan is being delivered;
- Indigenous Strategic Advisory Council – provides advice to CSIRO on its ongoing work with partnering and engaging with ATSI peoples and communities
- Aboriginal and Torres Straight Islander Forum – established in 2015 and meets monthly to build and maintain the connections between Aboriginal and Torres Strait Islander staff

In addition, the organisation also internally awards the annual CSIRO Medal for Diversity and Inclusion, which recognises and promotes outstanding work in Diversity and Inclusion, either by directly advancing CSIRO’s Diversity and Inclusion objectives, or by demonstrating impact arising from inclusive and diverse teams. As well as the Ruby Payne-Scott Award, which supports eligible staff who have taken extended leave of at least eighteen weeks. The award provides support to staff to re-establish themselves and reconnect with the research underway in their field and related fields of research, or advancements in their professional area. The Award is available to staff returning to work after parenting, family duties, sick or carer’s leave, or for other special circumstances.

7.2.5 Open access and open science strategies in the organisation

CSIRO is the largest patent holder in Australia, and like many other universities and research organisations, patents its technologies to protect its Intellectual Property (IP) and enhance
investments. However, CSIRO is also an organisation which promotes a culture of open source, information sharing and transparency of decision-making (CSIRO 2015b). The only exception is when the organisation has contractual obligations with industry partners, in which case, limitations on open access are dictated by the contractual arrangement. However, the organisation’s growing income from external funding sources (both government and private sector) may have the potential to increase restrictions on open access. This shift toward securing increased external funding sources for research was seen as potentially becoming a structural barrier as stated by one interviewee as follows:

“Open access is a tricky one for us because there is an ethos of sharing research in order to better disseminate the benefits of the research we do. But, the opposite is that when we do research for other companies and they ask us to sign confidentiality agreements, then it means that the research is quarantined and cannot go outside of the organisation. That is a conflict for some of our researchers and certainty for us sometimes because it means we have to categorise the research so it doesn’t get out to the public when you have signed a confidentiality agreement.” CSIRO 003

Although external funding arrangements preclude some projects from open access, overall there are strong structural and cultural drivers for promoting open access wherever possible. CSIRO has explicit KPIs focused on increasing the proportion of collections that are available and utilised by researchers and the public, including digitised and non-digitised collections. These structural drivers are explicitly monitored and reported within CSIRO’s Annual Reports.

This commitment to open access seemed to stem from the core values of transparency and integrity. Disseminating results further demonstrated accountability to the Australian people who indirectly fund CSIRO. However, open access journals were also seen as impediments to career progression due to the higher citation rates and impact factors in commercial journals. More broadly, one interviewee noted:

“...researchers need to change their mindset. It’s not just about ‘Hey, I got a publication’, no that’s a personal impact to them, no, it’s about how the supposed users of their research use their research, and just being able to track and understand that is a useful activity in itself” CSIRO 001.

To this end, one interviewee observed that an impediment to open access can be from more senior researchers who are more accustomed to publishing in the traditional journals:

“So, there is a cultural change that is happening from younger researchers, but you still have old school die-hards that are in positions that create that barrier to open access to data.” CSIRO 001

There was also acknowledgement that some of the fees required to publish in open access journals could be prohibitive if the project was externally funded and the cost had not been anticipated.

There is a strong commitment to rigorous internal peer review and quality in the production of all of CSIRO’s publications (whether as journal articles or as technical or client reports and so on). This is best demonstrated through CSIRO’s ePublish system and policy, which is the organisation’s formal and rigorous peer review, publications approval and reporting system. ePublish is crucial to maintaining the quality of CSIRO’s publications provides a workflow for the formal review and approval of all CSIRO publications. The “Authorship and Publication Policy” states the procedure for assigning authorship, review and approval of CSIRO publications, including the contractual arrangement with publishers. It is recognised that CSIRO has a responsibility to maintain the integrity of excellent science, to provide independent, authoritative advice and to respect the confidentiality
and intellectual property of others. Following review, a formal approval process ensures that there is appropriate risk management of intellectual property, commercial value and scientific or other sensitivities.

CSIRO is also responsible for maintaining a comprehensive collection of CSIRO publications to record its research outputs; to meet its obligations for stewardship of scientific information on behalf of the nation; and to meet its reporting requirements to government. In dealing with publishers, CSIRO is generally required to assign copyright in the publication or grant a publisher an exclusive licence. CSIRO aims not to assign more rights than is necessary for the purpose of the publication. CSIRO must not purport to deal with rights it does not own without proper authorization from the owner of those rights. Wherever possible, CSIRO aims to retain rights to freely use data, information and parts of its published work without breaching copyright. This procedure supports the CSIRO Science and Delivery policy. It is also designed to meet the Australian Code for Responsible Conduct of Research

In addition, CSIRO’s own Publishing services\(^97\) supports both ‘Green’ and ‘Gold’ Open Access to help authors reach the broadest audience for their work and to facilitate unrestricted access to scholarly research. All Open Access articles undergo the same rigorous peer-review as those published under a subscription model.

Beyond publications, another example of open access science within CSIRO has been the development of the Atlas of Living Australia\(^98\), which is a collaborative, national project which aggregates biodiversity data from multiple sources and makes it freely available and usable online. The project has seen over 73 million occurrence records on 119,965 species being available online, and resulted in over 1.4 million data downloads from 37,471 registered users (CSIRO 2017c). Because the program has been so successful, the resulting social and technical infrastructure has been adopted by numerous other countries - nine either developed or underway - for their own respective national biodiversity portals (Alluvium 2016).

Within Australia, the Atlas has led to improvements in the fit for purpose consistency and accessibility of online data more broadly, creating real cultural change within Australia regarding data management and reuse. It has also helped to support or inform government policy or programs, and also act as a tool in building and improving skills in STEM. One interviewee working within the project also noted how considerations of responsibility were also adapted beyond open access. Namely, the project incorporated ethical considerations such as species vulnerability to restrict certain datasets from the public where they thought it would cause more damage than benefit.

“Yeah, reasonably full access. For example, in our project, we do hide data. But, it would be around threatened and protected species, where we don’t want people to know exactly where they are because it could endanger them. In health services, you would want people to be hiding data, because of the personal information. Within reason, you can’t make everything open.”

CSIRO 004

A further example where CSIRO has been taking a lead in open access science for research impact is in the management of health data\(^99\). For many years personal health records were inconsistent in the language used by health professionals and mostly recorded manually. CSIRO identified this as a key strategic issue and have been working closely with various health departments across Australia to develop a standardised electronic system with a common language. As part of this they integrated a

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\(^97\) CSIRO Publishing supports open access - [https://www.publish.csiro.au/journals/openaccess](https://www.publish.csiro.au/journals/openaccess)


‘big data’ and coding approach to find a way that streamlined the process and was far more economical. The process has been so successful it is also being used across other countries where similar issues have been encountered

7.2.6 Science communication and engagement as integrated in research

Previously, CSIRO had significant investment in creating and maintaining Science Education Centres around the nation and was one of Australia’s largest information science education providers (CSIRO 2015c). However, CSIRO has recently been through a period of transition in relation to its science education direction, which has meant refocussing around different priorities in this area. In 2015, CSIRO closed their Science Education Centres across the nation (except for one CSIRO Discovery Centre in Canberra), which had catered to as many as 389,287 visitors per annum (CSIRO 2015a). Five interviewees expressed concern at the closure of the Science Education Centres due to a lack of funding as reflected in the quote by one of those below:

“We’ve sort of cut back on that. We used to have science education groups at Long-pocket, Dutton Park and they used to get the school groups to come in and do scientific experiments. We had science educators working full time, and they got rid of quite a few of them. Funding, it was a money thing.” CSIRO 003

Funding constraints were also seen to be a broader barrier where financial pressures were seen to diminish or reduce the effectiveness of certain programs with staff shortages. That said, another interviewee noted that CSIRO overall held very strong structural and cultural drivers for science education:

“I think we do okay considering we are not a university, we are not an educational institute, so we can’t take degree students for example, and we can’t run classes. A lot of our guys do double up and have conversations or jointly supervise students, there is a Scientists in Schools program. There is a whole education division that tries to open up and get people involved from an early age. In fact, our project employs an Education Officer just to help us to engage with the general public and STEM type of things.” CSIRO 004

CSIRO was seen to hold a plethora of diverse and indispensable science education programs (as noted in the “Societal Engagement” section) which include, but are not limited to:

- **Sustainable Futures** – Encouraging students to develop skills in the process of inquiry and literature research as well develop their experimental, investigation and critical thinking skills. Participating schools may have an opportunity to meet with scientists during an annual workshop for students.

- **STEM Professionals in Schools** – National program that creates and support long-term partnerships between primary or secondary school teachers and scientists, mathematicians and ICT professionals.

- **Indigenous STEM education program** – Run in partnership with BHP Billiton Foundation to help Aboriginal and Torres Strait Islander students to excel in science, technology, engineering and mathematics.

- **Double Helix** – Australia’s leading science magazine for a youth audience packed with science news, features, experiments, giveaways and lows mote.

- **Scope** – A half hour fast, funny and informative science television show for children aged 8-14 years. Leading scientists present stories about their research and discoveries in a direct-to-audience that engages the viewer.

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100 CSIRO Snapper Platform - [https://aehr.com/research/software/snapper/](https://aehr.com/research/software/snapper/)
• **StemX Academy** – Week long academy run by the Australian Science Teachers Association, CSIRO and Questacon which matches primary and secondary teachers with STEM professionals to look at megatrends within Australia and the world.

These science outreach programs aim to promote the importance of CSIRO science and its application to students, parents, teachers and the Australian community. It was recognised that often science education programs also had strong overlaps with the RRI societal engagement - often creating two-way information flows and benefit. Alongside this, the organisation also operates CSIRO Publishing, which is an independent science and technology publisher that has a global reputation for quality products and services on a wide range of scientific disciplines (CSIRO 2014b).

More broadly, CSIRO has several indicators for the success of their science education programs. For instance, CSIRO has a goal to increase the utilisation of science outreach programs, as well as demonstrating the success through levels of participation. In recent years, the numbers using CSIRO’s science outreach programs has fluctuated, however, qualitative analysis and survey data indicates that the science outreach programs are having a positive impact on target audiences (CSIRO 2014b). CSIRO has also had “1,972 Scientist and Mathematicians in School (SMiS) partnerships in 1,300 schools, with 32% of those partnerships in rural and regional schools, and 52 partnerships in schools with more than 25% Aboriginal and Torres Strait Islander students” (CSIRO 2016b, p. 6).

CSIRO has invested in exploring new and innovative options for us to engage students in additional, novel ways, and pursuing growth in student numbers to create a diverse pipeline of researchers who, in the future, can contribute and take up leadership roles throughout the national innovation system. The organisation’s intent is to monitor and continually improve the student and early career staff experience across the entire lifecycle, e.g. sourcing, recruitment, time with CSIRO, and post-cessation connection through Alumni. CSIRO is defining the particular attributes required of students and post-doctoral fellows, and those of their supervisors. In addition to better equipping and supporting supervisors of students or postdocs, the organisation will also focus on providing a standard and fit-for-purpose development offering to students and early career staff to build their customer, innovation, and team-work and project management skills.

In addition to formal communication and engagement programs delivered through CSIRO’s Education and Outreach program\(^{101}\) and Corporate Affairs, the organisation places significant effort towards effective science communication. With public concerns about certain research areas, such as Synthetic Biology, vaccines, and technologies aimed at replacing human labour, discussions about why some people have strong fears or adverse reactions, and why their perception of risk does not align with those of scientists, have been on the rise within the organisation. CSIRO argues that both sides, the scientists and the public, have a problem that could potentially be addressed by better science communication that works to include all sides of such debates rather than polarising them, and encourages the use evaluation to measure effectiveness in order to improve future interactions\(^{102}\). To this end, CSIRO aims to:

- improve the general public’s understanding of science;
- clearly articulate, and make publicly available, the intended or actual impact from research activities;
- allow for dialogue to occur in order to address concerns, questions, comments and feedback;
- look for a variety of channels to use to disseminate information, calls for participation and discussion, and presenting of results;

\(^{101}\) CSIRO Education and Outreach - [https://my.csiro.au/orginfo/structure/csiroservices/educationoutreach](https://my.csiro.au/orginfo/structure/csiroservices/educationoutreach)

\(^{102}\) Ring the changes on science communication - [https://blog.csiro.au/ring-the-changes-on-science-communication/](https://blog.csiro.au/ring-the-changes-on-science-communication/)
• build the capacity of staff to utilise science communication practices;
• include activities in projects which allow for understanding of social concerns, differing worldviews, and acceptance of research areas, as well as implementing effective and appropriate approaches to address these issues; and
• seek the framing of discussions in terms of the values the public is applying to the issues, rather than those of scientists.

7.2.7 Incorporation of AIRR dimensions into policies

Anticipation and reflexivity

Anticipation and reflexivity are not terms that were found within policy documents of CSIRO. However, there are statements which might be interpreted as proxies for these. For example, the vision statement in CSIRO’s Strategy 2020 is for “CSIRO to be Australia’s innovation catalyst, collaborating to boost Australia’s innovation performance” (2015b, p. 3). According to the Chief Executive, CSIRO must have:

“courage to take technical and commercial risk – knowing that it may sometimes fail but that there is no better teacher, and it will never stop learning and investing in creating the platforms of the future”.

While the statement does not include the words anticipation and reflexivity, it does encompass the essence of both words.

More practical examples, include CSIRO Futures103, a cross-cutting service which aims to work with a range of external partners, both government and private enterprise, to help the senior decision makers prepare for future challenges. They do this by drawing from their pool of scientists, depending on the topic identified. The key questions which are the focus of CSIRO Futures includes:

• “What emerging trends and technologies will re-shape your sector in the coming decades?
• What opportunities are going emerge from these rapid changes?
• What science and technology should you prioritize and invest in to maintain or create a competitive advantage?” (CSIRO 2017g, n.p.)

A key element of anticipation embedded in this work are the roadmaps that are produced for a range of different industry and issues. Examples include:

• “Working with the industry association for the Australian plastics and chemicals sector to determine the long-term trends affecting their industry and identify the growth opportunities” (CSIRO 2017m, n.p.)
• “Working with Australian industry, government and researchers to identify major growth opportunities for Australian manufacturing, as well as what is required to do to ensure a prosperous future” (CSIRO 2016a, n.p.)

Possibly one of the most influential foresighting pieces that CSIRO has produced has been the “Our Future World: Global megatrend report” (Hajkowicz, Cook & Littleboy 2012). The report was developed using a global foresight process which “identified six social, economic and environmental megatrends that will have a major impact on Australia over the next 20 years” (CSIRO 2017j, n.p.).

In addition to CSIRO Futures, there is evidence of some BUs applying foresight integrated assessment within their science domains. The other focus where CSIRO is demonstrating aspects of anticipation is through their Future Science Platforms (FSPs). The Corporate Plan states: “The FSP program is designed to create the scientific platforms which will underpin our future ability to deliver impact and national competitiveness from our research” (CSIRO 2017e, p. 18). These areas have been recognised at being the high risk end of science and therefore are reviewed at different intervals to monitor progress against agreed KPIs. The current FSPs include: Active Integrated Matter; Deep Earth Imaging; Environomics; Hydrogen Energy Systems; Precision Health; Probing Biosystems; and Synthetic Biology (refer Appendix F.5 for a description of each).

Another example provided in the interviews included the use of the LEAN Launchpad approach to reflect on potential uses for new and emerging science and technology. Building upon the successful uptake by staff of the LEAN approach, CSIRO developed the ON Program. ON is CSIRO’s innovation and entrepreneurship program, helping to equip their people with the skills and knowledge to innovate better and faster. ON is focused on improving Australia’s innovation performance by helping CSIRO, universities, other Publicly Funded Research Agencies and SME teams to build their entrepreneurial competencies and collaborate more with industry and the broader innovation system to understand and address global challenges.

Implementing a full planning, monitoring and assessment approach allows for anticipatory assessments to be conducted, as well as the identification of assumptions, risks and critical pathway KPIs. The conducting of impact case studies also supports reflexive learning that can feed into continual learning processes.

**Openness and transparency**

As part of its Code of Conduct, CSIRO notes that transparency around the decisions affecting staff members and CSIRO affiliates “are integral towards promoting an environment where innovation thrives and the principles of equity flourish” (CSIRO 2016c, p. 4). It is also seen in CSIRO’s focus on core capabilities, where the word transparency appears under the topics: ‘Inclusion, trust and respect’, where they outline a commitment to “promote a culture of open sourcing, information sharing and transparency of decision making”; and ‘Deliver on commitments’ to “continually increase the transparency, availability and utility of relevant information through whole of CSIRO knowledge management systems” (CSIRO Strategy 2020, p.11). CSIRO also demonstrates a commitment to open and transparency through making key policies and procedures available to staff and other stakeholders.

CSIRO’s commitment to transparent processes is clearly reflected in the review undertaken by Ernst and Young in August 2016. This review was proactively sought by the Board, Chief Executive and the leadership team to better understand what had transpired after the announcement of redundancies and the resultant negative press and concerns received from stakeholders both internal and external to the organisation. The process was extremely open and the results have been widely shared to ensure the learnings are embedded across the organisation.

CSIRO’s GISERA and Reflexivity, highlighted in the societal engagement section of this chapter, are also evidence of drivers for openness and transparency existing within CSIRO. These initiatives also help to build greater trust in the research findings.

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105 Review of CSIRO’s Science Prioritisation and Implementation Process
As a Commonwealth agency, CSIRO is called to Senate Estimates three times each year as part of the Industry, Innovation and Science Portfolio to answer questions asked by the Economics Legislation Committee. Senate Estimates Hearings provide an opportunity for Parliamentarians to directly question CSIRO about its spending and performance, budget initiatives, annual reports, Portfolio Budget Statements and other topics. CSIRO officials, usually from the Executive Team (ET), but on occasion other representatives based on expertise, appear in front of the Committee alongside the Minister responsible for the portfolio and the Secretary of the Department of Innovation, Industry and Science. The Committee can also request a specific CSIRO official attend. Transcripts from the Hearings (known as Hansards) are made publicly available. Hansards are managed by Parliament House and historical transcripts are available on their website.

Finally, the compliance of CSIRO to the PGPA Act and Rule in regards to delivering a Portfolio Budget Statement (PBS)\textsuperscript{106}, Corporate Plan and Annual Performance Statement (included as part of the Annual Report) is imperative to demonstrating the organisation’s commitment to openness and transparency. The corporate plan is CSIRO’s key strategic planning document. It sets out how and when they will make investments to deliver on their purpose and reflects the supporting planning processes undertaken at the Enterprise and BU levels. The corporate plan is aligned to the PBS document which describes the outcomes, proposed allocation of resources, and performance of CSIRO. Results of the organisation’s performance against the planned activities and outcomes, stated in both their corporate plan and the PBS, are provided in CSIRO’s Annual Report.

CSIRO also makes its Risk Policy\textsuperscript{107} publically available, which provides best practice information on the organisation’s scientific, financial, commercial and legal, health, safety and security, environmental, and reputational risks, as published in the CSIRO Corporate Plan. Effective management of risk is vital to successfully pursuing the opportunities created through scientific research and delivering on CSIRO’s purpose. By actively identifying and managing risks CSIRO aims to increase its effectiveness as an organisation and provide greater certainty and confidence for the Government, staff members, collaborators, partners, and other stakeholders in the community about its operations. The CSIRO Board is also active in supporting the organisation’s efforts to identify, communicate and manage their risks through three Board standing committees: People, Health and Safety Committee, Audit and Risk Committee, and Science Excellence Committee.

The Freedom of Information (FOI) Act 1982 also gives a general right to the public and staff to seek access to documents held by CSIRO. FOI requests are administered by CSIRO’s FOI Unit. CSIRO is required under subsection 11c (3) of the FOI Act to publish a disclosure on its website. The disclosure log\textsuperscript{108} lists information which has been disclosed in response to a FOI Request. In accordance with the Act, agencies are required to publish details of information released within 10 working days of an applicant being given access to documents. CSIRO maintains on a website a list of documents release under the FOI Act.

**Responsiveness and adaptation**

Within CSIRO policies, responsiveness is not mentioned, however, adaptation is a weak to moderate theme within CSIRO policies (albeit both terms are strongly used in the context of research areas). CSIRO is well aware that as the national research agency it must be able to respond and adapt to current and future challenges. CSIRO notes that this ability to adapt must come from high engagement and a conversational, non-hierarchical approach involving CSIRO people and leaders.

\textsuperscript{106} CSIRO PBS - [https://industry.gov.au/AboutUs/Budget/Pages/default.aspx](https://industry.gov.au/AboutUs/Budget/Pages/default.aspx)
CSIRO also notes how this will be influenced by culture, which is seen to be a “social phenomenon, shaped by shared experiences, and in the process of developing the plan for cultural change, the activities themselves are seen to support the change desired” (Davidson et al. 2016, p. 4).

As previously reported, the **CSIRO Impact Framework** includes a planning and monitoring component which supports the organisation in understanding the intended outcomes and impacts of its research and other activities. This process allows for not only tracking how progress is being made towards the planned results but also to provide a feedback loop to inform the organisation of shifts, changes or unintended consequences of the activities. This way CSIRO can respond and adapt its actions to correct the pathway or take advantage of opportunities.

The **Collaboration Hub strategic pillar**, outlined under the Societal Engagement section, is a good example of CSIRO’s ability to be responsive to feedback from partners. From a practical standpoint, “adaptation” as a concept, can draw many insights from CSIRO’s research work in the climate change adaptation, biosecurity, marine incident response, Great Barrier Reef, and the digital domains. For example:

On their website CSIRO notes under **Climate Change Adaptation**: “10 years ago, the major focus in adaptation work was on a better understanding of impacts and vulnerabilities. This was a legacy of still attempting to make the argument that we should not allow the climate to change as adaptation was going to be too challenging (CSIRO 2017a, n.p.).” From this, CSIRO has outlined the following focuses in adaptation research, which although are climate change orientated, could be interpreted more ubiquitously and broadly:

1. “Shift the focus from problems to solutions (even though one must know something of the problem).
2. Emphasise today’s decision, not impacts in 2070 or 2100 (even though some of those decisions must take account of conditions in 2070, etc.).
3. Talk about risk management not uncertainty (as there are plenty of well-understood methods for managing uncertainty and it should not inhibit decisions).
4. Frame adaptation as an economic and social challenge, not (only) an environmental one.
5. Recognise the role of values and institutional rules in decision-making, as well as knowledge.
6. Stress emergent, economy-wide impacts and opportunities, rather than only local specific issues which can be managed relatively easily.
7. Increasingly consider transformative adaptation, not only incremental adjustments that are more easily handled with modest extensions to business as usual” (CSIRO 2017a, n.p.).

The **Health and Biosecurity BU** conducts research that addresses complex and interdependent human, animal, and environmental health and biosecurity challenges through the development and translation of innovative products and services to provide benefit both to Australia and globally. From a responsiveness and adaptation perspective, CSIRO invests capability to ensure the nation manages invasive species and diseases, protects animal and human health, assessing biosecurity risks and preparedness, and nutrition and health. The Australian Animal Health Laboratory (AAHL)\(^{109}\) is one example of the type of national biosecurity research, services and infrastructure delivered by CSIRO. It works closely with veterinarian and human health agencies globally, to maintain the health of Australia’s animals, the international competitiveness of Australian agriculture and trade, the well-being of Australians and the quality of the environment.

7.2.8 Other concepts used to characterise responsibility in the organisation

From the CSIRO case study there were three additional areas identified by the organisation which they use to characterise responsibility in science and innovation not captured in the current RRI framework. These include: sustainability; health and safety; and integrated science.

**Sustainability** was identified, as part of the CSIRO case study, as an important factor to be included as being a “responsible innovator”. This was highlighted as three key sub-factors, financial, environmental and social. Forming part of that perspective includes the sustainability of the organisation’s strategy, investments and activities.

- **Financial sustainability** relates to ensuring that the research organisation employs the most effective business models to ensure long term sustainability. In order to deliver on their purpose and commitments, strong financial planning and management is essential. As highlighted previously, CSIRO’s operating budget is funded from appropriated revenue from Government and a range of sourced revenue streams. Therefore, financial sustainability is strongly dependent upon both the Australian market for R&D services (from both the private sector and public sector) and the global market for research and development services, together with commercial factors that include the intellectual property environment.

- **Environmental sustainability** is a key component of CSIRO’s responsibilities, and a core value of the organisation. As a world leader in sustainability research and one of Australia’s top 250 carbon emitters, CSIRO recognises it has a core responsibility to minimise their environmental footprint through building infrastructure and behaviour change.

- **Social sustainability** as a national science agency, CSIRO needs to maintain a social licence to operate from the government, industry and the Australian public by building trust. It does this through continually reviewing the mechanisms implemented across the organisation to ensure ethical behaviour and the production of responsible research and innovation.
Responsible innovation also includes research organisations embedding a culture of **health and safety**. CSIRO is committed to safeguarding the health, safety, and wellbeing of its people, its partners, and the community. The organisation’s focus has been on building the skills of leaders to support the health, safety and wellbeing of its teams through case study based leadership training and simplifying the systems and processes used. However, CSIRO reports that while safety performance has improved, staff are still being injured and there have been a number of incidents highlighting the need for more effective management of the diverse risks associated with the delivery of science.

An external review of the management of health, safety and environment was conducted that highlighted the need for a cultural shift in the organisation, a realignment of strategy and the HSE team structure, to provide more effective support to the organisation. The CSIRO Leadership Team embraced the need for change with the organisation moving from ‘zero harm’ to a focus on ‘Safety: Make it personal. What could go wrong?’

A sense of positive wellbeing is recognised as key for people to be at their best. CSIRO’s focus on wellbeing is being expanded over the next few years to be more holistic, and will include programs dedicated to physical and mental wellbeing as well as the sense of connectedness and community within CSIRO. The organisation will build on current programs that are highly valued in the organisation, such as the ‘Balance’ flexible working arrangements, the current mental illness awareness training, and the many activities that occur on the majority of sites in support of physical fitness and social connection. They intend to develop a broader range of metrics to help track progress and report performance.

CSIRO recognises the approaches required to address complex national challenges requires an **integrated science** approach. Integrated science is defined as a cumulative approach of scientific study that synthesises the perspectives of the individual disciplines, and integrates them during all phases of the approach to a question or problem, with the results having an impact (van Riper et al., 2012). Integrated science is therefore required to be interdisciplinary. Interdisciplinary research uses a wide spectrum of scientific disciplines that are brought together to solve complex problems. By breaking down traditional disciplinary barriers in such helps build connections to the other disciplines. Therefore, if a research organisation is going to act in a responsible manner then widening the approaches taken, areas of expertise involved and worldviews included is required to address significant, complex social challenges. Having strategic intent to support integrated science activities, as well as building the capacity of researchers in this approach, including the skills to conduct foresighting and integrated assessments, is crucial in meeting this practice.

The drive for integration arises from a need to understand connected and non-linear systems with dynamics and feedbacks that cannot be foreseen when studying single systems in isolation. Also, interdependency between human and natural factors can result in one issue (i.e. environmental) impacting another (i.e. social or economic), or vice versa (Hamilton et al., 2015). Uniquely placed as Australia’s leading scientific institute, CSIRO is committed to supporting integrated science, investing strategically through its Bus and by working collaboratively with its national and international scientific, industry and business partners to build sound scientific evidence to support policy and decision makers to ensure future national and global sustainability.

### 7.3 Reflection on Review findings, Outlooks developed and ways forward

#### 7.3.1 The integrated or fragmented nature of different responsibility related dimensions

As the national scientific research organisation CSIRO is known as the “trusted adviser” to the nation which means it has a strong commitment to upholding the principles of RRI.
• The CSIRO has clear governance structures to guide its operation and in many ways sets the parameters for RRI.
• The organisation has high commitment from leadership to pillars including ethics, gender and diversity, societal engagement.
• Committed to SAGE Athena SWAN to enhance gender outcomes and is aiming for bronze award.

7.3.2 Common barriers or drivers

• Key driver is to maintain trust in its science both from public accountability but also funding organisations including both government and private sector organisations.
• Must ensure that principles of RRI do not add to workload but rather complement strategy that is being implemented.

7.3.3 Final reflections and plan for follow-up

There are a number of indicators the organisation has committed to as part of the Outlooks review. Many of these are incorporated into the Strategic Plan of the organisation. Monitoring and evaluation of these indicators, where possible will be sit with the Planning, Performance and Evaluation team under the guidance of the Executive Manager, Anne-Maree Dowd - the key contact for guiding the case study of CSIRO.

8 Summary of findings on each responsibility dimension

8.1 The concept of responsibility

• Notion of responsibility is mostly process orientated around responsible conduct of research and research integrity.
• Impact Agenda is making research institutions more accountable.
• Policy drivers encouraging interactions with industry and more public-private partnerships.

8.2 The notion of ‘RRI’

• Not well known as a concept however, some cultural drivers are emerging which align with the EU notion of RRI.
• The notion is fundamentally present, however not formalised as per the definition.
• Possibly holds less scope than EU definition as well, i.e. transformational change.

8.3 Ethics

• Well defined and advanced across Australia.
• Strong Codes of Conduct through funding bodies (ARC and NHMRC) for human, medical and animal research.
• Spill over effects into rest of research.
• Research integrity officers and advisors are emerging across the universities and PFROs.
• National online application portal has recently been developed.

8.4 Societal engagement

• Sporadic, depending on institution and champions within those institutions.
• Lack of agreed definition and scope of societal engagement.
• Some excellent examples of societal engagement.
Citizen science is seen as proxy for societal engagement.
Impact Agenda is encouraging more of this.
UQ’s Queensland Brain Institute has a range of engagement activities for schools, public seminars and magazine inserts into a leading national paper.

8.5 Gender equality and diversity strategies
- Always includes diversity beyond just a focus on gender.
- SAGE Athena Swan pilot being driven by the Academy of Science into universities and research organisations.
- Long-slow process to build equity however, many initiatives being implemented – for example Male Champions of Change.
- National Reconciliation Indigenous People Plan particularly for Academia.

8.6 Open access and open science strategies
- Emerging, but a broad scope of vision (into open data and methodology).
- Driven nationally through policy and research funding requirements.
- Government aiming to be exemplar.
- Grappling with privacy issues.
- Green and Gold Access complications.
- Changing nature of performance reviews for academics.

8.7 The inclusion of science education into research
- Depends on research institution, core requirement of universities with science departments.
- Examples – Questacon, CSIRO various outreach programs, travelling show, often private-public partnerships.
- Recognition of reduced participation in STEM subjects creating national awareness
- Federal government funding commitment in latest budget announcement towards encouraging women in STEM.

8.8 Incorporation of AIRR dimensions
8.8.1 Anticipation and reflexivity
- The Australian Council of Learned Academies (ACOLA) runs a Horizon Scanning activities which results in reports that “present independent and timely analyses to guide decision-makers through the decade ahead.”
- A key activity and emergent document was CSIRO Megatrends which had high impact and influence across Australia.
- CSIRO Futures team works with a range of public and private sector organisations and peak bodies to anticipate future trends that may impact them.
- ON is CSIRO’s innovation and entrepreneurship program, helping to equip their people with the skills and knowledge to innovate better and faster.

8.8.2 Openness and transparency
- Freedom of Information Act requires all organisations to respond in a timely fashion.
- Transparency is strongly correlated to a commitment of accountability, and through this, integrity and ethical standards.
• UQ recognises the importance of transparent governance structures for exemplifying its status.

8.8.3 Responsiveness and adaptation

• Societal engagement activities are an example of how organisations across Australia can be responsive to feedback.
• Climate adaptation has also been a focus of research across Australia.
• CSIRO’s ‘Diagnostic Emergency Response Laboratory’ in the event of an emergency animal disease outbreak and also their ‘Marine Incident Response’ to mitigate, manage and monitor marine incidents.

8.9 The integrated or fragmented nature of different responsibility related dimensions

• CSIRO:
  o Sustainability – financial, social and environmental.
  o Commitment to health and safety.
  o Integrated science to solve complex challenges.

9 Discussion of findings

While the Australian Government provides broad oversight in setting and realising the vision for the future of science and innovation, any discussions around the ongoing application of RRI in Australia need to take into consideration the relationship the Australian people have with science and technology more broadly. This makes understanding the culture and values that exist across Australian society important for considering what aspects of RRI may have appeal in Australia.

Relative to most European countries, with Australia’s colonisation by the First Fleet only occurring in 1788, Australia is still considered relatively young as a nation. However this is in contrast to Indigenous Australians’ culture which has a long and rich history pre-dating well before colonisation. This contrast in itself is important for understanding the juxtaposition between the different cultures that have emerged over time and more recently the efforts being made for reconciliation and recognition of Indigenous rights. Additionally, in the early days Australia had a strong reliance on immigration to build its skilled and unskilled workforce. This has contributed to Australia being classified as a multi-cultural nation. Such diversity augers well for providing international linkages, both economically and socially. As well, this dotted history of multi-culturalism and inclusion has naturally diffused into most aspects of the Australian way of life and reflects the broader societal value system that exists in Australia.

At the same time, Australia is a hot, dry, island nation110 which means Australians also place a high value on their environment and natural resources, particularly water. With the Australian economy being built on agriculture and mineral resources – both for internal use and external through exports – both sectors have relied heavily on science and technology innovations over time. Such innovations have been attributed to ensuring continuous improvement and efficiencies have been made which has resulted in a culture that traditionally values science and innovation. In more recent times however, as smaller farms are subsumed by larger ones, Australia’s rural and regional towns are shrinking, if not dying, as people migrate to urban areas. This is placing mounting pressure on these communities as well as the governments responsible for their livelihoods. Simultaneously, the

110 Over seventy percent of the country is classified as arid or semi-arid - receiving less than 500 mm of rain each year
resource extraction industry continues to grow and this growth is creating tensions between these two sectors as they attempt to co-exist. The new processes for extraction, which are seen to potentially threaten water supplies, are also leading more of the public to question whether the science can be trusted. Recognition of this contestation of different value sets and ideologies brings to the forefront the question of what the value proposition of RRI might be for Australia.

Through this lens, it is also worth noting that while the observations through this RRI Practice project have taken place over 21 months, the Australian research and innovation landscape has not stood still during this time. This observed pace of change reinforces the notion that science and innovation often moves at a pace more quickly than regulations can keep up. This places a responsibility on all of the actors working collectively across the science and technology landscape to ensure controversies surrounding new technologies do not impact negatively on society, ultimately damaging the impact of research and innovation.

At the commencement of the project RRI was not well recognised in Australia. Early discussions on the topic, gravitated to processes of research integrity or triple bottom line and sustainable research practices. However, over time and through interactions with Europe and other countries, it appears to becoming more familiar to those working across the research and innovation sector. Whether this is important for overall RRI Practice to be adopted in Australia remains to be seen. However, a focus on RRI from a policy perspective does send a signal that government and broader society do want research and innovation to be done responsibly.

Reflecting on the review of the national landscape and the two organisations studied it is clear that many of the RRI pillars are present and being implemented at varying degrees across Australia.

Addressing each of the pillars in turn:

- **Ethics** – Australia is generally recognised as an ethically sound research conducting nation. This is mainly due to its strong framework and culture of addressing research misconduct and other ethical issues. The NHMRC, the ARC and Universities Australia (UA), jointly publish the *Australian Code for the Responsible Conduct of Research* (the “Code”) (*NHMRC, ARC & UA 2018*) on a decadal basis. The “Code” is seen to be essential for setting the standards of research both for institutions and researchers and helps to maintain credibility and trust in the quality of the work. However, one down side is that the “Code” is not well adopted across the business sector unless there is an overlap with the NHMRC and ARC funding business R&D.

- **Diversity and inclusion** – Australia’s multi-cultural society means diversity and inclusion are at the heart of the country’s value system including a focus on the need for gender equity. This is reinforced across Australia’s research institutions through the Science in Australia Gender Equity (SAGE) Pilot of the Athena SWAN. Led by the Academy of Sciences, through a staged roll out across all PFROs there is a plan to reward STEM institutions for their monitoring and reporting through the use of data, self-reflection and organisational planning to reduce gender inequality. Beyond this there is also a significant policy focus at Commonwealth Government level on STEM school education, and more recently on promotion and engagement of women and diverse and underrepresented groups in STEM employment and research. Similarly, there is a strong focus on improvements to Indigenous employment through a National Indigenous Higher Education Workforce Strategy (NIHEWS). This national strategy aims to help universities and other PFROs to improve their Aboriginal and Torres Strait Islander employment strategies.

- **Science education and open science** - In relation to science education, there is consensus that Australian science is in good health, but with some issues surrounding time and resource
constraints that lead to limitations in confidence and training of teachers. There is a concern over the lack of STEM educated teachers, with very few high-performing STEM students aspiring to becoming teachers. At the same time, there exists numerous public-private partnerships within Australia that focus on science education. However, it has been suggested that the falling participation rates in ‘science’ subjects to its lowest level in 20 years makes it harder to reach the broader population already distancing itself from the value of science. Citizen science is one way that is working to overcome this issue.

- Societal engagement – under Australia’s Science and Innovation Agenda has been a priority area for many years but with a changing focus based on political context. Engagement occurs across multiple levels from individuals and communities through to national and multinational organisations, SME’s not for profits and philanthropy organisations. While there is some evidence of public private partnerships in research and innovation, overall Australia is seen to have low collaboration between public sector researchers and businesses. Not helped by most promotions in academia being based on measures such as peer-reviewed papers, rather than industry collaboration or commercialisation metrics. However, the introduction of the Impact Agenda is bringing about an observed change where there is a greater focus towards societal engagement. In terms of societal engagement at the grass roots level, there is no systematic approach to societal engagement but pockets of institutions do recognise the value of incorporating citizens responses into the early social shaping of research and innovation.

- Open access and open science - also has a strong focus across Australia’s R & D landscape. While still emerging, there has been a great deal of focus on how institutions respond to the requirements of Australian funding agencies for making all publically funded datasets available as a minimum standard. At the research institution level, many are still coming to grips with what this actually means but are working towards a level of meeting what is required. At the same time assisting researchers to more proactively embrace the opportunities that open access can bring.

The AIRR dimensions were present, albeit at different levels, depending on how they were being applied. For example, anticipation was associated with foreseeing both the positive and negative effects of research at the national level. It was also used in reference to anticipating future workforce requirements, the impacts of disruptive technology and the impact of releasing data. Each of these are seen to require anticipatory practises, while responsiveness was conceptualised as part of cultural and workforce factors. Both openness and transparency are primarily associated with research methodologies, declaring potential conflicts of interests, and other institutional processes. For example dissemination of findings and replicability of science. The expressed need for research to be conducted in an open and transparent manner was seen to be critical for building trust in research and research institutions more broadly. The sentiment being that this would ultimately lead to greater public trust in science and enhanced support for increased investment in research and innovation. Not reported in any detail during the data collection, but lessons learned from failed research and innovation were also thought to be important for developing responsive and reflexive behaviours within institutions.

Other areas that emerged outside of the pillars of RRI included sustainability, health and safety and an integrated science approach. Sustainability was identified, as part of the CSIRO case study, as important for being a “responsible innovator” through the responsible management of financial, environmental and social considerations which are integral to the maintaining the organisation’s strategy, investments and activities. It also emerged that research organisations need to embed a culture of health and safety if they are to be responsible innovators. This includes ensuring the
health, safety, and wellbeing of people, partners, and the community. Finally, an integrated science approach which brings together individual disciplines, and integrates them to resolve complex problems was also a tenant of RRI that had perhaps been omitted from the EU pillars approach.

Research governance including processes for handling research misconduct were seen as integral to RRI. With a number of regulations and Acts governing publically funded research organisations and the ever evolving national research priorities influencing the focus of research there remains a question on what the value proposition will be for integrating the precepts of RRI in Australia. Given the current burdens being placed on all researchers, it will be important that RRI remains flexible and is embedded in Australian research institutions a way that is proportional and makes sense across the Australian research and innovation landscape.

10 Conclusions

While many of the pillars of RRI are evident in the Australian R & D landscape the question remains whether an RRI approach will deliver more value than the current ad hoc approach. And if so, how will RRI values be embedded in future research? Given the increasing demands of researchers’ time and institutional resources it is clear that it will have to be simple and easy to use without creating any unnecessary burdens on either the researcher or the institution. Otherwise it is unlikely to create any significant changes in day to day research practices. However, there does appear to be a window of opportunity where the concept of RRI could meet and inform some of the requirements of the federal government’s Impact Agenda. However, it will require some changes to policy. This is unlikely to be commensurate with the level of adoption witnessed in the EC but provides an opportunity to signal to the broader Australian society the commitment of research organisations to responsible research and innovation and the pillars that underpin them. There are a number of recommendations arising from the report which are summarised below.

10.1 Policy recommendations to national policy makers

- Ensure the commitment to the *Australian code for the responsible conduct of research, 2018* (the ‘Code’) remains in place and is reinforced across all levels.
- Encourage adoption of the ‘Code’ by the private sector through offering training.
- Consider different reward structures for both institutions and ultimately researchers where the pillars of RRI are overtly recognised, either through funding or awards.
- Encourage recognition for investigating the unintended consequences of research as part of the research development process.
- Lead by example to ensure the pillars of RRI are also present in requirements for funding as appropriate.

10.2 Policy recommendations to European policy makers

- Continue to fund and share knowledge of RRI projects and associated impacts.
- Continue to identify the transformational practices that have resulted from RRI and the key elements that underpin them.
- Share further examples of how RRI is being translated across different disciplines.
- Assemble examples of the key barriers to RRI and how they have been overcome.
- Encourage recognition for investigating the unintended consequences of research as part of the research development process.
10.3 Recommendations to research conducting and funding organisations

- Ensure key pillars are implemented as appropriate within organisational settings.
- Exemplify the values of RRI in organisational codes of conduct.
- Develop reward structures and merit promotions around the pillars of RRI most important to the organisation.
- Need to find a way to embed ethics more proactively in a way that ensures it is viewed beyond compliance. This could be done by having ethics committees work more cooperatively with researchers.

10.4 Best practices scalable to European or national level

Several best practices have been highlighted in the report, some of these are summarised below.

- The Cooperative Research Centre (CRC) program (see p.26) is a successful program that was established in 1990. The CRC competitive grants program actively encourages multi-institutional collaboration between government, industry, research organisations and the wider community. CRC’s are industry led with a medium to longer term focus on innovation. They aim to “solve industry problems and improve the competitiveness, productivity and sustainability of the Australian industries” (DIIS, 2018c). The funding model both cash and in-kind contributions and provides access to those funds for up to ten years although many tend to be run over seven years. CRC programs also tend to have strong educational and training components which is also well liked. Building on the success of the CRC program the government introduced CRC-Project (CRC-P) grants in 2016 which support short-term industry-led projects up to 3 years in duration. CRC-Ps must have at least two Australian industry organisations including at least one small or medium-sized enterprise (SME) and at least one Australian research organisation (DIIS, 2018c).

- The NHMRC, ARC and UA Australian code for the responsible conduct of research, 2018 (see p.21) is updated on a decadal basis and clearly outlines expectations and responsibilities for the responsible conduct of research. It is a useful resource with a range of supplementary materials that would be relevant to institutions around the world. The standardisation of ethics applications through an online portal has also streamlined this process which may be useful for other jurisdictions (see p.24)\textsuperscript{111}.

- CSIRO has developed a unique way to measure and define impact pathways (p.55) with the intent of increasing the adoption and impact of research outputs. It has developed a framework which encourages researchers to consider the economic, social, and environmental benefits of their research activities. To ensure this is effectively managed they have developed an Measurement and Evaluation group which has the core business of measuring and mapping the impact of research for each of the individual business units. CSIRO has well developed capability in this area which could be helpful to other institutions trying to ensure they can document the impact of their research as it develops.

- To help promote uptake of open access (p.43) UQ Library has developed a decision tree and made it available online to their employees. The aim is to help researchers see the benefit of publishing in open access journals and gaining greater uptake of their research. It also aims to help them in their publishing decisions around which journals to publish in and not to be confused into paying additional unnecessary fees (UQ, 2017f). This has the potential to be replicated in other institutions.

\textsuperscript{111} Online portal accessed at https://hrea.gov.au
There have been a number of best practice examples of societal engagement featured in the report. Key elements of these common to all include they have a strong focus on the community and building trust. Although each is different in their approach it is clear that two way engagement which meets the needs of local communities has increased the credibility of the methods used. Each are detailed in the report but include:
  o GISERA (p.54) was established through a collaboration between CSIRO, the Federal and State governments and industry, to undertake publicly-reported independent research with a focus on the unconventional gas industry which originally had very low perceptions towards it.
  o Reflexivity (p.54) provides a foundation for a company and community to understand how the impacts and benefits of mining and infrastructure, and the relationship between industry, government and society, affect the ‘social licence to operate’.
  o UQ Boomtown Toolkit (p. 40) is an online resource to monitor socio-economic indicators of the Coal Seam Gas industry on local communities where indicators are chosen by the community. Funded by the industry, but delivered by the university it provides another arm’s length way of developing trust in the industry through the university undertaking research that is meaningful to the community as well as raising awareness across all levels of government.
  o The Queensland Brain Institute (p. 39) has adopted a range of activities which demonstrate best practice societal engagement. Activities can include researchers actively participating in radio shows and in-house produced podcasts, inserts into the national newsletter and so on. All of these types of activities also help to build trust in science and technology more broadly.
11 References


ARC, (2016b). Gender equality in research, ARC statement of support and expectations for gender equality.

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CSIRO, (2017m). *Transforming challenges into Australia’s opportunities Corporate Plan 2017-18*.


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Inspiring Australia, (2012). *Science Engagement and tropical Australia: Building a prosperous and sustainable future for the north.*


UQ, (2014b). *UQ Staff Consultations on Equity, Diversity and Inclusion*.


UQ, (2017a). *1.50.01 Code of Conduct*, viewed July 26 2017, [https://ppl.app.uq.edu.au/content/1.50.01-code-conduct](https://ppl.app.uq.edu.au/content/1.50.01-code-conduct).


12 Annex 1: Reviewed Documents

Australian Academy of Science
- Science in Australia: Gender Equity Forum

Australian Council of Learned Academies
- Securing Australia’s Future: Review of Australia’s Research Training System
- Securing Australia’s Future: Skills and capabilities for Australian enterprise innovation
- Securing Australia’s Future: The role of science, research and technology in lifting Australian productivity
- Securing Australia’s Future: Translating research for economic and social benefit: country comparisons
- The character of interdisciplinary research: Examined through a sample of socio-environmental research projects

Australian Government
- Australian Education Act 2013
- Australian Workplace Gender Equality Act 2012
- Australia’s National Science Statement
- Collaborations between the Public and Private Sectors: The Role of Intellectual Property
- Coordination Committee on Innovation: Best Practice Guide to Evaluation of Science and Innovation Initiatives
- Economics References Committee: Australia’s Innovation System
- Engagement and Impact Assessment Consultation
- Industry Innovation and Competitiveness Agenda
- National Innovation & Science Agenda
- Powering Ideas: An Innovation Agenda for the 21st Century
- Review of High Education Access and Outcomes for Aboriginal and Torres Strait Islander People

Australian Research Council
- Corporate Plan 2016-17 to 2019-20
- Gender Equality in Research: ARC Gender Equality Action Plan 2017
- Open Access Policy
- Research Integrity and Research Misconduct Policy

Business Council of Australia
- Building Australia’s Comparative Advantages

Committee for Economic Development of Australia
- Australia’s future workforce

Department of Education and Training
- Review of Research Policy and Funding Arrangements

Department of Innovation, Industry, Science and Research
- Focusing Australia’s Publicly Funded Research Review: Maximising the innovation dividend (Review Key Findings and Future Direction)
- Research skills for an innovative future: A research workforce strategy to cover the decade to 2020 and beyond
Education Council

- National STEM School Education Strategy: A comprehensive plan for Science, Technology, Engineering and Mathematics education in Australia

Innovation and Science Australia

- 2030 Strategic Plan Issues Paper
- Performance Review of the Australian Innovation, Science and Research System

Inspiring Australia

- A National Strategy for Engagement with the Sciences
- Science Engagement and Tropical Australia: Building a prosperous and sustainable future for the north
- Indigenous Engagement with Science: Towards deeper understandings
- Inspiring industry to inspire Australia: Business and Science Outreach
- Science and the media: From ideas to action
- Science Engagement in and about Australia’s Desert Regions

Office of the Chief Scientist and Chief Scientist

- Building Australia through citizen science (Occasional Paper)
- Busting myths about women in STEM (Occasional Paper)
- Health of Australian Science
- Science, Technology, Engineering and Mathematics in the National Interest: A Strategic Approach (A position paper)
- Science, Technology, Engineering and Mathematics: Australia’s Future

National Health and Medical Research Council, Australian Research Council, Universities Australia

- Australia Code for the Responsible Conduct of Research (2007)
- Australian Code for the Responsible Conduct of Research (2017 Draft)
- Guide to investigating and managing potential breaches of the Australian Code for the Responsible Conduct of Research (Public Consultation Report)

National Health and Medical Research Council, Australian Research Council, Australian Vice-Chancellors’ Committee

- National Statement on Ethical Conduct in Human Research

Productivity Commission

- Data Availability and Use (Draft Report)
- Data Availability and Use (Inquiry Report)
- Digital Disruption: What do governments need to do? (Research Report)
- Intellectual Property Arrangement (Inquiry Report)
- Public Support for Science and Innovation (Research Report)

Venturous Australia

- Building strength in innovation
### 13 Appendices

**Appendix A: Statistical Data**

**A.1 Population Statistics**

Table 2: Estimated Resident Population, States and Territories - Greater Capital City Statistical Areas (GCCSAs) (ABS 2017a)

<table>
<thead>
<tr>
<th>GCCSAs</th>
<th>ERP at 30 June 2016p no.</th>
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<tr>
<td><strong>NSW</strong></td>
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<tr>
<td>Greater Sydney</td>
<td>5,005,358</td>
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<tr>
<td>Rest of NSW</td>
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<tr>
<td>Total</td>
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<td><strong>VIC</strong></td>
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<tr>
<td>Greater Melbourne</td>
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<td>Rest of VIC</td>
<td>1,428,000</td>
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<td>Total</td>
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<tr>
<td><strong>QLD</strong></td>
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<td>Greater Brisbane</td>
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<td>Rest of QLD</td>
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<td>Total</td>
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<td><strong>SA</strong></td>
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<td>Rest of SA</td>
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<td>Total</td>
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<td>Total</td>
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<td>Greater Capital Cities</td>
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<td>Rest of Australia</td>
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<td>Total</td>
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</table>
Figure 5: Country of Birth(a), Proportion of Australia's Population (ABS 2017b)

Figure 6: Degree of innovation novelty in Australia goods and services innovation, 2001-03 to 2014-15 (DIIS & Office of the Chief Economist 2016)

A.2 Research Statistics
Figure 7: Australian R&D funding courses and performers (DIIS & Office of the Chief Economist 2016)

Figure 8: Australian Government investment in R&D, 2015-16 (Australian Government 2015a)
Figure 9: Gross expenditure on R&D (GERD) as a percentage of GDP, by sectoral contributions, 1996-97 to 2013-14 (Innovation and Science Australia 2016)
Figure 10: Business expenditure on R&D as a percentage of GDP and relative ranking against other OECD+ countries, 2004-05 to 2013-14 (Innovation and Science Australia 2016)
Figure 11: Higher education expenditure on R&D as a percentage of GDP and relative ranking against other OECD+ countries, 2004 to 2014 (Innovation and Science Australia 2016)
Figure 12: Government expenditure on R&D as a percentage of GDP and relative ranking against other OECD+ countries 2004-05 to 2014-15 (Innovation and Science Australia 2016)
Figure 13: Private non-profit expenditure on R&D as a percentage of GDP, 2004-15 to 2014-15 (Innovation and Science Australia 2016)
Figure 14: Patents and Applied Income sources by discipline (ARC 2015a)
A.3 Research Funding

Figure 15: Australian Government science, research and innovation expenditure, 2016-17 (Innovation and Science Australia 2017b, p. 41)
Figure 16: Projections of research and development expenditure by source, 2015-16 to 2029-30 (Innovation and Science Australia 2017b, p. 97)
Appendix B: National Research and Innovation Priorities/Agenda

B.1 2002 National Research Priorities

- "Research Priority 1: An Environmentally Sustainable Australia – Transforming the way we utilise our land, water, mineral and energy resources through a better understanding of human and environmental systems and the use of new technologies. The following goals were identified;
  - Water: Sustainable ways of improving water productivity, using less water in agriculture and other industries, providing increased protection of rivers and groundwater and the re-use of urban and industrial waste waters.
  - Transforming existing industries: New technologies for resource-based industries to deliver substantial increases in national wealth while minimising environmental impacts on land and sea.
  - Overcoming soil loss, salinity and acidity: Identifying causes and solutions to land degradation using a multidisciplinary approach to restore land surfaces.
  - Reducing and capturing emission in transport and energy generation: Alternative transport technologies and clean combustion and efficient new power generation systems and capture and sequestration of carbon dioxide.
  - Sustainable use of Australia’s biodiversity: Managing and protecting Australia’s terrestrial and marine biodiversity both for its own value and to develop long term use of ecosystem goods and services ranging from fisheries to ecotourism.
  - Developing deep earth resources: Smart high-technology exploration methodologies, including imaging and mapping the deep earth and ocean floors, and novel efficient ways of commodity extraction and processing (examples include minerals, oil and gas) while minimising negative ecological and social impacts.
  - Responding to climate change and variability: Increasing our understanding of the impact of climate change and variability at the regional level across Australia, and addressing the consequences of these factors on the environment and on communities.

- Research Priority 2: Promoting and Maintaining Good Health – Promoting good health and well being for all Australians
  - A healthy start to life: Counteracting the impact of genetic, social and environmental factors which predispose infants and children to ill health and reduce their well being and life potential.
  - Ageing well, ageing productively: Developing better social, medical and population health strategies to improve the mental and physical capacities of ageing people.
  - Preventive Healthcare: New ethical, evidence-based strategies to promote health and prevent disease through the adoption of healthier lifestyles and diet, and the development of health-promoting products.
  - Strengthening Australia’s social and economic fabric: Understanding and strengthening key elements of Australia’s social and economic fabric to help families and individuals live healthy, productive, and fulfilling lives.

- Research Priority 3: Frontier Technology for Building and Transforming Australian Industries - Stimulating the growth of world-class Australian industries using innovative technologies developed from cutting-edge research.
  - Breakthrough Science: Better understanding of the fundamental processes that will advance knowledge and facilitate the development of technological innovations.
  - Frontier Technologies: Enhanced capacity in frontier technologies to power world-class industries of the future and build on Australia’s strengths in research and innovation.
  - Advanced Materials: Advanced materials for applications in construction, communications, transport, agriculture and medicine.
  - Smart Information Use: Improved data management for existing and new business applications and creative applications for digital technologies.
o **Promoting an innovation culture and economy:** Maximising Australia’s creative and technological capability by understanding the factors conducive to innovation and its acceptance.

- **Research Priority 4: Safeguarding Australia** - Safeguarding Australia from terrorism, crime, invasive diseases and pests, strengthening our understanding of Australia’s place in the region and the world, and securing our infrastructure, particularly with respect to our digital systems.
  o **Critical Infrastructure:** Protecting Australia’s critical infrastructure including our financial, energy, communications, and transport systems.
  o **Understanding our region and the world:** Enhancing Australia’s capacity to interpret and engage with its regional and global environment through a greater understanding of languages, societies, politics and cultures.
  o **Protecting Australia from invasive diseases and pests:** Counteract the impact of invasive species through the application of new technologies and by integrating approaches across agencies and jurisdictions.
  o **Protesting Australia from terrorism and crime:** By promoting a healthy and diverse R&D system that anticipates threats and supports core competencies in modern and rapid identification techniques.
  o **Transformational defence technologies:** Transform military operations for the defence of Australia by providing superior technologies, better information and improved ways of operation. “ (Australian Government 2003, pp. 1-10)

### B.2 2008 Innovation Priorities

- “Public research funding supports high-quality research that addresses national challenges and opens up new opportunities.
  o Increase proportion of research at world-class levels.
- **Australia has a strong base of skilled researchers to support the national research effort in both the public and private sectors.**
  o Increase higher degrees by research completions by 2020.
- **The innovation system fosters industries of the future, securing value from the commercialisation of Australian R&D.**
  o Increase the number of businesses investing in R&D.
- **More effective dissemination of new technologies, processes, and ideas increases innovation across the economy, with a particular focus on SMEs.**
  o By 2020 increase by 25% the proportion of businesses that innovate.
- **The innovation system encourages a culture of collaboration within the research sector and between researchers and industry.**
  o By 2020 double collaboration between businesses, universities and PROs
- **Australian researchers and businesses are involved in more international collaborations on R&D.**
  o Increase international research collaboration.
- **The public and community sectors work with others in the innovation system to improve policy development and service delivery.**
  o Raise public and community sector innovation. “ (Cutler 2008, pp. 141-7)

### B.3 2013 Strategic Research Priorities

- “Area 1: Living in a changing environment” - *Research outcomes will identify strategies to develop resilient natural (ecosystems) and human environments (people, communities and their utilities and industry) that can all thrive in a changing environment.*
o Identify vulnerabilities and boundaries to the adaptability of changing natural and human systems: Research will identify the level of environmental change human and natural systems can tolerate before fundamental ecological processes are irreversibly changed. This includes understanding complex systems, especially human-natural linked systems, to be able to interpret and predict their behaviour.

o Manage risk and capture opportunities for sustainable natural and human systems: Research will identify behavioural, economic, technological, institutional and design options for managing change in the linked human and natural environment (including climate change, extreme events, population growth, consumption and biodiversity).

o Enable societal transformation to enhance sustainability and wellbeing: Research will identify areas of highest risk and develop options for the change required to mitigate and/or adapt to environmental change. This priority will focus on urban design, governance systems, decision frameworks and industry policies.

• Area 2: Promoting population health and wellbeing - Research outcomes will help to build resilient communities and achieve a state of physical, mental and social wellbeing, and not merely the absence of disease, or infirmity, for all Australians in whichever part of Australia they live.

o Optimise effective delivery of health care and related systems and services: Research will address policy needs for a practicable and sustainable health care system, including harnessing opportunities and addressing challenges to maximise health impacts.

o Maximise social and economic participation in society: Research will identify strategies to maximise social and economic participation, particularly in relation to key life stages, intergenerational disparities and socioeconomic disadvantage.

o Improve the health and wellbeing of Aboriginal and Torres Strait Islander people: Research will identify ways to improve access, utilisation and engagement with health, education and social services in partnership with urban, rural and remote Aboriginal and Torres Strait Islander communities.

• Area 3: Managing our food and water assets - Research outcomes will identify new food production practices and systems that can accommodate competing demands for soil and water while ensuring the long-term sustainability of these assets.

o Optimise food and fibre production using our land and marine resources: Research will identify ways to make Australian agriculture and food processing more productive, globally competitive and efficient in producing high quality, innovative, safe and sustainable food while protecting our natural assets.

o Develop knowledge of the changing distribution, connectivity, transformation and sustainable use of water in the Australian landscape: Research will study the dynamics of water and its use, patterns of rainfall, water resource distribution, how to retain water in our soils and how to resolve conflicting demands on water resources to maximise the large-scale efficiency of our water usage to meet Australia’s needs.

o Maximise the effectiveness of the production value chain from primary to processed food: Research will enable effective planning to meet changing needs of consumers while increasing food production to help meet domestic and global demand in a sustainable and competitive way. Research will therefore identify the weaknesses, vulnerabilities and bottle-necks in food production, and methods for integrating capability in the production value chain.

• Area 4: Securing Australia’s place in a changing world - Research outcomes will identify ways to improve Australia’s capacity to deliver national security and identify the means by which personal security in Australia will be safeguarded. This challenge should be considered in the context of global uncertainty and changes in the Asia Pacific region.
• **Area 5: Lifting productivity and economic growth** - Research outcomes will identify the challenges and opportunities in a changing world economy, particularly in the context of the economic rise of Asia, and help to build a resilient new economy so that Australia can thrive, while also identifying the means to enhance the wellbeing of all Australians.

  - **Identify the means by which Australia can lift productivity and economic growth:** Research will identify the areas that have the capacity to produce the largest productivity and economic gains for Australia, and the means by which those gains can be realised to the benefit of the whole Australian economy.
  - **Maximise Australia’s competitive advantage in critical sectors:** Research will underpin the development of the future supply of reliable, low cost, low emission energy; enhance the long-term viability of Australia’s resources, services and manufacturing industries; and support Australia’s access to new markets and supply chains.
  - **Deliver skills for the new economy:** Research will identify the skills profile required as we shift towards an entrepreneurial and innovative knowledge economy fully engaged with our region and the world; and identify the methods and systems needed to develop Australia’s human capital. “ (Australian Government 2013b)

B.4 2015 Science and Research Priorities

1. **Food:** Research will aim to optimise food and fibre production and processing, enhance food safety and minimise waste. Research will also be critical to preserve our hard won reputation for clean, safe and sustainable production. Departments and agencies should give priority to research that will lead to:

   - Knowledge of global and domestic demand, supply chains and the identification of country specific preferences for food Australia can produce.
   - Knowledge of the social, economic and other barriers to achieving access to healthy Australian foods.
   - Enhanced food production.

2. **Soil and Water:** Research should therefore focus on critical assets such as the Great Barrier Reef, Northern Australia, key agricultural regions, aquifers and urban catchments, and build capacity for improved accuracy and precision in predicting change. Research will lead to better decision-making strategies in the context of potentially conflicting demands between development, the environment and landscape management. Departments and agencies should give priority to research that will lead to:

   - New and integrated national observing systems, technologies and modelling frameworks across the soil-atmosphere-water-marine systems.
   - Better understanding of sustainable limits for productive use of soil, freshwater, river flows and water rights, terrestrial and marine ecosystems.
Minimising damage to, and developing solutions for restoration and remediation of, soil, fresh and potable water, urban catchments and marine systems.

3. **Transport:** Research will be critical to developing low cost, reliable, resilient and efficient transport systems that meet the needs of businesses and enable sustainable mobility, while lowering carbon emissions and other pollution. Departments and agencies should give priority to research that will lead to:
   - Low emission fuels and technologies for domestic and global markets.
   - Improved logistics, modelling and regulation: urban design, autonomous vehicles, electrified transport, sensor technologies, real time data and spatial analysis.
   - Effective pricing, operation, and resource allocation.

4. **Cybersecurity:** Research in cyber security including quantum technologies will position Australia as a leader in fast moving and emerging areas such as distributed network management, machine learning, and intelligent and secure data management and retention. Departments and agencies should give priority to research that will lead to:
   - Highly-secure and resilient communications and data acquisition, storage, retention and analysis for government, defence, business, transport systems, emergency and health services.
   - Secure, trustworthy and fault-tolerant technologies for software applications, mobile devices, cloud computing and critical infrastructure.
   - New technologies and approaches to support the nation’s cybersecurity: discovery and understanding of vulnerabilities, threats and their impacts, enabling improved risk-based decision making, resilience and effective responses to cyber intrusions and attacks.
   - Understanding the scale of the cyber security challenge for Australia, including the social factors informing individual, organisational, and national attitudes towards cyber security.

5. **Energy:** Research will lead to the development of reliable, low-cost, sustainable energy supplies that are resilient to sudden shocks, as well as decadal trends in demand and climate, and to technologies that use energy more efficiently. Departments and agencies should give priority to research that will lead to:
   - Low emission energy production from fossil fuels and other sources.
   - New clean energy sources and storage technologies that are efficient, cost-effective and reliable.
   - Australian electricity grids that can readily integrate and more efficiently transmit energy from all sources including low- and zero-carbon sources.

6. **Resources:** Research will lead to a fundamental understanding of the structure, composition, and processes governing the formation and distribution of resources in Australia. This knowledge will support the exploration, the potential discovery of major new sources, production, distribution of the traditional resources such as strategic metals and minerals, coal and gas and those in increasing demand such as rare earth elements and groundwater. Departments and agencies should give priority to research that will lead to:
   - A fundamental understanding of the physical state of the Australian crust, its resource endowment and recovery.
   - Knowledge of environmental issues associated with resource extraction.
   - Lowering the risk to sedimentary basins and marine environments due to resource extraction.
   - Technologies to optimise yield through effective and efficient resource extraction, processing and waste management.

7. **Advanced Manufacturing:** Research will be critical in developing and supporting existing industries while enabling the development of a new and advanced manufacturing sector. Departments and agencies should give priority to research that will lead to:
   - Knowledge of Australia’s comparative advantages, constraints and capacity to meet current and emerging global and domestic demand.
Cross-cutting technologies that will de-risk, scale up, and add value to Australian manufactured products.

Specialised, high value-add areas such as high-performance materials, composites, alloys and polymers.

8. Environmental Change: Research will build Australia’s capacity to respond to environmental change. It will require the integration of research outcomes from biological, physical, social and economic systems. Departments and agencies should give priority to research that will lead to:

- Improved accuracy and precision in predicting and measuring the impact of environmental changes caused by climate and local factors.
- Resilient urban, rural and regional infrastructure.
- Options for responding and adapting to the impacts of environmental change on biological systems, urban and rural communities and industry.

9. Health: Research will be essential to building healthy and resilient communities throughout Australia. It will capitalise on Australia’s strengths in science and technology to generate wider economic benefits through improved knowledge translation and commercialisation, and partnerships with industry. Departments and agencies should give priority to research that will lead to:

- Better models of health care and services that improve outcomes, reduce disparities for disadvantaged and vulnerable groups, increase efficiency and provide greater value for a given expenditure.
- Improved prediction, identification, tracking, prevention and management of emerging local and regional health threats.
- Better health outcomes for Indigenous people, with strategies for both urban and regional communities.
- Effective technologies for individuals to manage their own health care, for example, using mobile apps, remote monitoring and online access to therapies. “(Australian Government 2015b, pp. 2-4)

B.5 2015 National Innovation and Science Agenda

1. “Culture and Capital
   a. Align the tax system and business laws with a culture of entrepreneurship and innovation.
   b. Back high potential ideas with capital to help ensure they stay and grow in Australia.
   c. Back small businesses and start-ups to help them establish and grow.

2. Collaboration
   a. Build world-class national research infrastructure
   b. Greater collaboration between universities and businesses
   c. Link to the world
   d. Invest in the future of information technology

3. Talent and Skills
   a. Equip young Australians to create and use digital technologies
   b. Expand opportunities for women in STEM
   c. Improve visa arrangements
   d. Inspiring STEM literacy

4. Government as an exemplar
   a. Place innovation and science at the heart of policy making
   b. Encourage innovation through government procurement
   c. Government joining the data revolution” (Australian Government 2015a, p. 4)
Appendix C: 2013 Office of Chief Scientist STEM Agenda

“STEM will work best when it is accorded a ‘Social Compact’ from the community. In return the community must have confidence that the approaches taken by STEM practitioners and the quality of their work meet the needs, aspirations and ethical expectations of the community.

**Key Objective:** A refreshed Social Compact that articulates the responsibilities and obligations of the three key parties (governments, community and STEM practitioners.

The substance of the Compact will commit STEM practitioners to:

- Continued high ethical standards;
- Clearly articulated mechanism by which standards are maintained;
- Provision of a bountiful stream of new knowledge and practical solutions to short and long-term problems of benefit to the community;
- Following a best practise, regulatory framework for STEM;
- Describing benefits and risks, and the limits of knowledge, when contributing to policy development;
- Open access to research outcomes of publicly funded Australian STEM research.

The community in return will commit to:

- Supporting STEM through sustained public and private investment at an appropriate level to keep it comparable with the best performing nations;
- Allowing and respecting that the methods and processes of STEM can be left to the practitioner peer community to design and monitor;
- Supporting a stable policy environment;
- Ensuring regulatory frameworks adhere to best practises.

As the compact is refreshed, it is important to recognise:

- The effort, foresight and investment required to discover and apply new knowledge;
- The folly of drawing on previous efforts of STEM practitioners without renewal;
- The vulnerabilities that follow from reliance on the knowledge and skills of others;
- The need to build community confidence in its STEM enterprise;
- The importance of keeping the community informed: what is being done, why, how and with what potential benefit and any risk.” (Office of the Chief Scientist 2013, pp. 11-2)
### Appendix D: Open Government National Action Plan Commitment 5.2: Concepts

#### Table 3: Key recommendations: Framework initiatives (DIIS 2018, pp. III-IV)

<table>
<thead>
<tr>
<th>Concept title</th>
<th>What’s the big idea?</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Citizen Panel</td>
<td>Panel of citizens that act like a permanent citizen jury that APS agencies can consult.</td>
</tr>
<tr>
<td>Engagement Diagnostic</td>
<td>Conceptual tool that helps public servants diagnose their engagement problem, and how best to solve it.</td>
</tr>
<tr>
<td>Exchange programmes</td>
<td>Develop secondment/exchange, day in the life and exchange programmes to build empathy with stakeholder, creating awareness of the value of, and building capacity in, public participation.</td>
</tr>
<tr>
<td>Engagement Reporting and Metrics</td>
<td>The APS establishes, and reports on, agency level engagement metrics; and individual level measures.</td>
</tr>
<tr>
<td>Rethinking risk</td>
<td>Decision tool that helps public servants identify and manage risks involved in engagement.</td>
</tr>
<tr>
<td>The Discovery Fund</td>
<td>Provides risk free funding for ‘discover’ engagements – both experimental and best practise based.</td>
</tr>
<tr>
<td>The Bar: Minimum standards</td>
<td>Publish APS minimum standards for engagement.</td>
</tr>
<tr>
<td>The APS Engagement Practitioner’s Toolkit</td>
<td>Provides practical help public servants can use to improve their engagement.</td>
</tr>
<tr>
<td>Off-the-shelf Models and Methodologies</td>
<td>Models and methodologies, including ‘how to’ guides, for a variety of different engagements that public servants can take ‘off the shelf’ and apply – including how to modify them depending on time and resource constraints</td>
</tr>
<tr>
<td>The Engagement Marketplace</td>
<td>Establish an Engagement Marketplace, where public servants can go to improve chances of finding people with expertise they can contribute to their work.</td>
</tr>
<tr>
<td>The APS Engagement Network</td>
<td>Establishing an APS wide engagement network: Organises information sharing about engagement and shared initiatives between APS public servants, as well as (potentially) state public servants and the public.</td>
</tr>
<tr>
<td>The APS Engagement Snapshot</td>
<td>Each year, the APS releases an Engagement Snapshot of good practise and successes for that year.</td>
</tr>
<tr>
<td>Partic-hub – the Engagement Hub</td>
<td>Establish a team of engagement experts to manage rollout of the framework; deliver and coordinate associated initiatives; and build APS engagement capacity.</td>
</tr>
<tr>
<td>Revamped Engagement Awards</td>
<td>Awards for high quality engagement are established; and included in existing award processes e.g. Australia Day awards; Public Sector Innovation Awards.</td>
</tr>
<tr>
<td>Egg time</td>
<td>Software that assists people to estimate the time required to undertake an engagement.</td>
</tr>
<tr>
<td>Increased engagement event accessibility</td>
<td>Changes to events and engagement processes to help reach a wider range of people.</td>
</tr>
</tbody>
</table>
Table 4: Structural, cultural and interchange indicators for ethics within UQ

<table>
<thead>
<tr>
<th>Organisation aspect</th>
<th>Structural issues</th>
<th>Cultural issues</th>
<th>Interchange related</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Federal and state mandates and legislation, supported by institutional specific legislation and support hierarchies.</td>
<td>Culture of compliance.</td>
<td>Public and appropriation funding accountability. Broader societal trend.</td>
</tr>
<tr>
<td>Barriers</td>
<td>Difficulties of creating change in a big organisation.</td>
<td>Lack of conversation on the ethos of being ethical. Seen to be a compliance exercise.</td>
<td>Not first point of action for many disciplines.</td>
</tr>
<tr>
<td>Actions</td>
<td>Establish communication channels for discussion as well as further education/exposure of requirements/best practices. Compliance mechanism that subtly bounces and direct research into the right direction.</td>
<td>Explicit reference to ethical requirements within operational processes.</td>
<td>Promote interaction between disciplines.</td>
</tr>
<tr>
<td>Indicators</td>
<td>Reducing ethical misconduct reported by internal parties.</td>
<td>Number of researchers actively pursuing further knowledge and best practice compliance.</td>
<td>Reducing ethical misconduct reports by external entities. Increased trust in UQ by public.</td>
</tr>
</tbody>
</table>

**Indicator for Improvement**: Reducing number of complaints relating to ethical misconduct.

Table 5: Structural, cultural and interchange indicators for societal engagement within UQ

<table>
<thead>
<tr>
<th>Structural issues</th>
<th>Cultural issues</th>
<th>Interchange related</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspects of organisation s</td>
<td>Transparency mandates and legislation. DVC Engagement senior role within the organisation. Institutional directive through informal hierarchies.</td>
<td>Natural participants within society. Public accountability and cooperation. Changing in funding to impact requires more engagement.</td>
</tr>
<tr>
<td>Drivers</td>
<td>Structural issues</td>
<td>Cultural issues</td>
</tr>
<tr>
<td>---------</td>
<td>------------------</td>
<td>----------------</td>
</tr>
<tr>
<td></td>
<td>Justification of importance of UQ’s role within society. Strategically aligned with several Faculties and Institutions directions.</td>
<td>Inherently and naturally tied to many research groups and directions. Some researchers are very keen to engage.</td>
</tr>
<tr>
<td>Barriers</td>
<td>Often fragmented resources across campus. Not trained in how to engage.</td>
<td>Lack of cohesion and coordination within UQ. Researchers not wishing to engaged out of their comfort zones.</td>
</tr>
<tr>
<td>Actions</td>
<td>Increase public understanding of UQ’s role within society. Developing innovation hubs which bring industry partners on campus to engage with the UQ community. Incorporating measures of high quality internal collaboration as a core criteria in academic appraisal and promotion processes.</td>
<td>Increase formal or informal societal engagement as part of research activities. Ensuring that all organisational unit reviews include a focus on internal and external collaboration.</td>
</tr>
<tr>
<td>Indicators</td>
<td>Increased alumni engagement, amount of philanthropic funds raised, international delegations.</td>
<td>Expanding volunteering initiatives and social engagement projects that serve the community such as the UQ Pro Bono Centre.</td>
</tr>
<tr>
<td><strong>Indicator for Improvement</strong></td>
<td>Rank first in Australia for attracting research income from industry. Growth in philanthropic income to $500m.</td>
<td></td>
</tr>
</tbody>
</table>

Table 6: Structural, cultural and interchange indicators for gender equality and diversity within UQ

<table>
<thead>
<tr>
<th>Structural issues</th>
<th>Cultural issues</th>
<th>Interchange related</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspects of organisation</td>
<td>Federal and state mandates and legislations leading to institutional mandates and supporting hierarchies.</td>
<td>Recognition of benefits and challenges. Previously more piecemeal approach.</td>
</tr>
<tr>
<td>Drivers</td>
<td>Strong internal leadership and developing processes.</td>
<td>Strong internal support for initiatives and action.</td>
</tr>
</tbody>
</table>

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112 “The centre oversees and facilitates a diverse range of activities for law student to participate in the delivery of pro bono legal services. These activities direct casework through our clinical legal education program, legal research, community legal education and legal reform”. (UQ 2014a, p. 2). As part of this, the centre actively engages with the UQ community, community legal centres, high school, courts, charities and non-profits, law firms to help expose law students and researchers to community challenges and/or problems.
### Structural issues

- Previous long standing career development for women. Workplace Diversity and Inclusion area of responsibility

### Cultural issues

- Discipline biased pressures without context. Social norms, entrenched attitudes.

### Interchange related

- SAGE Athena Swan Pilot.

### Barriers

- Historical precedence.

### Actions

- Clearly documented in strategic plan. Data collection and analysis. Evidence of good practice. Consultation, self-reflection and evaluation, leading to action plans.

### Indicators

- Growing representation and experience of women in STEM towards institutional targets.

### Indicators for Improvement

- Achievement of an institutional award in the Athena SWAN charter – March 2019.

### Table 7: Structural, cultural and interchange indicators for open access and open science within UQ

<table>
<thead>
<tr>
<th>Structural issues</th>
<th>Cultural issues</th>
<th>Interchange related</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drivers</td>
<td>Funding body requirements. Institutional direction to be trusted provider of data and information.</td>
<td>Generational ideological shifts. Age of academic. Differing reward structures.</td>
</tr>
<tr>
<td>Structural issues</td>
<td>Cultural issues</td>
<td>Interchange related</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------------</td>
<td>--------------------</td>
</tr>
<tr>
<td><strong>Actions</strong></td>
<td><strong>Indicators</strong></td>
<td><strong>Indicator for Improvemen</strong></td>
</tr>
<tr>
<td>Development of data management system. Develop flexible models to effectively utilise the institution’s intellectual property.</td>
<td>Increased open access. Reducing compromised situations stemming from researcher actions.</td>
<td>Development of a list and rankings of quality open access journals across disciplines for researchers. Database for storing all research outputs. Uptake of ORCiD.</td>
</tr>
<tr>
<td><strong>Structural, cultural and interchange indicators for science education within UQ</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Drivers</strong></td>
<td>Growing opportunities for science education as part of broader strategic directions.</td>
<td>Different academics with a focus on science in their research.</td>
</tr>
<tr>
<td><strong>Barriers</strong></td>
<td>Often secondary outcomes from strategic actions.</td>
<td>Not inherently tied to most of UQ research and teaching, outside of the on-campus science education. Limited financial incentives for participation.</td>
</tr>
<tr>
<td><strong>Actions</strong></td>
<td>Increase influence in educational pipeline towards STEM related. Partnering to build multinational educational programs.</td>
<td>Increase UQ staff awareness of science education opportunities and rewards.</td>
</tr>
<tr>
<td><strong>Indicators</strong></td>
<td>Number of students attending science education programs, open days, camps or educational programs.</td>
<td></td>
</tr>
<tr>
<td><strong>Indicator for Improvement</strong></td>
<td>Number of students attending UQ science related activities and open days.</td>
<td></td>
</tr>
<tr>
<td>Aspects of organisation s</td>
<td>Structural issues</td>
<td>Cultural issues</td>
</tr>
<tr>
<td>--------------------------</td>
<td>------------------</td>
<td>----------------</td>
</tr>
<tr>
<td><strong>Drivers</strong></td>
<td>Institutional recognition of need for such dimensional thinking. Strategic plan looking forward.</td>
<td>Implicit cultural understanding of the aspect.</td>
</tr>
<tr>
<td><strong>Barriers</strong></td>
<td>Lack of systematic approach within UQ. Limited awareness in some areas of the institution.</td>
<td>Time and project constraints. Researchers focus too narrow and have limited understanding of the concept of impact and the skills required for this. Lack of resources for monitoring and evaluating. Balancing competing requirements with teaching components of the university. A tick the box, compliance nature of ethics for some researchers. As well the time it takes for to approve applications based on the voluntary nature of ethics committees.</td>
</tr>
<tr>
<td><strong>Actions</strong></td>
<td>Institution maintains its ability to be agile in the face of disruption. Increase utilisation of institutional capabilities. Increase the emphasis on strategic initiatives which support agility and adaptiveness practices</td>
<td>Develop skills and capability in understanding impact. Raise the awareness of the impact stories already collated. Increase the awareness and lessons learnt from impact case study assessments to gain wider adopt of learnings.</td>
</tr>
<tr>
<td><strong>Indicators</strong></td>
<td>Communication of UQ’s strategy and vision. Number of impact case studies already developed.</td>
<td>Sharing the impact case studies already developed internally.</td>
</tr>
</tbody>
</table>
### Responsible Research and Innovation in Practice: Case Study of Australia

<table>
<thead>
<tr>
<th>Indicator for Improvement</th>
<th>Structural issues</th>
<th>Cultural issues</th>
<th>Interchange related</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Development of training in defining impact for research.</td>
<td>Collation of impact case studies from across the university.</td>
<td></td>
</tr>
</tbody>
</table>

Table 10: Structural, cultural and interchange indicators for openness and transparency within UQ

<table>
<thead>
<tr>
<th>Structural issues</th>
<th>Cultural issues</th>
<th>Interchange related</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspects of organisation s</td>
<td>Institutional mandate derived from State mandate. Governance structures from the Board.</td>
<td>Enables internal cultural development.</td>
</tr>
<tr>
<td>Drivers</td>
<td>Strong institutional undertone promoting openness and transparency. Institutional processes in place.</td>
<td>Codes of conduct and values. Enterprise bargaining process requires this of UQ. Development of open access decision support and Research Data Management portal Societal engagement in research.</td>
</tr>
<tr>
<td>Barriers</td>
<td>Lack of communication of shared vision for this.</td>
<td>Time and resources Lack of buy in from researchers.</td>
</tr>
<tr>
<td>Actions</td>
<td>Ensure own governance structures are transparent.</td>
<td>Publishing UQ’s and Institutes’ annual reports Ensure communication of research findings through seminars open to broader public. Induction training for all staff to understand requirements for online researcher profiles and open access.</td>
</tr>
<tr>
<td>Indicators</td>
<td>Sharing of strategic leadership decisions after these meetings.</td>
<td>Number of hits on UQ and Institutes’ annual reports. Number of completed online researcher profiles. Number of CRC bids UQ is a successful partner in.</td>
</tr>
</tbody>
</table>

*Indicator for Improvement*
- Number of senior leadership communication and engagement with staff to share strategic vision. 
- Numbers of UQ research outputs published in various media outlets 
- Numbers of successful CRC bids UQ is a partner in.
E.2 UQ Organisational Chart (as at January, 2018)\textsuperscript{113}

\textsuperscript{113} Source: https://www.uq.edu.au/about/docs/org-chart.pdf
E.3 University Vision, Mission and Values

“UQ Vision: UQ’s Strategic Plan 2014–2017 outlines our objectives to achieve our vision of knowledge leadership for a better world.

UQ Mission: UQ positively influences society by engaging in the pursuit of excellence through the creation, preservation, transfer and application of knowledge. UQ helps shape the future by bringing together and developing leaders in their fields to inspire the next generation and to advance ideas that benefit the world. UQ strives for the personal and professional success of its students, staff and alumni.

UQ Values:

- **Pursuit of excellence**: We strive for excellence, seeking to apply the highest standards to benefit our communities.
- **Creativity and independent thinking**: We welcome new ideas from our staff and students as well as from our alumni and our external partners. We support intellectual freedom, courage and creativity. We encourage the pursuit of innovation and opportunities.
- **Honesty and accountability**: We act with integrity and professionalism and uphold the highest ethical standards. We are committed to transparency and accountability. Our decisions ensure responsible stewardship of the University’s resources, reputation and values. We lead by example in all areas, including our approaches to sustainability.
- **Mutual respect and diversity**: We promote diversity in the University community—through our people, ideas and cultures. We create a vibrant, inclusive environment in which ideas flourish and future generations, regardless of background, are empowered. We respect our colleagues and work together for shared success.
- **Supporting our people**: We ensure the safety and wellbeing of our people. We create an inclusive and supportive university community in which achievements are celebrated and rewarded. Our people have the opportunity to enrich their lives and pursue their goals.” (UQ 2017g)

Queensland Public Service Values (Queensland Government 2017)
E.4 Ethical Principles

The following is the values describing the behaviour demonstrating the relevant ethical principles as discussed in the UQ Code of Conduct (UQ 2017a)

“Ethical Principle 1 - Integrity

University staff occupy positions of trust. It is therefore important that all staff act in a way that maintains public confidence in the integrity of the University. Consistent with that objective, staff must: (a) be committed to, and to act in accordance with, the highest ethical standards; (b) accept and value their duty to act with objectivity, independence and impartiality; (c) show respect towards all persons including other members of staff, to students and to the general public; (d) acknowledge the primacy of the public interest and ensure that any conflict of interest issue is resolved or appropriately managed in accordance with the University's Conflict of Interest Policy; and (e) be committed to honest, fair and respectful engagement with the general public. Examples of Ethical Principle 1 in Practice:

- Managing conflicts of interests
- Proper use of position
- Appropriate use of University information
- Professional and ethical external activity and public comment
- Responsible conduct of research
- Respect for persons
- Integrity in research commercialisation

Ethical Principle 2 – Promoting the Public Good

Staff must: perform their duties conscientiously and professionally, with proper diligence, care and attention and in a manner that gives effect to official decisions and policies of the University; be accountable for their conduct and decisions; use resources effectively, efficiently and economically; and follow lawful and reasonable directions issued by their supervisor or other persons in more senior positions of authority. Examples of Ethical Principle 2 in Practice:

- Using resource for University purposes
- Maintain and enhance their standards of performance
- Exercise duty to take care in their duties
- Not left substances affect their work performance or safety and well-being of others
- Disclosure of fraud or corrupt conduct

Ethical Principle 3 – Commitment to the System of Government

Commitment to the system of government is based on compliance with the rule of law and personal accountability. Respect for the law and system of government does not limit or impede staff academic freedom even where this may involve criticism of policies or the practices of government. Examples of Ethical Principle in practice:

- Complying with the law
- Complying with the University’s policies, procedures and decisions
- Preventing fraud, corruption and maladministration

Ethical Principle 4 – Accountability and Transparency

Staff must perform their duties to the best of their ability with proper diligence, care and attention and be accountable for their actions and decisions. Staff must act in a transparent way by managing
information as freely as possible within legal constraints and frameworks. **Examples of Ethical Principle 4 in practice:**

- Acting in a professional and conscientious manner
- Maintaining the confidentiality of information “ (UQ 2017a)
### E.5 Gender and Diversity Statistics

#### Table 11: Summary workforce profile All UQ

<table>
<thead>
<tr>
<th>Workforce headcount (excluding Casuals)</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
<td>Male</td>
<td>Total</td>
</tr>
<tr>
<td>Academic</td>
<td>1,265 (41%)</td>
<td>1,833 (59%)</td>
<td>3,098</td>
</tr>
<tr>
<td>Professional</td>
<td>2,743 (64%)</td>
<td>1,547 (36%)</td>
<td>4,290</td>
</tr>
<tr>
<td>Total Headcount (unduplicated)</td>
<td>4,005 (54%)</td>
<td>3,380 (46%)</td>
<td>7,385</td>
</tr>
</tbody>
</table>

#### Table 12: Percentage of academic staff at Level D who are women

<table>
<thead>
<tr>
<th>Institution</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>UQ</td>
<td>Target 30%</td>
<td>31%</td>
<td>32%</td>
<td>33%</td>
<td></td>
</tr>
<tr>
<td>Actual</td>
<td>28.4%</td>
<td>30.8%</td>
<td>31.9%</td>
<td>34.2%</td>
<td>33.9%</td>
</tr>
<tr>
<td>AIBN</td>
<td>Target 20%</td>
<td>20%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual</td>
<td>20%</td>
<td>25%</td>
<td>50%</td>
<td>33.3%</td>
<td>66.7%</td>
</tr>
<tr>
<td>BEL</td>
<td>Target 33%</td>
<td>37%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual</td>
<td>28.9%</td>
<td>33.3%</td>
<td>30%</td>
<td>36.7%</td>
<td>38.2%</td>
</tr>
<tr>
<td>EAIT</td>
<td>Target Not Set TBC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual</td>
<td>3.1%</td>
<td>2.9%</td>
<td>10.5%</td>
<td>11.8%</td>
<td>6.9%</td>
</tr>
<tr>
<td>HABS</td>
<td>Target 50%</td>
<td>50%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual</td>
<td>50%</td>
<td>46.9%</td>
<td>47.9%</td>
<td>51.1%</td>
<td>43.5%</td>
</tr>
<tr>
<td>HASS</td>
<td>Target Maintain Maintain</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual</td>
<td>52.5%</td>
<td>55.8%</td>
<td>53.3%</td>
<td>54%</td>
<td>51%</td>
</tr>
<tr>
<td>IMB</td>
<td>Target 20%</td>
<td>20%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>16.7%</td>
<td>14.3%</td>
</tr>
<tr>
<td>MBS</td>
<td>Target 29%</td>
<td>30%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual</td>
<td>28%</td>
<td>32.7%</td>
<td>34.4%</td>
<td>30.9%</td>
<td>36.7%</td>
</tr>
<tr>
<td>QBI</td>
<td>Target 37.5%</td>
<td>38.5%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual</td>
<td>37.5%</td>
<td>33.3%</td>
<td>33.3%</td>
<td>16.7%</td>
<td>14.3%</td>
</tr>
<tr>
<td>Science</td>
<td>Target 22.2%</td>
<td>24%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual</td>
<td>20.3%</td>
<td>20.5%</td>
<td>23.7%</td>
<td>27.3%</td>
<td>29.9%</td>
</tr>
<tr>
<td>SMI</td>
<td>Target 3</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual</td>
<td>3 (17.6%)</td>
<td>4 (28.6%)</td>
<td>4 (30.8%)</td>
<td>40%</td>
<td>27.3%</td>
</tr>
</tbody>
</table>
### Table 13 Percentage of academic staff at Professional Level E who are women

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>UQ</td>
<td>Target</td>
<td>20.5%</td>
<td>21.5%</td>
<td>22.5%</td>
<td>23.5%</td>
</tr>
<tr>
<td></td>
<td>Actual</td>
<td>18.8%</td>
<td>19.6%</td>
<td>19.1%</td>
<td>19.5%</td>
</tr>
<tr>
<td>AIBN</td>
<td>Target</td>
<td>11.1%</td>
<td>11.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Actual</td>
<td>11.1%</td>
<td>11.1%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>BEL</td>
<td>Target</td>
<td>23%</td>
<td>28%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Actual</td>
<td>17%</td>
<td>20.4%</td>
<td>22.2%</td>
<td>19.4%</td>
</tr>
<tr>
<td>EAIT</td>
<td>Target</td>
<td></td>
<td>Not Set</td>
<td>TBC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Actual</td>
<td>9.2%</td>
<td>10.4%</td>
<td>10%</td>
<td>8.9%</td>
</tr>
<tr>
<td>HABS</td>
<td>Target</td>
<td></td>
<td>46%</td>
<td>47%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Actual</td>
<td>44.6%</td>
<td>44.4%</td>
<td>39.6%</td>
<td>33.3%</td>
</tr>
<tr>
<td>HASS</td>
<td>Target</td>
<td></td>
<td>27.5%</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Actual</td>
<td>25%</td>
<td>29.3%</td>
<td>28.6%</td>
<td>38.5%</td>
</tr>
<tr>
<td>IMB</td>
<td>Target</td>
<td></td>
<td>14.3%</td>
<td>15.8%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Actual</td>
<td>14.3%</td>
<td>15.8%</td>
<td>10.5%</td>
<td>6.3%</td>
</tr>
<tr>
<td>MBS</td>
<td>Target</td>
<td></td>
<td>20%</td>
<td>21%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Actual</td>
<td>19.7%</td>
<td>22.4%</td>
<td>24.3%</td>
<td>23.9%</td>
</tr>
<tr>
<td>QBI</td>
<td>Target</td>
<td></td>
<td>8.8%</td>
<td>16.7%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Actual</td>
<td>8.3%</td>
<td>14.3%</td>
<td>13.3%</td>
<td>16.7%</td>
</tr>
<tr>
<td>Science</td>
<td>Target</td>
<td></td>
<td>15%</td>
<td>16%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Actual</td>
<td>14.8%</td>
<td>12.6%</td>
<td>15.5%</td>
<td>15.5%</td>
</tr>
<tr>
<td>SMI</td>
<td>Target</td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Actual</td>
<td>2 (10%)</td>
<td>2 (5%)</td>
<td>1 (5.9%)</td>
<td>1 (7.1%)</td>
</tr>
</tbody>
</table>

### Table 14 Percentage of professional staff at HEW 10 and above who are women

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>UQ</td>
<td>Target</td>
<td>48.7%</td>
<td>49.2%</td>
<td>49.7%</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>Actual</td>
<td>47.7%</td>
<td>46.2%</td>
<td>47%</td>
<td>47%</td>
</tr>
<tr>
<td>AIBN</td>
<td>Target</td>
<td>33.3%</td>
<td>33.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Actual</td>
<td>47.7%</td>
<td>46.2%</td>
<td>47%</td>
<td>50%</td>
</tr>
<tr>
<td>BEL</td>
<td>Target</td>
<td></td>
<td>50%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Actual</td>
<td>50%</td>
<td>33.3%</td>
<td>25%</td>
<td>40%</td>
</tr>
<tr>
<td>EAIT</td>
<td>Target</td>
<td></td>
<td>Maintain</td>
<td>Maintain</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Actual</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>2013</td>
<td>2014</td>
<td>2015</td>
<td>2016</td>
<td>2017</td>
</tr>
<tr>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>HABS</td>
<td>Target</td>
<td>100%</td>
<td>&gt;50%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Actual</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>HASS</td>
<td>Target</td>
<td>Maint</td>
<td>Maint</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Actual</td>
<td>66.7%</td>
<td>50%</td>
<td>50%</td>
<td>60%</td>
</tr>
<tr>
<td>IMB</td>
<td>Target</td>
<td>25%</td>
<td>33.3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Actual</td>
<td>25%</td>
<td>0%</td>
<td>33.3%</td>
<td>66.7%</td>
</tr>
<tr>
<td>MBS</td>
<td>Target</td>
<td>33.3%</td>
<td>27.3%</td>
<td>44.4%</td>
<td>57.1%</td>
</tr>
<tr>
<td></td>
<td>Actual</td>
<td>33.3%</td>
<td>27.3%</td>
<td>44.4%</td>
<td>57.1%</td>
</tr>
<tr>
<td>QBI</td>
<td>Target</td>
<td>50.5%</td>
<td>51%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Actual</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>Science</td>
<td>Target</td>
<td>65%</td>
<td>50%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Actual</td>
<td>83.3%</td>
<td>66.7%</td>
<td>71.4%</td>
<td>55.6%</td>
</tr>
<tr>
<td>SMI</td>
<td>Target</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Actual</td>
<td>0 (0%)</td>
<td>1 (16.7%)</td>
<td>1 (16.7%)</td>
<td>1 (33.3%)</td>
</tr>
</tbody>
</table>
### E.6 Staff Consultation on Equity, Diversity and Inclusion

Table 15: Agreement with current equity and diversity priorities (UQ 2014b)

<table>
<thead>
<tr>
<th>Priority</th>
<th>Per cent Agreed or Strongly Agreed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attract and retain Aboriginal and Torres Strait Islander students</td>
<td>93.24</td>
</tr>
<tr>
<td>Attract and retain students from low socio-economic backgrounds and those experiencing disadvantage</td>
<td>94.35</td>
</tr>
<tr>
<td>Provide globalised learning experiences</td>
<td>89.81</td>
</tr>
<tr>
<td>Improve the recruitment, retention and career progression of Aboriginal and Torres Strait Islander staff</td>
<td>90.94</td>
</tr>
<tr>
<td>Improve the recruitment, retention and career progression of women staff</td>
<td>90.50</td>
</tr>
<tr>
<td>Value the diversity of sexualities and gender identities amongst its staff and students</td>
<td>91.97</td>
</tr>
<tr>
<td>Provide a more accessible institution for all staff and students including people with disabilities</td>
<td>96.43</td>
</tr>
</tbody>
</table>

Table 16: Success measures/key performance indicators (UQ 2014b)

<table>
<thead>
<tr>
<th>Success Measure/Key Performance Indicators</th>
<th>Per cent Agreed or Strongly Agreed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased number of Aboriginal and Torres Strait Islander student completions (number of Aboriginal and Torres Strait Islander student completions)</td>
<td>92.20</td>
</tr>
<tr>
<td>Increase participation of students with low socio-economic status (all domestic students who are low SES as a percentage of all domestic students residing in Australia)</td>
<td>93.04</td>
</tr>
<tr>
<td>Increased student participation in outbound mobility programs (percentage of undergraduate students who have had access to an international study experience)</td>
<td>89.69</td>
</tr>
<tr>
<td>Increased proportion of women in senior positions (percentage of academic staff at Level D (Associate Professor) who are women)</td>
<td>89.18</td>
</tr>
<tr>
<td>Increased proportion of women in senior positions (percentage of academic staff at Professional Level E who are women)</td>
<td>89.05</td>
</tr>
<tr>
<td>Increased proportion of women in senior positions (percentage of professional staff at HEW 10 and above who are women)</td>
<td>87.88</td>
</tr>
</tbody>
</table>
Table 17: Summary of other equity and diversity priorities most frequently mentioned (UQ 2014b)

<table>
<thead>
<tr>
<th>Theme</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cultural Diversity</td>
<td>Staff seek greater recognition and expression of the international and globalised environment of the university, including recognising its position regionally. This involves incorporating, accommodating and embracing diverse cultural, national, ethnic and religious backgrounds of staff and students. Staff suggested this could be achieved by:</td>
</tr>
<tr>
<td></td>
<td>• Valuing the contributions and approaches of persons from culturally diverse backgrounds;</td>
</tr>
<tr>
<td></td>
<td>• Attracting and retaining staff from ethnic, national and culturally diverse backgrounds, particularly in higher level and management positions;</td>
</tr>
<tr>
<td></td>
<td>• Ensuring openness to career opportunities for persons with non-English speaking backgrounds;</td>
</tr>
<tr>
<td></td>
<td>• Supporting and assisting students from diverse backgrounds in relation to integration with the university environment, such as orientation activities;</td>
</tr>
<tr>
<td></td>
<td>• Providing targeted support and assistance to staff and students from refugee or humanitarian backgrounds and for those from developing countries;</td>
</tr>
<tr>
<td></td>
<td>• Training and development of staff in inclusive teaching practices;</td>
</tr>
<tr>
<td></td>
<td>• Respect and acknowledgement of the freedom to express religious convictions;</td>
</tr>
<tr>
<td></td>
<td>• The development and carrying out of multicultural and diversity events to foster this culture.</td>
</tr>
<tr>
<td>Family/Carer Responsibilities</td>
<td>Staff seek greater recognition of the needs of carers in the workplace. Such recognition could include greater work life balance initiatives, such as best practice flexible work, permanent part-time, job-share, and childcare facility arrangements and practices. These initiatives are sought to ameliorate the effects of caring responsibilities impacting careers, health and well-being whilst acknowledging the interplay with gender.</td>
</tr>
<tr>
<td>Disability</td>
<td>Staff suggest the prioritisation of disability inclusion, including the following:</td>
</tr>
<tr>
<td></td>
<td>• Bolstering strategies and policies to attract and retain, support and encourage, staff and students with disabilities;</td>
</tr>
<tr>
<td></td>
<td>• A heightened focus on mental health issues in order to support and integrate persons with mental health conditions into the university environment;</td>
</tr>
<tr>
<td></td>
<td>• The concept of ‘neurodiversity’ to be introduced in order to recognise and support persons on the autism spectrum and with other learning difficulties such as dyslexia;</td>
</tr>
<tr>
<td></td>
<td>• The university is urged to accommodate individuals with disabilities by conducting assessments of the university physical environment and technologies to ensure compliance with legal standards in order to deliver on disability accessibility.</td>
</tr>
<tr>
<td>Age</td>
<td>Staff express concerns in relation to ageist attitudes present within the university and suggest employees should be valued regardless of age. Staff desire stronger consideration to be given to the experience of the ageing workforce, particularly with changes in workplace demographics such as people staying at work for longer. Staff suggest such consideration could include recruitment and retention strategies to apply specifically to older workers and career opportunities, including academic career opportunities, extended to the older workforce. In terms of students, staff suggest UQ should encourage mature age students to the university and support the specific needs of that cohort of students.</td>
</tr>
</tbody>
</table>
## Appendix F: CSIRO

### F.1 UQ Outlooks

#### Table 18: Structural, cultural and interchange indicators for ethics within CSIRO

<table>
<thead>
<tr>
<th>Aspects of organisations</th>
<th>Structural issues</th>
<th>Cultural issues</th>
<th>Interchange related</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal and state mandates and legislation, supported by institutional specific legislation and support hierarchies.</td>
<td>Strong culture of and commitment to ethical conduct.</td>
<td>Public, private and appropriation funding accountability. Broader societal trend. Emerging more in public discourse.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drivers</th>
<th>Structural, cultural and interchange indicators for ethics within CSIRO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strong compliance and support framework along with established processes.</td>
<td>Framing of ethics mainly in regards to “research”, greater focus needed on including “business ethics”. Delay and loss of control for researchers. Contrasting in time delays. Variable knowledge between disciplines.</td>
</tr>
<tr>
<td>Maintaining “trust advisor” role and reputation external to CSIRO. Maintaining leading role in research ethics and integrity. Potential value add as a point of difference for private sector partners.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Structural, cultural and interchange indicators for ethics within CSIRO</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Actions</th>
<th>Structural, cultural and interchange indicators for ethics within CSIRO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continual development of ethics standards. Ethics training and development, to continually develop a strong culture of ethics in the organisation.</td>
<td>Greater incorporation of ethics into research support functions – has the ability to increase awareness of ethics related to the research but also expands application to the investment decision-making process, project management and other support activities embedded with the research project.</td>
</tr>
<tr>
<td>Continual involvement as a key player in the development of ethics standards at the national level. Maintain awareness and involvement of global ethics standards – increase ability to provide guidance and advice to staff when conducting business and research internationally.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Structural, cultural and interchange indicators for ethics within CSIRO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of new projects reviewed and approved each year and ongoing monitoring and support.</td>
<td>Number of ethics training activities undertaken, across the organisation (Business Units and Enterprise Support Services). Completion of all new staff induction – brief introduction to ethics. Number of staff across the organisation completing the “Fraud and misconduct” training course Number of awards for outstanding ethics practice that contribute to improved</td>
</tr>
<tr>
<td>Number of non-compliance or breaches reported to national bodies. Percentage of projects ceased due to major ethics breach. Maintain or increase positive public perceptions of CSIRO at the current historically high levels (Community Survey).</td>
<td></td>
</tr>
<tr>
<td>Structural issues</td>
<td>Cultural issues</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------------</td>
</tr>
<tr>
<td></td>
<td>standards and practice (i.e. case studies of success).</td>
</tr>
</tbody>
</table>

**Table 19: Structural, cultural and interchange indicators for societal engagement within CSIRO**

<table>
<thead>
<tr>
<th>Aspects of organisations</th>
<th>Structural issues</th>
<th>Cultural issues</th>
<th>Interchange related</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Institutional mandate through formal policy and strategic objectives. Explicit and implicit organisational focus.</td>
<td>Formal and informal activities within CSIRO. Common understanding of the benefits of multi-stakeholder views included in problem definition, approaches and solutions.</td>
<td>Maintaining public respect, relevance and recognition. Engaging with all stakeholders, at the national and international levels. Managing risks.</td>
</tr>
<tr>
<td>Drivers</td>
<td>Maintaining organisational position within society. Strong links within organisation between different research groups. Strong focus from leadership.</td>
<td>Strong culture to incorporate societal aspects into all research. Growing influence on collaborative research metrics. Importance of engaging with other research institutions.</td>
<td>Integral focus on impact demonstrating return on investment for funders. Cross-over with Science Education initiatives. Societal trend through community push for accountability and engagement.</td>
</tr>
<tr>
<td>Barriers</td>
<td>Narrow scope of “societal engagement”. Scale of national (and international) projects can be hard to manage, facilitate and enable.</td>
<td>Lack of staff understanding and capacity of staff on how to engage. Lack of appreciation of citizen science. Time and resources.</td>
<td>Growing lack of trust in private and public institutions. Requirement for fast turn-around of research results/solutions.</td>
</tr>
<tr>
<td>Actions</td>
<td>Provide top-down systems and strategies to facilitate and promote engagement. Embed the use of effective KPIs to support the adoption of engagement practices.</td>
<td>Continue reaching out with new and existing stakeholders. Grow the amount of internally and externally collaborative research. Ongoing investment in training and practical application of engagement skills.</td>
<td>Outward facing impact measurements. Business Development to grow relationships with industry and SMEs. Provide engaging and interactive ways to draw the attention of communities in STEM areas.</td>
</tr>
<tr>
<td>Indicators</td>
<td>Increased awareness of CSIRO activities, outputs and impacts by stakeholders. Feedback from universities involved in the ON Program – maintain or increase their willingness to recommend the Program (4 or higher on a 5 point scale) Demonstrate triple-bottom line impacts through:</td>
<td>Increased societal engagement as part of research and innovation process. Percentage of Research Programs with defined impact pathways, mapped to impact statements. Number of staff completing engagement training.</td>
<td>Report levels and channels of engagement across the various stakeholder groups in publicly available reports (e.g. CSIRO’s Annual Report). Demonstrate impact (social, economic and environmental) of CSIRO research and other activities.</td>
</tr>
</tbody>
</table>


- Assessment of the quality of impact from independent Business Unit Reviews
- An external ‘Value of CSIRO Impact Assessment’ every two years
- Externally validated impact case studies Evidence of triple-bottom line impacts from global activities, with demonstrated benefits to Australia. Establishing new, significant and strategic level MOUs.

| Percentage of staff completing the CSIRO Impact Planning and Monitoring Workshop. Percentage of projects with more than one external partner organisation. Quality of recipients of the internal CSIRO Aboriginal and Torres Strait Islander Engagement Study Award and Medal. |
|---|---|---|
| Increased use of CSIRO patent and licencing portfolio. Maintain customer satisfaction - 10% increase by 2019-20 and beyond in number of participants utilising the science outreach programs. |

**Table 20: Structural, cultural and interchange indicators for gender and diversity within CSIRO**

<table>
<thead>
<tr>
<th>Indicator for Improvement</th>
<th>Structural issues</th>
<th>Cultural issues</th>
<th>Interchange related</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of SIEF research projects involving more than one organisation is &gt;94% for 2018-19 (Corporate Plan 17-18). Maintain customer satisfaction using Customer Willingness to Recommend Net Promoter Score (NPS) to above +18 for 2018-19 (Corporate Plan 17-18). <strong>Quality of research partnerships.</strong> Include specific “engagement behaviours” in which a staff member can be recognised, and rewarded for, in Merit Promotions. This needs to be defined for all functions across the organisation, not only for research activities but also to include National Facilities and Collections, CSIRO Services and Enterprise Support Services.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Structural issues</th>
<th>Cultural issues</th>
<th>Interchange related</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institutional and federal mandates through institutional legislation and formal hierarchies.</td>
<td>Formal and informal routines with CSIRO.</td>
<td>Broader societal trend. SAGE Athena SWAN Charter bought in by Academy of Science</td>
</tr>
<tr>
<td>Historical organisational momentum that conflicts with present situational pressures experienced by staff. Costs of developing individuals.</td>
<td>Historical experiences leading to lack of trust. Changing leadership. Fear of undermining merit processes. Limited desirability of senior roles to diverse applicants.</td>
<td>Limitations in the labour market.</td>
</tr>
<tr>
<td>Addressing barriers over academic career progression and work schedules. Increase the diversity of our leadership cohort including gender, non-English speaking background, and Aboriginal and Torres Strait Islander people.</td>
<td>Encouraging staff to think about how they might contribute to achieving employment targets. Ensuring all staff benefit through actions.</td>
<td>Collective sectoral approach to improve gender equity in STEM. 88 actions as part of SAGE action plan (See Appendix F.4).</td>
</tr>
<tr>
<td>Structural issues</td>
<td>Cultural issues</td>
<td>Interchange related</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Enhancing capabilities of recruitment panels.</td>
<td>Staff morale through staff surveys. Quality of applications for the CSIRO Medal for Diversity and Inclusion. Number and quality of female staff awarded the Ruby Payne-Scott Award.</td>
<td>Sectoral improvement of gender and diversity equality.</td>
</tr>
</tbody>
</table>

**Indicators**

- Reaching Indigenous employment target. Targets across Group and Team Leader appointments.

**Indicator for Improvement**

Increase number of shortlisted female applicants for leadership positions from 30% to 40%. Achieve a 10% better result than the industry benchmark across each of the science disciplines.

REFER APPENDIX F.5 for comprehensive list

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### Table 21: Structural, cultural and interchange indicators for open access within CSIRO

<table>
<thead>
<tr>
<th>Structural issues</th>
<th>Cultural issues</th>
<th>Interchange related</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drivers</td>
<td>Strong institutional processes and protocols.</td>
<td>Strong cultural views that open access is associated with public good research. Alternate publishing routes and access channels i.e. The Conversation.</td>
</tr>
<tr>
<td>Barriers</td>
<td>Contractual restrictions. IP protectionism. Increasing reliance on external funding. Financial constraints of journals requiring open access fees.</td>
<td>Inferior open access journals and potential effects on career progression. Limited internal capacity to pursue alternative communication channels.</td>
</tr>
<tr>
<td>Actions</td>
<td>Develop a set of principles. Find open access champions. Once principles finalised, procedures will be developed. CSIRO to continue to recognise the importance of the peer review process.</td>
<td>Improve recognition of data custodianship. Include in rewards and recognition processes for alternative access channels to be incentivised. Senior Managers should encourage and support researchers to participate in the ePublish process.</td>
</tr>
<tr>
<td>Indicators</td>
<td>Increasing the proportion of collections that are available and utilised by researchers and the public.</td>
<td>Increased adoption of resources. Number of staff recognised for their use of alternative access and communication approaches. Percentage of research staff compliant with ePublish processes.</td>
</tr>
<tr>
<td>Indicator for Improvement</td>
<td>Develop guidelines for publishing in open access to assist with author decision making. Develop alternative metrics for performance reviews linked to publishing beyond commercial journals to open access</td>
<td>Sector change in culture relating to open access.</td>
</tr>
</tbody>
</table>
Table 22: Structural, cultural and interchange indicators for science education within CSIRO

<table>
<thead>
<tr>
<th>Organisation aspect</th>
<th>Structural issues</th>
<th>Cultural issues</th>
<th>Interchange related</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural issues</td>
<td>Institutional mandate.</td>
<td>Offers vehicles for CSIRO partners to connect into STEM related programs. Role of communication in this aspect.</td>
<td>Participation in STEM a priority for Australian government.</td>
</tr>
<tr>
<td>Drivers</td>
<td>Part of perceived institutional responsibilities within education pipeline.</td>
<td>Often two-way transfer of knowledge with external stakeholders. Many scientists are keen to participate.</td>
<td>Chief Scientist/ACOLA report on participation in STEM.</td>
</tr>
<tr>
<td>Barriers</td>
<td>Funding constraints. Changes in institutional direction.</td>
<td>Time and project constraints mean staff do not have spare capacity to participate. Changing resource constraints through availability of funding.</td>
<td>Uncertainty around new and emerging science can make it difficult. Risks and unintended consequences.</td>
</tr>
<tr>
<td>Actions</td>
<td>Promote importance of CSIRO science and its application to society.</td>
<td>Scientists working with business (e.g. secondments) see the need for science and different areas. Encourage appointment of students/Post Docs/Early Career researchers.</td>
<td>Large focus on STEM across all universities and education institutions.</td>
</tr>
<tr>
<td>Indicators</td>
<td>Increasing utilisation of science outreach programs. Demonstrating success of outreach programs through number of participants.</td>
<td>Percentage of project staff are early career researchers/Post Docs/students. Number of staff volunteer in the STEM Professionals in Schools program.</td>
<td>Increased science understanding and STEM uptake within society.</td>
</tr>
</tbody>
</table>

**Indicator for Improvement**

Number of participants who utilise our science and outreach programs show 10% increase in 2018/19 year.

Number of projects where additional SIEF STEM+ Business funds are spent on research between the company and the STEM+ Fellow’s host research team or with others (12 for 2018/19 year).

Table 23: Structural, cultural and interchange indicators for anticipation and reflexivity within CSIRO

<table>
<thead>
<tr>
<th>Organisation aspect</th>
<th>Structural issues</th>
<th>Cultural issues</th>
<th>Interchange related</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implicit undertone of the institution. Formal and informal practices. Services offered to clients.</td>
<td>CSIRO Futures function in forecasting and road mapping future worlds. Performance and Evaluation Team used to build capacity on impact planning and monitoring across the organisation, as well as conduct impact assessments.</td>
<td>Many industry partners are looking for assistance in this area.</td>
<td></td>
</tr>
<tr>
<td>Drivers</td>
<td>ON Program actively draws participants from across CSIRO, as well as externally.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Societal trends in requiring articulation of anticipated benefits from R&amp;D investments (e.g. Responsible Innovation Initiative in the FSP Program).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barriers</td>
<td>BUs may be looking for help in predicting core issues – drawing more upon the CSIRO Impact Framework across Programs to ascertain this information. Greater use of the Impact Framework by Business Development and other Enterprise Support Services.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time and resourcing.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actions</td>
<td>Increase utilisation of institutional capabilities.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increase access to capability development in impact planning and monitoring. Raise the awareness of the outputs produced by the CSIRO Futures team. Encourage participation in programs such as ON. Increase the awareness and lessons learnt from impact case study assessments to gain wider adopt of learnings.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ensuring the services are well known externally.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indicators</td>
<td>Recognition of being trusted advisor in this domain internally within the organisation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Collection of externally validated impact case studies. Maintain or increase the assessments on the “impact” criteria from independent Business Unit Reviews in top two rating levels. Conduct an external “Value of CSIRO Impact Assessment” every 2 years. Percentage of Programs with defined Impact Statements and Impact Pathways, with defined monitoring and evaluation plans. Number of participants and teams in ON Prime &amp; ON Accelerate.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of applicants received from PRFAs and universities as proportion of total applications. Number of innovation Mentors signed and participating in the ON Program. Recognition of ON Program in the media - positive in nature and longevity of attention.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 24: Structural, cultural and interchange indicators for openness and transparency within CSIRO

<table>
<thead>
<tr>
<th>Organisation aspect</th>
<th>Structural issues</th>
<th>Cultural issues</th>
<th>Interchange related</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Drivers</strong></td>
<td>CSIRO Board and Leadership Teams. Features in core capabilities.</td>
<td>Codes of conduct. Builds on previous values. Need for open and transparent investment decision-making processes and allocation of resources. Clear understanding of CSIRO’s strategy and active participation in engagement processes aligned to future direction of the organisation, BU and Programs.</td>
<td>Societal trend for government agencies to be open and transparent on their purpose and how they intend to deliver upon that expectation. Expectations from government funding organisations.</td>
</tr>
<tr>
<td><strong>Barriers</strong></td>
<td>Risk management frameworks. Confidentiality agreements with funders.</td>
<td>Staff not comfortable or confused with the strategy and other investment decision-making and reporting processes.</td>
<td>External partners requiring commercial in confidence agreements.</td>
</tr>
<tr>
<td><strong>Actions</strong></td>
<td>Commitment to openness and transparency of investment decisions and strategic directions. Active involvement in identifying and rating the risks associated with CSIRO’s operations and engaging in communication activities on those risks.</td>
<td>Publishing the: • Science Investment and Implementation Process • CSIRO Corporate Plan • CSIRO Annual Report. Actively participate in CSIRO Connect events. Encourage the awareness of CSIRO’s risks, particularly at the Program, Group, Team and individual levels.</td>
<td>FOI requests.</td>
</tr>
<tr>
<td><strong>Indicators</strong></td>
<td>Level of engagement of Executive level staff attending and participating at the CSIRO Connect events. Number of all staff webinars held within a calendar year.</td>
<td>Number of staff that attend the CSIRO Connect events. Number of hits to the intranet and internet pages on “Science Investment and Implementation Process”, “CSIRO Corporate Plan” and “CSIRO Annual Report” pages. Percentage of risks mitigated and communicated to staff in accordance with the Organisational Risk Profile.</td>
<td>Number of hits to the intranet and internet pages on “CSIRO Corporate Plan” and “CSIRO Annual Report” pages. Number and speed of replies to FOI requests.</td>
</tr>
<tr>
<td>Structural issues</td>
<td>Cultural issues</td>
<td>Interchange related</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Indicator for Improvement</strong></td>
<td>Number of staff that attend the CSIRO Connect events.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Percentage of risks mitigated and communicated to staff in accordance with the</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organisational Risk Profile.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number and speed of replies to FOI requests.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 25: Structural, cultural and interchange indicators for responsiveness and adaptation within CSIRO

<table>
<thead>
<tr>
<th>Organisation aspect</th>
<th>Structural issues</th>
<th>Cultural issues</th>
<th>Interchange related</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulatory obligations.</td>
<td>Formal and informal practices.</td>
<td>Expectation that CSIRO will be there when disasters or emergencies occur.</td>
<td></td>
</tr>
<tr>
<td>National safety and preparedness expectations.</td>
<td>Part of the function of the organisation is to be responsive and adapt –</td>
<td>Assume CSIRO is protecting the nation from safety and health threats.</td>
<td></td>
</tr>
<tr>
<td>National policies.</td>
<td>strategically, operationally and scientifically.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Drivers</strong></td>
<td>Goal and strategic direction for most Business Units is to ensure national</td>
<td>Societal expectations.</td>
<td></td>
</tr>
<tr>
<td>Institutional recognition of the function and role of the</td>
<td>preparedness and response solutions available.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>organisation.</td>
<td>Historical momentum of certain disciplines.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aligned with Organisational Risk Profile – recognised as a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>key deliverable for CSIRO.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decision to move to a rolling strategy approach.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Barriers</strong></td>
<td>Time and project constraints.</td>
<td>Scale and breadth of expectations can be outside the responsibility of CSIRO.</td>
<td></td>
</tr>
<tr>
<td>Clear understanding on how best to apply the rolling</td>
<td>Acceptance of the rolling strategy approach - changing the fundamental process</td>
<td></td>
<td></td>
</tr>
<tr>
<td>strategy approach.</td>
<td>for identifying our priorities, and funding, is a significant change and could</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>cause concern.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Actions</strong></td>
<td>Wider adoption of the impact framework to assist with planning and monitoring of</td>
<td>Articulate continued support for CSIRO to be publicly funded in areas of national</td>
<td></td>
</tr>
<tr>
<td>High engagement.</td>
<td>activities.</td>
<td>security, safety and health.</td>
<td></td>
</tr>
<tr>
<td>Conversational, non-hierarchical approach involving CSIRO</td>
<td>Awareness of the benefits associated with a rolling strategy approach.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>people and leaders.</td>
<td>Continue to build scientific and engineering capability in response and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Focus remaining on responsive and adaptation research.</td>
<td>adaptation research areas.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Invest in national facilities and collections which support R&amp;D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>efforts.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Indicators</strong></td>
<td>Percentage of Programs with defined impact statements and associated impact</td>
<td>Maintain or increase positive public perceptions of CSIRO at the current historically high levels.</td>
<td></td>
</tr>
<tr>
<td>Maintenance and operation of the research infrastructure to</td>
<td>pathway plans.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>appropriate standards.</td>
<td>Utilisation of research infrastructure and collections.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of the Rolling Strategic Planning &amp; Implementation</td>
<td>Utilisation of the SIEF funded research infrastructure.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Framework.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continued strategic investment in responsive and adaptation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>research areas.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Indicator for Improvement

**Utilisation of research infrastructure and collections** (use of facilities and collections as measured through: successful observations, time lost during observations and operations, core-hour use, outward loans and successful research days delivered)
<table>
<thead>
<tr>
<th>Structural issues</th>
<th>Cultural issues</th>
<th>Interchange related</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utilisation of the SIEF funded research infrastructure</td>
<td>Maintenance and operation of the research infrastructure to appropriate standards</td>
<td></td>
</tr>
</tbody>
</table>

Table 26: Structural, cultural and interchange indicators for sustainability within CSIRO

<table>
<thead>
<tr>
<th>Organisation aspect</th>
<th>Structural issues</th>
<th>Cultural issues</th>
<th>Interchange related</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulatory obligations. Effective management of operations.</td>
<td>Financially viable as project teams.</td>
<td>Expected to operate in a trustworthy, efficient and cost saving manner.</td>
<td></td>
</tr>
<tr>
<td>Barriers</td>
<td>Effective systems, processes and policies to support efficient management of resources.</td>
<td>Systems and processes create barriers to implementation or practical application. Lack of supporting culture.</td>
<td>Lack of trust.</td>
</tr>
<tr>
<td>Indicators</td>
<td>Meet or exceed bottom line budget operating result as approved by the Board. Percentage of total budget associated with external revenue. Number of CSIRO sites – property portfolio appropriate for the number of staff.</td>
<td>Percentage of projects that are co-funded or co-invested. Purchased energy (electricity and gas) consumed per employee (GJ/FTE). Million air kilometres travelled (km). Air travel per employee (km/FTE). Amount of water use per employee (kilolitres/FTE).</td>
<td>Support for site consolidation plans. Co-location of CSIRO with other organisations and partners. Social licence to operate.</td>
</tr>
</tbody>
</table>

**Indicator for Improvement**

Percentage of total budget associated with external revenue. Purchased energy (electricity and gas) consumed per employee (GJ/FTE). Million air kilometres travelled (km). Air travel per employee (km/FTE). Amount of water use per employee (kilolitres/FTE). Social licence to operate.
### Table 27: Structural, cultural and interchange indicators for health and safety within CSIRO

<table>
<thead>
<tr>
<th>Organisation aspect</th>
<th>Structural issues</th>
<th>Cultural issues</th>
<th>Interchange related</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drivers</td>
<td>Board and Executive Leadership team as significant champions.</td>
<td>Staff commitment to safety and wellbeing.</td>
<td>Expect CSIRO to be a safe place to work.</td>
</tr>
<tr>
<td>Barriers</td>
<td>Lack of funding to support all initiatives.</td>
<td>Lack of awareness and connection to the Culture Vision Plan.</td>
<td>Want Australians to have a balanced work life.</td>
</tr>
<tr>
<td>Actions</td>
<td>Continue to commit focus in strategies and resources to effective initiatives.</td>
<td>Raise awareness of the HSE initiatives and show, at the individual level, how staff can be involved.</td>
<td>Expect CSIRO reporting of instances of workplace accidents.</td>
</tr>
<tr>
<td>Indicators</td>
<td>Number of recommendations successfully implemented from any HSE audits.</td>
<td>% HSE audits and reviews actions completed on time Reporting of Regulatory Reportable Comcare Incidents</td>
<td>Reporting of Regulatory Reportable Comcare Incidents</td>
</tr>
<tr>
<td>Indicator for Improvement</td>
<td>Number of recommendations successfully implemented from any HSE audits. Reporting of Regulatory Reportable Comcare Incidents</td>
<td>Morale - Staff Engagement score as measured through the Staff Survey</td>
<td>Number of sick days taken by staff</td>
</tr>
</tbody>
</table>

### Table 28: Structural, cultural and interchange indicators for integrated science within CSIRO

<table>
<thead>
<tr>
<th>Organisation aspect</th>
<th>Structural issues</th>
<th>Cultural issues</th>
<th>Interchange related</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drivers</td>
<td>Institutional recognition of the function and role of the organisation.</td>
<td>Future direction of research problems, will require interdisciplinary approaches.</td>
<td>Society expectation that complex, national challenges are addressed. Funders’ expectations that future funding grants to be provided to interdisciplinary research teams.</td>
</tr>
<tr>
<td>Barriers</td>
<td>Working with organisations with less experience in interdisciplinary research. Lack of cross-organisational strategic agreement on which complex national challenges to focus on.</td>
<td>Lack of staff with experience in integrated science skills/capabilities. Not recognised or rewarded for interdisciplinary research activities. Research activities and outputs take longer to conduct and achieve – disincentive to</td>
<td>Lack of understanding of the complexity that comes with multiple disciplines working together. Unrealistic time frames for results.</td>
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<tr>
<td>Structural issues</td>
<td>Cultural issues</td>
<td>Interchange related</td>
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<td></td>
<td>approach research in this manner.</td>
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<tr>
<td>Actions</td>
<td>Provide strategic focus on identifying which interdisciplinary, complex challenges you need staff to target.</td>
<td>Build capacity and opportunities for staff to work on integrated science projects. Include interdisciplinary activities in reward and recognition policies.</td>
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<td>Articulate which national challenges are the priority for the R&amp;D sector to focus their efforts.</td>
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<tr>
<td>Indicators</td>
<td>Percentage of the budget assigned to support interdisciplinary science opportunities.</td>
<td>Number of integrated science projects with impact monitoring plans that include recognised and feedback loops. Number of social science projects go through the ON Program. Evidence of constructive technology development – case studies. Number of scientists recognised as stakeholders on interdisciplinary projects. Collection of externally validated impact case studies of interdisciplinary projects. Normalised citation rate of interdisciplinary publications.</td>
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<tr>
<td>Rating of national challenges.</td>
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<tr>
<td>Indicator for Improvement</td>
<td>Number of interdisciplinary teams that are working on grand challenges</td>
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</table>
F.2 Investment Criteria

Below highlights the investment criteria for CSIRO’s end-to-end Investment Decision Framework to support the decision-making process throughout the Science Prioritisation phase. (EY 2016, p. 15)

<table>
<thead>
<tr>
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<th>Impact Value</th>
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</table>
| 1. | • The measurable outcomes sought will deliver clear and significant value to Australia’s economy, society and/or environment  
• The activity is consistent with CSIRO’s mandate and strategy |
| 2. | Customer need/market attractiveness                                                                     |
|   | • There is a clear and feasible path to impact for the research including a receptive, attractive market and demonstrated customer and end user application, demand and value  
• Ability to form commercial relationships with customers to support the research, development and extension activities required for impact  
• Compelling evidence that supports the identification of the right science and technical challenges to achieve the impact that are both ambitious and plausibly achievable given available resources |
| 3. | Competitiveness                                                                                        |
|   | • The research area has access to science and technology capability and outputs globally differentiated and competitive in its field  
• CSIRO is the most appropriate organisation to deliver the goal, and no other organisations are better placed |
| 4. | Performance                                                                                             |
|   | • An evaluation of the current performance of the BU against agreed key performance indicators         |
| 5. | Financial Attractiveness                                                                               |
|   | • An assessment of the prospective financial value return to CSIRO to be created by the research activities, outputs and pathways |
| 6. | Financial Investment required                                                                         |
|   | • The retrospective and prospective whole of life cost to CSIRO of the research, development and extension activities |
F.3 Ernst and Young Review of CSIRO’s Science Prioritisation and Implementation Process

- “Recommendation 1A: Strengthen and better communicate the existing governance practices including accountability, responsibilities and sponsorship needed to support all phases of the SPI
- Recommendation 1B: Reassess the existing organisational structure and practices (including lines of reporting and distribution of corporate functions) to provide appropriate management and coordination to all phases of the SPI Process
- Recommendation 2A: Update and improve the documentation of policies, processes and procedures that underpin the SPI for greater clarity of purpose and consistency of approach (e.g. protocols around recording decision), and ensure they are widely communicated and commonly understood.
- Recommendation 3A: Formally integrate CSIRO’s existing Risk Management Framework into the SPI process so that risks are optimally identified, monitored and treated, and investment opportunities appropriated resourced, particularly at the Implication Assessment stage.
- Recommendation 3B: Improve existing risk management practise and culture (through, for example, training and assigning risk owners) to ensure that, at each of the Investment, ET and BU levels, decisions are made and resourced that are risk-based and proportionate, using the best capability (including the CSIRO risk team) and internal and external information.
- Recommendation 4A: Ensure that an enterprise-wide view of change management is undertaken for any change affecting either a significant part of, or the whole organisation (as determined by, for example, pre-determined thresholds)
- Recommendations 4B: Ensure timely engagement and responsiveness of the relevant Corporate Bus (e.g. Organisational Development & Change) at the start of the Implication Assessment phase; and especially when proposed changes are likely to have a material impact on CSIRO’s staff or reputation.
- Recommendation 4C: Establish protocols and guidance principles for the development of all staff messaging and communications, informed by approaches that have proven effective in the past. Protocols and guidance should be in relation to topics such as communicating the drivers of change and communicating preliminary and final decisions.
- Recommendation 5A: Continue the work started to develop an external stakeholder engagement strategy (ESES) – including target stakeholder groups and protocols for engagement – to build trust in external stakeholders and support robust decisions or decision-making.
- Recommendation 5B: Improve the understanding of the CLT in engaging Ministers, external government officials and other key external stakeholders, including through strengthening CSIRO’s senior leadership presence in Canberra.
- Recommendation 6A: Develop a long-term strategy to change aspects of CSIRO’s culture by resetting expectations and reinforcing behaviours that enable greater trust and transparency, linking with the existing Culture Alignment Program.
- Recommendation 6B: Increase awareness and enforce a greater emphasis on CSIRO’s code of conduct and the values and behaviours expected of CSIRO staff.
- Recommendation 7A: Ensure that the most appropriate levels of the Crisis Management Framework (CMF) are invoked at the Implication Assessment stage, and when announcing major changes to the organisation or a number of Bus.
- Recommendation 7B: Improve the understanding of the CLT on the specific triggers that warrant invoking CMF through, for example, training and operational crisis simulation exercises.” (EY 2016, pp. 4-6)
F.4 Ethics Framework

CSIRO Framework for Social and Interdisciplinary research involving human participants

<table>
<thead>
<tr>
<th>Resources</th>
<th>Processes</th>
<th>Professional Development/Training</th>
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</table>
| - National guidelines (both generic and indigenous specific) outlining ethics requirements for research involving human participants  
- Information booklets and guides for researchers/supervisors to support ethical research design and conduct  
- Case studies exploring the range of ethics issues that can arise during research projects and strategies for effectively responding to them  
- Templates and examples of best practice eg informed consent forms, participant information sheets, research agreements, contract clauses, engagement protocols  
- Quick access links to other related information and policy documents eg. Data management, privacy, supervision of students, IP, complaints/grievances | - Trigger points in existing project planning and review processes to support consideration, assessment and monitoring of ethics issues.  
- Two stage ethics review process  
1. Initial review and project risk assessment of projects prior to contract finalisation with low/negligible risk projects given expedited clearance and managed internally.  
2. Formal review via human research ethics committee for higher risk projects  
- Reciprocal review arrangements with other institutional committees to minimise unnecessary duplication  
- Internal administrative arrangements to facilitate tracking, reporting and monitoring of projects and review process outcomes. | - Introductory training for new staff or non-social science practitioners, including those working in interdisciplinary teams  
- Advanced professional development for social science practitioners and mentors  
- Annual moderation/reflection forum for research staff to explore challenging ethical issues or questions that have arisen throughout the year  
- Development of a network of ethics mentors and advisors across CSIRO to provide peer support and feedback  
- Provision of ongoing professional development for ethics committee members |
### F.5 SAGE Action Plan

#### Cultural Changes

**Aim 1.1 Implement collective responsibility for diversity and inclusion at CSIRO**

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<thead>
<tr>
<th>Rationale</th>
<th>ID</th>
<th>Action</th>
<th>Status</th>
<th>Progress to date</th>
<th>Responsibility</th>
<th>Measurable Outcome</th>
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<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.4(i) SAGE focus group participants, as well as many staff via staff surveys, have expressed frustration at seeing poor people leaders remain in their positions, and even be promoted, reinforcing a sense that the most important criteria for leadership is external revenue and/or a form of cronyism. Enterprise efforts to advance an inclusive culture at CSIRO will be regarded with scepticism if there is no measure of accountability.</td>
<td>1.1(i)</td>
<td>The Executive Team and CSIRO Leadership Team is held accountable for diversity and inclusion outcomes in their portfolios of responsibility through APA performance assessments against Key Performance Indicators (KPIs), including listening to and learning from staff through focus group participation, taking action, participating in Diversity &amp; Inclusion activities, and distributing Diversity and Inclusion responsibilities across their leadership teams.</td>
<td>Builds on existing initiative</td>
<td>SAGE-related activities were assessed as a part of CSIRO’s Leadership Team KPIs in 2017.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Human Resources, CSIRO Executive Team, CSIRO Leadership Team. Cost: Minimal. Effort: High. Impact: High.</td>
<td>By 1 July 2019, diversity and inclusion KPIs are developed and implemented for the CSIRO Executive and Leadership Teams.</td>
</tr>
<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.4(ii) Addressing historic gender inequities involves some genuinely tough philosophical problems, and areas outside CSIRO’s sphere of influence that CSIRO could nonetheless aim to support. For example, if two people are doing the same job today, but one worked part-time five years ago for one year, is it reasonable that they be paid the same wage now, or does the one year part-time impact experience to a substantial degree. How long should that impact last? There are arguments for and against both positions, and having a transparent debate on these types of wicked problems will engage staff and move the organisation forward collectively.</td>
<td>1.1(ii)</td>
<td>The CSIRO Leadership Team and invitees spend time in two of their four annual meetings to have a substantive discussion about contentious diversity and inclusion challenges at CSIRO, and agree on a disruptive action to fast-track progress in that area. Staff views are canvassed by the Leadership Team in preparation.</td>
<td>New initiative</td>
<td>Not yet started</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, CSIRO Leadership Team. Cost: Minimal. Effort: High. Impact: High.</td>
<td>Two disruptive actions to fast-track diversity and inclusion at CSIRO are agreed by the CSIRO Leadership Team each year.</td>
</tr>
<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.4(iii) In the SAGE focus groups, staff reported that their experience at work was strongly impacted by their immediate managers, and also more senior leaders. By utilising the Male Champions of Change Leadership Shadow model, senior leaders will better understand the impact their leadership has on their staff, and the tools for positive self-development.</td>
<td>1.1(iii)</td>
<td>Roll out the Male Champions of Change Leadership Shadow tool for all CSIRO Leadership Team members with annual review.</td>
<td>Builds on existing initiative</td>
<td>CSIRO’s Chief Executive is a Male Champion of Change who has already undertaken the Leadership Shadow program, and has asked the CSIRO’s Executive Team to undertake the program in 2018.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, CSIRO Leadership Team, Human Resources. Cost: Moderate. Effort: High. Impact: High.</td>
<td>Beginning in 2018, all members of the CSIRO Leadership Team have undertaken the Leadership Shadow program by December 2021.</td>
</tr>
<tr>
<td>Rationale</td>
<td>ID</td>
<td>Action</td>
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<td>Progress to date</td>
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<td>Measurable Outcome</td>
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<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.4(i)</td>
<td>1.1(iv)</td>
<td>CSIRO’s Chief Executive makes it clear through statements and actions that repeat perpetrators of discriminatory or bullying behaviours (including leaders) will be removed from the organisation (e.g. “You may not always see it but last year four people were exited from the organisation…”).</td>
<td>New initiative</td>
<td>Not yet started</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Human Resources, Chief Executive</td>
<td>A “You may not always see it…” statement is made during the second quarterly Diversity &amp; Inclusion Chief Executive blog update, beginning in 2018.</td>
</tr>
<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.4(i)</td>
<td>1.1(v)</td>
<td>“Small Wins: How did you do it?” initiative to drive collective outcomes at the local level. Encourage teams, groups and programs that have set and achieved meaningful local D&amp;I objectives to share outcomes with the Enterprise D&amp;I Team for shared learning, and possible use by CSIRO’s Chief Executive as success stories in his/her quarterly Diversity &amp; Inclusion update to staff.</td>
<td>New initiative</td>
<td>Not yet started</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, all CSIRO teams, Corporate Affairs</td>
<td>The Small Wins initiative has begun by 1 July 2020.</td>
</tr>
<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.4(i)</td>
<td>1.1(vi)</td>
<td>Expand the Senior Leadership and Site Leader roles to include the expectation that they actively facilitate and participate in Diversity &amp; Inclusion initiatives.</td>
<td>New initiative</td>
<td>Not yet started</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Human Resources, Site Leaders, Senior Leaders</td>
<td>Sponsorship of and participation in site-based and Enterprise Diversity &amp; Inclusion events and activities is embedded and discussed in annual APA assessments by 1 July 2019.</td>
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</tbody>
</table>
### Cultural Changes

#### Aim 1.1 Implement collective responsibility for diversity and inclusion at CSIRO

<table>
<thead>
<tr>
<th>Rationale</th>
<th>ID</th>
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<th>Responsibility</th>
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<tbody>
<tr>
<td>should be expanded to include the expectation that they actively facilitate and participate in Diversity and Inclusion initiatives.</td>
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<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.4(v)</td>
<td>1.1(vii)</td>
<td>Develop and pilot an Inclusive Leader curriculum with a view to expansion across CSIRO.</td>
<td>Builds on existing initiative</td>
<td>An Inclusive Leader Program is being piloted in partnership with the Agriculture &amp; Food Business Unit in 2018.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Agriculture &amp; Food Inclusion Team, Diversity Team, Learning &amp; Development</td>
<td>Pilot complete by March 2018 and recommendations for expansion made by 1 July 2018.</td>
</tr>
<tr>
<td>SAGE focus group participants made clear that an inclusive culture at CSIRO is contingent on inclusive leaders, but that many leaders are perceived as being rigid, hierarchical, and uncomfortable around difference. In CSIRO's 2017 staff survey, 73% of staff responded favourably to the question: &quot;My immediate manager actively includes people who are different to themselves&quot;, which is 7% below the Australian National norm. Supporting CSIRO leaders to develop inclusive behaviours will advance an inclusive and diverse workplace.</td>
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<td>Find in CSIRO SAGE Bronze Application Section 5.4(v)</td>
<td>1.1(viii)</td>
<td>Develop and disseminate guidelines for inclusive meetings.</td>
<td>Builds on existing initiative</td>
<td>Agriculture and Food has developed a set of inclusive meeting guidelines that can be used as a template for CSIRO-wide guidelines.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Agriculture &amp; Food Inclusion &amp; Diversity Team</td>
<td>Inclusive meeting guidelines are available to staff by December 2018.</td>
</tr>
<tr>
<td>SAGE focus group participants made clear that an inclusive culture at CSIRO is contingent on inclusive leaders, but that many leaders are perceived as being rigid, hierarchical, and uncomfortable around difference. Developing and disseminating material on good practice for inclusive meetings will help to raise awareness and provide guidelines for those who are unsure.</td>
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<td>Find in CSIRO SAGE Bronze Application Section 5.4(v)</td>
<td>1.1(ix)</td>
<td>Understand the pool available to CSIRO external committees, and work to achieve gender-balance on those committees by 2025.</td>
<td>New initiative</td>
<td>Not yet started.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Business Units</td>
<td>CSIRO's external committees are gender-balanced by 2025.</td>
</tr>
<tr>
<td>CSIRO's external committees, such as Business Unit Advisory Panels, are the least gender-balanced despite having the theoretically largest pool of female candidates. Whilst CSIRO will drive internal committees to gender-balance via a &quot;50:50 If not why not? If not what next&quot; campaign, there may be greater scope for actions to fast track gender balance on external committees.</td>
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### Aim 1.2 Diversify the face of CSIRO

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<th>Progress to date</th>
<th>Responsibility</th>
<th>Measurable Outcome</th>
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<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.4(x)</td>
<td>1.2(i)</td>
<td>Build upon the MCC Panel Pledge, and develop an internal “50:50 if not, Why not? If not, what next?” campaign to roll out across the organisation, targeting internal and external conferences and events, committees, internal and external communication images and spokespeople.</td>
<td>Builds on existing initiative</td>
<td>Preliminary planning for a 50:50 campaign is underway.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Corporate Affairs</td>
<td>An ongoing internal 50:50 Campaign has been launched by June 2018.</td>
</tr>
<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.4(x)</td>
<td>1.2(ii)</td>
<td>Establish a formal check-point for all significant CSIRO investments and activities, and internal and external CSIRO delegates, to review whether equitable gender and cultural representation has been considered and implemented.</td>
<td>New initiative</td>
<td>Not yet started</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team</td>
<td>A formal diversity and inclusion checkpoint has been established by 1 July 2018.</td>
</tr>
<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.4(x)</td>
<td>1.2(iii)</td>
<td>Identify a pool of diverse spokespeople in science areas of high public interest, provide them with media training, and engage them for internal and external communication activities as appropriate.</td>
<td>New initiative</td>
<td>Not yet started</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Corporate Affairs, Human Resources</td>
<td>A diverse pool of potential spokespeople is media-trained and in contact with Enterprise and in-Business Communication Managers by 1 July 2020.</td>
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</table>
### Aim 1.3 Enabling mechanisms

<table>
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<tr>
<th>Rationale</th>
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<th>Progress to date</th>
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<th>Measurable Outcome</th>
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<tbody>
<tr>
<td><strong>Find in CSIRO SAGE Bronze Application Section 5.4(i)</strong></td>
<td>1.3(i)</td>
<td>Each BU creates an annual Diversity and Inclusion Award to recognise outstanding work in the areas of Diversity and Inclusion, or impact arising from diverse teams, and each award winner becomes a finalist in an Enterprise-wide D&amp;I Award on awards night.</td>
<td>New initiative</td>
<td>Not yet started</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Human Resources</td>
<td>An annual CSIRO Diversity and Inclusion Award is launched at the 2019 CSIRO Awards.</td>
</tr>
<tr>
<td><strong>Find in CSIRO SAGE Bronze Application Section 5.4(ii)</strong></td>
<td>1.3(ii)</td>
<td>CSIRO's Chief Executive provides quarterly Diversity and Inclusion updates via his blog to staff, sharing success stories, and giving an honest assessment of progress.</td>
<td>Builds on existing initiative</td>
<td>CSIRO's Chief Executive is a Male Champion of Change and has committed to this action.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, CSIRO's Chief Executive, Corporate Affairs</td>
<td>Quarterly updates are provided to staff beginning in first quarter 2018.</td>
</tr>
<tr>
<td><strong>Find in CSIRO SAGE Bronze Application Section 5.4(iii)</strong></td>
<td>1.3(iii)</td>
<td>Broaden understanding of the impact of historical diversity within CSIRO's workforce by commissioning and taking around to large sites an art/science installation to be launched in Canberra during National Science Week 2019, where the historical faces of CSIRO (e.g. portraits from walls) are interspersed with faces that were less visible at the time. The art installation will be accompanied by a</td>
<td>New initiative</td>
<td>Not yet started</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Corporate Affairs, History of CSIRO Project Team (Tom Spurling), CSIRO Publishing</td>
<td>Launch of the art installation, film, and booklet during National Science Week 2020.</td>
</tr>
<tr>
<td>Rationale</td>
<td>ID</td>
<td>Action</td>
<td>Status</td>
<td>Progress to date</td>
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<td>rectify the historical gender imbalance in a symbolic way.</td>
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<tr>
<td>Find in CSIRO SAGE Bronze Application Section 6(iii)</td>
<td>1.3(iv)</td>
<td>If not already present, ensure that there is at least one unisex toilet/bathroom in every CSIRO building, and unisex facilities are explicitly considered during building refurbishments, site consolidations, and new builds. Take an &quot;if not, why not&quot; approach.</td>
<td>New initiative</td>
<td>Not yet started.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, CSIRO Business &amp; Infrastructure Services, Pride@CSIRO</td>
<td>Every CSIRO building has at least one unisex toilet/bathroom by 2022.</td>
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<td>In SAGE focus groups, transgender staff spoke about their gender being challenged when they tried to use bathrooms matching their gender. A strong recommendation from the LGBTI+ focus group was that each CSIRO building should offer unisex toilets.</td>
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<tr>
<td>Find in CSIRO SAGE Bronze Application Section 6(iii)</td>
<td>1.3(v)</td>
<td>Simplify and make more inclusive systems for transgender or non-binary gendered staff, ensure that CSIRO meets or exceeds Australian Guidelines.</td>
<td>Builds on existing initiative</td>
<td></td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Human Resources, Pride@CSIRO</td>
<td>CSIRO meets or exceeds Australian standards with respect to gender identification by December 2018.</td>
</tr>
<tr>
<td>Transitioning and transgender staff at CSIRO have reported frustration with a HR system where gender can be defined only as male, female, or other, whereas Australian Guidelines recommend M (male), F (female) or X (Indeterminate/Intersex/Unspecified).</td>
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<tr>
<td>Find in CSIRO SAGE Bronze Application Section 7(iii)</td>
<td>1.3(vi)</td>
<td>CSIRO resources a number of activities to demonstrate strong and visible support for its LGBTI+ community.</td>
<td>New initiative</td>
<td></td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Corporate Affairs, Pride@CSIRO</td>
<td>The membership of Pride@CSIRO increases as staff feel supported to bring their whole selves to work.</td>
</tr>
<tr>
<td>In SAGE focus groups, LGBTI+ staff at CSIRO were over-represented in comments relating to experiencing overt discrimination, bullying, and unconscious bias from their colleagues. By running a booth at the 2018 Mardi Gras Fair Day; supporting its staff to march in the 2019 Mardi Gras Parade under the banner &quot;Science is Fabulous&quot;; celebrating Wear It Purple Day; and, making ALLY pins widely available, CSIRO will send a strong signal to its LGBTI+ staff in particular, and to all staff, that CSIRO supports people bringing their whole selves to work each day. Providing resources for internal and external workshops, speakers, and other activities to increase capability and awareness is another way CSIRO can support its LGBTI+ community.</td>
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**Table Notes:**
- **Aim 1.3 Enabling mechanisms**
- **ID**
- **Action**
- **Status**
- **Progress to date**
- **Responsibility**
- **Measurable Outcome**

**Rationale:**
- rectify the historical gender imbalance in a symbolic way.
- Find in CSIRO SAGE Bronze Application Section 6(iii)
  - In SAGE focus groups, transgender staff spoke about their gender being challenged when they tried to use bathrooms matching their gender. A strong recommendation from the LGBTI+ focus group was that each CSIRO building should offer unisex toilets.

**Action:**
- If not already present, ensure that there is at least one unisex toilet/bathroom in every CSIRO building, and unisex facilities are explicitly considered during building refurbishments, site consolidations, and new builds. Take an "if not, why not" approach.

**Status:**
- New initiative

**Progress to date:**
- Not yet started.

**Responsibility:**
- SAGE SAT, Diversity & Inclusion Team, CSIRO Business & Infrastructure Services, Pride@CSIRO

**Measurable Outcome:**
- Every CSIRO building has at least one unisex toilet/bathroom by 2022.

**Find in CSIRO SAGE Bronze Application Section 6(iii)**
- Simplify and make more inclusive systems for transgender or non-binary gendered staff, ensure that CSIRO meets or exceeds Australian Guidelines.

**Find in CSIRO SAGE Bronze Application Section 7(iii)**
- CSIRO resources a number of activities to demonstrate strong and visible support for its LGBTI+ community.

**Responsibility:**
- SAGE SAT, Diversity & Inclusion Team, Corporate Affairs, Pride@CSIRO

**Cost:**
- Moderate

**Effort:**
- High

**Impact:**
- High

**Find in CSIRO SAGE Bronze Application Section 6(iii)**
- Simplify and make more inclusive systems for transgender or non-binary gendered staff, ensure that CSIRO meets or exceeds Australian Guidelines.

**Find in CSIRO SAGE Bronze Application Section 7(iii)**
- CSIRO resources a number of activities to demonstrate strong and visible support for its LGBTI+ community.

**Responsibility:**
- SAGE SAT, Diversity & Inclusion Team, Corporate Affairs, Pride@CSIRO

**Cost:**
- Moderate

**Effort:**
- High

**Impact:**
- High
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<th>Rationale</th>
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<tbody>
<tr>
<td>Find in CSIRO SAGE Bronze Application Section 7(i)</td>
<td>1.3(vii)</td>
<td>CSIRO supports the Pride@CSIRO network in submitting an application to the Australian Workplace Equity Index in 2018.</td>
<td>New initiative</td>
<td>The Pride@CSIRO has begun to organise teams to lead this work.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Pride@CSIRO</td>
<td>CSIRO is benchmarked against the Australian Workplace Equity Index in 2018, and acts on negative findings.</td>
</tr>
<tr>
<td>Find in CSIRO SAGE Bronze Application Section 7(iii)</td>
<td>1.3(viii)</td>
<td>CSIRO supports site-based celebrations on key National days of recognition.</td>
<td>Builds on existing initiative</td>
<td>In 2017, CSIRO supported site-based celebrations of International Women’s Day, Wear It Purple Day, and National Reconciliation Week.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Site and Business Unit leaders, Corporate Affairs, D&amp;I networks, site Social Clubs, CSIRO Staff Association</td>
<td>A regularly-updated calendar of upcoming D&amp;I events is available on the CSIRO intranet by December 2018 that includes both events being celebrated at CSIRO, and other dates that individual sites or groups may wish to celebrate locally. 2. A minimum of three all-site celebrations are held each year beginning in 2018.</td>
</tr>
<tr>
<td>Find in CSIRO SAGE Bronze Application Section 7(iii)</td>
<td>1.3(ix)</td>
<td>Change the colour of CSIRO’s electronic logo to represent the National days of recognition that are being celebrated across all CSIRO sites (i.e. red, black, yellow, green, blue and white during National Reconciliation week, purple on Wear It Purple Day, and purple, green and white on International Women’s Day).</td>
<td>New initiative</td>
<td>In 2017, CSIRO used a purple logo on hard-copy promotional material for Wear It Purple Day, and a rainbow logo for the 2018 Mardi Gras Fair Day. Preliminary discussions now underway to assess the logistics and feasibility of changing the electronic logo on CSIRO’s external landing page, and on the internal MyCSIRO landing page in 2018.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Corporate Affairs, IM&amp;T</td>
<td>A decision is made by March 2018, and, if yes, implemented on the first National Day of Recognition celebrated in 2018.</td>
</tr>
<tr>
<td>Find in CSIRO SAGE Bronze Application Section 8(iii)</td>
<td>1.3(viii)</td>
<td>Pilot an Indigenous Artist in Residence program at one CSIRO site</td>
<td>New initiative</td>
<td>Not yet started.</td>
<td>Responsibility:</td>
<td>The pilot is launched during Reconciliation Week 2019, and...</td>
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<td><strong>Aim 1.3 Enabling mechanisms</strong></td>
<td>Rationale</td>
<td>ID</td>
<td>Action</td>
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<td>Visibly celebrating the indigenous history of CSIRO sites in a way that integrates the science on that site will provide a powerful symbol that CSIRO strongly values the contributions made by Aboriginal and Torres Strait Islander staff past and present. This can be done by working with local Aboriginal and Torres Strait Islander artists to both share the site’s indigenous heritage, and interpret and integrate the science on site by painting a mural on a prominent external wall.</td>
<td>(Waite), with a view to expanding to other key sites.</td>
<td></td>
<td></td>
<td></td>
<td>SAGE SAT, Diversity &amp; Inclusion Team, Indigenous Engagement Implementation Committee.</td>
<td>evaluation complete by 2022.</td>
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<tr>
<th><strong>Circuit Breakers</strong></th>
<th><strong>Aim 2.1 Understand and Expand our pool</strong></th>
<th>Rationale</th>
<th>ID</th>
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<tr>
<td>Find in CSIRO SAGE Bronze Application Section 4.1(i)</td>
<td>CSIRO is below both all-sector and academic/research sector percentage employment of STEMM PhD-qualified (or industry equivalent) females across a majority of its Business Units, particularly with increasing seniority. This suggests that “the females are out there”, but are either not attracted to CSIRO, or are less likely to be hired. Evaluating CSIRO’s Employee Value Proposition in the context of what is appealing to STEMM-qualified females will facilitate better and more targeted external messaging of what CSIRO has to offer.</td>
<td>2.1(i)</td>
<td>Assess CSIRO’s Employee Value Proposition against what domestic and international STEMM-qualified women are looking for, and identify opportunities to broaden appeal to a diversity of candidates.</td>
<td></td>
<td></td>
<td>SAGE SAT, Diversity &amp; Inclusion Team, Human Resources</td>
<td>1. Review CSIRO’s current Employee Value Proposition results by gender, and identify any gender-specific differences. If the existing assessment does not include benchmarking against the academic/research sector, or cannot be segmented by gender, revisit the work to include this information. 2. Use this information to identify opportunities to improve CSIRO’s attractiveness to STEMM-qualified females.</td>
<td></td>
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</table>

<p>| Find in CSIRO SAGE Bronze Application Section 4.1(iv) | Whilst more males leave CSIRO by headcount, slightly more women do by percentage cohort. Even a small bias against women in percentage cohort can have a | 2.1(ii) | Understand why more women are leaving the organisation as a percentage of gender cohort via: 1) a review of the demographics of the voluntary redundancy list and confidential interviews; | | | SAGE SAT, Diversity &amp; Inclusion Team, Human Resources | A report outlining the reasons why more women are leaving the organisation as a percentage of gender cohort, and recommendations to mitigate (if needed) is complete by 1 July 2021. |</p>
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<tr>
<td>big impact in terms of already lower headcounts. Closer monitoring of the demographics and reasons for staff leaving will allow us to rapidly respond to areas where women appear to be disproportionately impacted.</td>
<td>2</td>
<td>a review checkpoint of proposed redundancies to assess whether one demographic is being particularly impacted, establishing more comprehensive exit survey and data collection, and; 3) assessment of the demographics of exiting staff on a six-monthly basis.</td>
<td>New initiative</td>
<td>Preliminary discussions for an &quot;opt out&quot; pilot are underway.</td>
<td>Impact: Moderate</td>
<td>Pilots and reviews are held as appropriate between 1 July 2019-1 July 2022.</td>
</tr>
<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.1(i)</td>
<td>2.1(iii)</td>
<td>Explore and test new ideas to diversify the pool of internal applications for jobs at CSIRO (e.g. &quot;opt out&quot; rather than &quot;opt in&quot; to consideration).</td>
<td>New initiative</td>
<td></td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Learning &amp; Development, Human Resources</td>
<td>Cost: Moderate</td>
</tr>
<tr>
<td>In SAGE focus groups, there was some evidence to suggest that women at CSIRO felt males were more strongly networked with other males, and that this led to reduced opportunities for them. Establishing a job shadowing program in the CSIRO Leadership Team will help women in CSIRO benefit from increased networks, as well as increase insight and awareness into the roles and responsibilities of leadership positions, with a view that this may encourage more women to apply for senior roles at CSIRO.</td>
<td>2.1(iv)</td>
<td>Extend CSIRO’s leader job-shadowing program to all CLT leaders to increase insight, awareness, and networks for women in CSIRO.</td>
<td>Builds on existing initiative</td>
<td>Some members of the CSIRO Leadership Team are already offering job shadowing opportunities.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, CSIRO Leadership Team, CSIRO Executive Team</td>
<td>Cost: Minimal</td>
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### Circuit Breakers

**Aim 2.1 Understand and Expand our pool**

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</table>
| Find in CSIRO SAGE Bronze Application Section 5.1(i)  
In SAGE focus groups, there was some evidence to suggest that women at CSIRO felt males were more strongly networked with other males, and that this led to reduced opportunities for them. Working with the Women on Boards network to support women in CSIRO to gain external Board positions will expand the external networks of women in CSIRO, as well as enhance their resumes for promotion opportunities within CSIRO or elsewhere. | 2.1(v) | Partner with the Women on Boards network to support females in CSIRO to nominate and gain external Board positions. | New initiative | Not yet started | Responsibility: SAGE SAT, Diversity & Inclusion Team  
Cost: Minimal  
Effort: Moderate  
Impact: Moderate | CSIRO has partnered with the Women on Boards network by 1 July 2019. |
| Find in CSIRO SAGE Bronze Application Section 5.1(i)  
Whilst it is difficult to determine whether CSIRO’s low rate of female research staff recruitment is due to CSIRO’s value proposition, or biases within our own system that disadvantage or discourage women, limited case study evidence suggests that very few women apply for leadership jobs at CSIRO. Making it easy for women to understand that CSIRO is actively diversifying and supporting a modern and flexible workforce, and directly link to current vacancies at CSIRO may increase the number of female applicants for jobs at CSIRO. | 2.1(vi) | Promote CSIRO as an employer of choice for women on the Diversity Careers’ Site. | New initiative | Complete | Responsibility: Human Resources  
Cost: Moderate  
Effort: Moderate  
Impact: Moderate | CSIRO became an endorsed employer for women on the Diversity Career’s site in November 2017. |
| Find in CSIRO SAGE Bronze Application Section 5.1(ii)  
Analysis of CSIRO’s promotion data from the past three years suggests that female research staff, and male professional & service staff (both under- | 2.1(vii) | More deeply understand the differences in percentage gender cohort applying for promotions at CSIRO, and the slightly lower success rate for women. Implement mitigation | New initiative | Not yet started | Responsibility: SAT, Diversity & Inclusion Team, Human Resources  
Cost: Minimal  
Effort: High | 1. An information gathering and assessment process across demographics is undertaken in the 2018 and 2019 promotion periods to understand if there are any differences in who feels supported and encouraged by |
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<td>represented in those functional areas) are both less likely to apply for a promotion than males, and slightly less likely to be successful. A deeper investigation into why relative minorities are less likely to apply for a promotion, and slightly less likely to be successful, will allow CSIRO to develop targeted mitigation strategies.</td>
<td>2.1(iii)</td>
<td>Run a campaign including all staff communications, and work with Human Resources and front-line leaders to establish clear guidelines and expectations to support staff who are employed part-time to apply for promotions.</td>
<td>New initiative</td>
<td>For the past two years, HR has offered promotion and reward training, which includes encouragement for part-time to apply for promotion.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Human Resources, Corporate Affairs</td>
<td>Impact: High</td>
</tr>
<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.2(ii)</td>
<td>2.1(ix)</td>
<td>Investigate whether the data showing gender-disparity in the number of development days requested has an impact on staff.</td>
<td>Not yet started</td>
<td></td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Learning &amp; Development Team, Human Resources</td>
<td>Cost: Minimal Effort: Minimal Impact: Moderate</td>
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<td>Although we do not know how many development days staff use each year, the average number of such days approved for males and female staff differ, and males on average request more days than females. This suggests that there is not a standardised understanding of how many days are available to each staff member to use for career and personal development. It may also reflect that women are less likely to “ask for more” than men.</td>
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<td>2.1(x)</td>
<td>1. Design and roll out unconscious bias training to raise awareness of the multiple types of unconscious biases that can influence the way we perceive (and limit) ourselves as</td>
<td>Builds on existing initiative</td>
<td></td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Learning &amp; Development Team, Human Resources</td>
<td>Cost: Minimal Effort: Minimal Impact: Moderate</td>
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<td>Find in CSIRO SAGE Bronze Application Section 5.2(ii)</td>
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<td>Entry level female leaders may be under-rating their own capabilities at CSIRO, which might</td>
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<td>be another factor in their willingness to opt in to leadership roles (potentially with good reason as Research Directors on average rate male Group Leaders higher than female Group leaders). Both of these can indicate unconscious biases, and suggest that broad unconscious bias training may have long-term positive outcomes at CSIRO.</td>
<td></td>
<td>well as others, and offer practical mitigation strategies. 2. Expand and embed unconscious bias learning in CSIRO's current leadership and team curriculum.</td>
<td></td>
<td>and development programs contain some information about unconscious bias. Human Resource promotion and reward training includes practical mitigation strategies.</td>
<td>Effort: High Impact: High</td>
<td>embedded in CSIRO's leadership and team curriculum by 30 June 2019.</td>
</tr>
<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.2(iii)</td>
<td>2.1(xi)</td>
<td>Encourage a mentoring culture by recognising and rewarding the value that mentors bring to the organisation. Facilitate mentor-mentee relationships by developing online tools to match mentors to mentees, provide training for mentors and mentees, including that it's okay if any given match does not gel, and share success stories.</td>
<td>Builds on existing initiative</td>
<td>An assessment of what mentoring programs currently exist and work at CSIRO, what has been tried but found not to work, and how other large companies encourage a mentoring culture is underway.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Organisational Development &amp; Culture, Human Resources, in-Business Diversity &amp; Inclusion Teams, Learning &amp; Development, Corporate Affairs Cost: Minimal Effort: Moderate Impact: High</td>
<td>1. Review and implement recommendations from the mentoring assessment by 2019; 2. An improvement in the number of staff who feel that they have access to a mentor is seen in the next all-staff survey at CSIRO.</td>
</tr>
<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.2(ii)</td>
<td>2.1(xii)</td>
<td>Investigate why more men as a percentage of gender cohort are attending international conferences per year, and also that the average male is more likely to attend at least one international conference/visit per year than the average female. This pattern holds for research staff as well as the professional and service staff cohort (and the differences are greater in the latter groups).</td>
<td>New initiative</td>
<td>Not yet started</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Business Units Cost: Minimal Effort: Moderate Impact: Moderate</td>
<td>By 2022, there is no gender disparity in international conference attendance.</td>
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<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.2(ii)</td>
<td>2.1(xiii)</td>
<td>Foster a speaking-up culture at CSIRO by 1. Re-run the Speaking up in CSIRO survey (last run in 2013), to measure the extent to which staff currently feel it is safe to speak up in CSIRO; 2. Speak with staff to understand what feeling safe to speak looks like for them and act on common themes; 3. Run a Speaking Up campaign (including making clear the collateral damage of not doing anything).</td>
<td>Builds on existing initiative</td>
<td>Not yet started</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Organisational Development &amp; Change, Human Resources, Corporate Affairs</td>
<td>Results and recommendations are made to the CSIRO Executive Team by December 2020.</td>
</tr>
<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.1(viii)</td>
<td>2.1(xiv)</td>
<td>Work with CSIRO’s Human Resources to increase the attractiveness of management positions in CSIRO by reviewing the scope of jobs, and mitigate the impact on the science careers of research staff in management positions.</td>
<td>Builds on existing initiative</td>
<td>In progress</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Organisational Development &amp; Culture Team, Human Resources</td>
<td>Revised job scopes and roles are tested against staff across focus group demographics by 2020.</td>
</tr>
<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.4(xi)</td>
<td>2.1(xv)</td>
<td>1. CSIRO liaises with boys’ schools to match female STEMM role models with those schools for the Scientists in Schools program during National Science Weeks; 2. CSIRO assesses the potential to develop a ‘girls in STEMM/entrepreneurship’ secondary education program.</td>
<td>Builds on existing initiative</td>
<td>Preliminary discussions have been held between the SAGE Project Team and the Education &amp; Outreach team.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, CSIRO Education &amp; Outreach, Corporate Affairs</td>
<td>1. Work with Education &amp; Outreach to partner outreach volunteers who are from diverse backgrounds with schools who don’t have a diverse student body (e.g. women into private all boys schools) in 2019. Collect data to ascertain whether the partnership has had an impact</td>
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<td>aimed at supporting girls in STEMM, there are some niche markets where CSIRO Education &amp; Outreach could make a meaningful contribution.</td>
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<td><strong>Find in CSIRO SAGE Bronze Application Section 5.4(xi)</strong></td>
<td>2.1(xvi)</td>
<td>Develop a CSIRO Pack for staff to hand out at events where they are engaging with students, including a how-to guide to overcome commonly experienced barriers for girls and women when continuing science education, and transitioning to a career in STEMM.</td>
<td>New initiative</td>
<td>Not yet started.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, CSIRO Education &amp; Outreach</td>
<td>The CSIRO pack is available to staff engaging in student outreach activities by 2021.</td>
</tr>
<tr>
<td><strong>Find in CSIRO SAGE Bronze Application Section 5.1(ii)</strong></td>
<td>2.1(xvii)</td>
<td>Develop and implement role-based induction for leaders.</td>
<td>Builds on existing initiative</td>
<td>Learning &amp; Development is piloting job-based entry level training for new Project Leaders in 2018, with a view to expansion to other management and leadership positions.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Learning &amp; Development</td>
<td>The new project leader training will be piloted in 2018. Following an evaluation, a decision to expand the approach to other leadership and management roles will be made by 2020.</td>
</tr>
<tr>
<td><strong>Find in CSIRO SAGE Bronze Application Section 5.1(i)</strong></td>
<td>2.1(xix)</td>
<td>Work with Business Units to identify domestic and international universities that have a good representation of female candidates in STEM disciplines of relevance to CSIRO, and target them to promote CSIRO as a great place to work.</td>
<td>Builds on existing initiative</td>
<td>Some Business Units are already taking this approach, but it is not consistently applied across all Business Units.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Business Units, Education &amp; Outreach</td>
<td>Each Business Unit has a list of Universities with high female representation in STEM disciplines relevant to their research, and an outreach and engagement plan by 2021.</td>
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<td>Targeting Universities with high female representation in disciplines relevant to CSIRO, to promote CSIRO as a great place to work, may raise our profile in key demographics, and increase the diversity of our candidate pool for jobs at CSIRO.</td>
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<td>High</td>
<td>The language used in CSIRO job advertisements is gender neutral, clear, and simple.</td>
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</table>
| Find in CSIRO SAGE Bronze Application Section 5.1(i)                     |    | Review CSIRO job advertisements to ensure the language is non-gendered, avoids jargon, clearly articulates the outcomes desired, and pares back the use of essential and desirable criteria. | New initiative | Not yet started   | Responsibility: SAGE SAT, Diversity & Inclusion Team, Human Resources, Business Units | Cost: Minimal  
Effort: Moderate  
Impact: High |
| 2.2(xx)                                                                 |    | Explore staff perceptions and experiences of ageism, and develop targeted actions to be included in CSIRO’s future application for a Silver SAGE Award. | New initiative | Not yet started   | Responsibility: SAGE SAT, Diversity & Inclusion Team, Human Resources | CSIRO’s Silver SAGE application contains data and actions targeting whether staff experience negative impacts relating to ageism at CSIRO. |
| Find in CSIRO SAGE Bronze Application Section 5.2(ii)                    |    | Gather data, and increase opportunities for staff from under-represented demographics to access on the job experience via acting roles, switch, mentoring, | New initiative | Not yet started   | Responsibility: SAGE SAT, Diversity & Inclusion Team, Human Resources, Learning & Development, Corporate Affairs | There is a measurable increase and uptake of stretch opportunities for under-represented staff by 2022. |
| 2.2(xxii)                                                                |    |                                                                                                                 |              |                  |                                                          |                                                                                  |
| Find in CSIRO SAGE Bronze Application Section 7(iii)                     |    |                                                                                                                 |              |                  |                                                          |                                                                                  |
### Circuit Breakers

#### Aim 2.1 Understand and Expand our pool

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<td>who is accessing stretch opportunities at CSIRO, and if there is gender disparity. Gathering data and acting on findings will address this gap.</td>
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<td>and internal secondments and stretch opportunities.</td>
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<td>Minimal Effort: High Impact: High</td>
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#### Aim 2.2 Neutralise the “Carers’ Penalty”

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<tbody>
<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.1(i)</td>
<td>2.2(i)</td>
<td>Change assessment criteria for rewards and promotions to be role-based output by number of days worked each year (i.e. full-time equivalent in role).</td>
<td>New initiative</td>
<td>A pilot is being run with the Science Excellence Team for internal grant applications.</td>
<td>SAGE SAT, Diversity &amp; Inclusion Team, Human Resources, Science Excellence</td>
<td>Results of the pilot are assessed by 1 July 2019, and any associated recommendations are rolled out across the organisation.</td>
</tr>
<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.2(i)</td>
<td>2.2(ii)</td>
<td>1. Pilot a CSIRO Caring Voucher scheme to support staff with caring responsibilities. On presentation of a receipt, staff with caring responsibilities will be refunded 75% of two days’ care to facilitate their uptake of a career opportunity (i.e. training, conference attendance). 2. Incorporate a mechanism for staff to request carer support for training, internal conferences, and other development opportunities as a default in Client Central invitations.</td>
<td>New initiative</td>
<td>Not yet started</td>
<td>SAGE SAT, Diversity &amp; Inclusion Team, Business Units, Information Management &amp; Technology</td>
<td>A pilot of CSIRO Caring Vouchers is implemented during the 2019-2020 financial year, monitored, and recommendations made to retain, expand, or change by December 2020.</td>
</tr>
<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.2(i)</td>
<td>2.2(iii)</td>
<td>Develop and pilot an entry-level leadership non-residential program in an online and virtual format.</td>
<td>New initiative</td>
<td>An online and virtual format of the “Ready to Lead” residential program has been developed and</td>
<td>Learning &amp; Development</td>
<td>An evaluation and extension of the program/concept is complete by 2020.</td>
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</tbody>
</table>
### Aim 2.2 Neutralise the “Carers’ Penalty”

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<tr>
<th>Rationale</th>
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<tr>
<td>Hours, but this is not always inclusive of staff with child caring responsibilities. Utilising web-based and virtual technology to develop new ways to deliver the course material will improve accessibility for people with carer responsibilities, people at remote locations, and generally increase accessibility and throughput across CSIRO.</td>
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<tr>
<td><strong>Find in CSIRO SAGE Bronze Application Section 5.3(v)</strong></td>
<td>2.2(iv)</td>
<td>Explore the feasibility for CSIRO to offer equal parental leave for males and females = 18 weeks total, irrespective of gender.</td>
<td>Builds on existing initiative</td>
<td>A feasibility assessment is currently underway.</td>
<td><strong>Responsibility:</strong> SAGE SAT, Diversity &amp; Inclusion Team, Finance, Human Resources</td>
<td>A feasibility assessment and formal business case is complete by December 2018, and a decision made by March 2019.</td>
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<tr>
<td>CSIRO should set an aspirational target to meet best practice for parental leave, which is to offer equal parental leave irrespective of gender. This will provide male parents the same opportunities as female parents. Furthermore, this will neutralise the unconscious bias against “ticking biological clocks”.</td>
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<tr>
<td><strong>Find in CSIRO SAGE Bronze Application Section 5.3(vi)</strong></td>
<td>2.2(v)</td>
<td>Implement and accelerate uptake of default flexible working practices at CSIRO.</td>
<td>Builds on existing initiative</td>
<td>CSIRO introduced “Balance”, a default flexible working initiative on 1 July 2017. CSIRO’s 2017 staff survey indicated particular minority demographics who have rated their access to flexibility below all staff average. Next steps will be to undertake a targeted information-gathering process.</td>
<td><strong>Responsibility:</strong> SAGE SAT, Diversity &amp; Inclusion Team, Balance Implementation Team</td>
<td>Next staff survey indicators for flexible working across the organisation remain above benchmark, and the indicators for minority demographic access to flexible working improves from the 2017 survey to match that from all staff.</td>
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<td>As a part of the SAGE process, CSIRO identified that introducing an “all roles flex” initiative would help to increase equitable access to flexible working conditions, as well as normalise flexible working arrangements irrespective of gender. Implementation of this initiative was accelerated through its inclusion in the Male Champions of Change Action Plan, and it was rolled out across the organisation on 3 July 2017. Monitoring uptake and impact of flexible working practices by gender, and understanding where staff are not accessing flexible practices is a next step in normalising flex work across genders.</td>
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<tr>
<td><strong>Find in CSIRO SAGE Bronze Application Section 5.3(vii)</strong></td>
<td>2.2(vi)</td>
<td>Assess the feasibility of extending salary sacrifice arrangements for childcare to non-CSIRO care centres.</td>
<td>Builds on existing initiative</td>
<td>A feasibility assessment is currently underway.</td>
<td><strong>Responsibility:</strong> SAGE SAT, Diversity &amp; Inclusion Team, Human Resources, Finance</td>
<td>An assessment of the feasibility of extending salary sacrifice arrangements for childcare to non-CSIRO care centres has been completed by 30 June 2018.</td>
</tr>
<tr>
<td>CSIRO allows staff to salary sacrifice CSIROCare fees, but this does not apply to non-CSIRO care centres, and there are only three of those across 59 sites. CSIRO could assess the feasibility of salary sacrificing childcare, irrespective of the centre, to support our staff through the financial hardship and anxiety.</td>
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### Aim 2.2 Neutralise the “Carers’ Penalty”

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<td>(that may, in turn, reduce productivity at work) that comes during these years.</td>
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<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.3(viii)</td>
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<td>CSIRO offers quiet rooms for carers on many sites, but these are not always known to general staff. In SAGE focus groups, some female staff who were breastfeeding described expressing milk in their offices with the windows papered over, first aid rooms, and toilets, because there was nowhere to go. Providing comfortable and private carer rooms on all sites, and mapping where they are across CSIRO sites will allow staff to more easily access these facilities, as well as know what facilities are on other sites during travel.</td>
<td>2.2(vii)</td>
<td>Commit to providing comfortable and private carer rooms on all sites, map their location, and make easily available to staff on the intranet.</td>
<td>New initiative</td>
<td>This is an active project for CSIRO Business and Infrastructure Services.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, CSIRO Business and Infrastructure Services.</td>
<td>A map of bookable carer rooms across CSIRO sites is accessible to staff on the intranet by December 2018.</td>
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<td>Find in CSIRO SAGE Bronze Application Section 5.3(ix)</td>
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<td>Some types of unanticipated care can cause short-term high-level distress. With an ageing workforce, which in turn means increased chances of emergency care for elderly parents or spousal care due to illness, it is timely to consider how CSIRO can support carers at times of high distress and need.</td>
<td>2.2(viii)</td>
<td>Assess the needs of carers in distress with a view to providing recommendations for support mechanisms that staff feel confident and comfortable accessing.</td>
<td>New initiative</td>
<td>Not yet started</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Human Resources, Health, Safety &amp; Environment</td>
<td>Recommendations for support mechanisms for carers in distress are developed by December 2020.</td>
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<td>Find in CSIRO SAGE Bronze Application Section 5.3(i)</td>
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<td>In SAGE focus groups and other staff engagement activities, female staff described variable experiences with respect to planning discussions with their line managers, knowledge about their entitlements, and their return to work. Resources are available on line, but currently there is no hard-copy material sent to staff taking maternity and parental leave that is consistent for everyone.</td>
<td>2.2(ix)</td>
<td>Develop a “goodie bag” for staff taking parental leave, including information on leave entitlements, planning tools, and a small gift. Managers receive the same, but without the gift.</td>
<td>New initiative</td>
<td>Not yet started</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Human Resources</td>
<td>CSIRO’s maternity and parental “goodie bag” is being sent to all staff planning to take maternity and parental leave by January 2019.</td>
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<td>Find in CSIRO SAGE Bronze Application Section 5.1(i)</td>
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<td>CSIRO staff with families have noted that they find it difficult to maintain productivity during school holidays, in part due to a lack of</td>
<td>2.2(x)</td>
<td>Pilot affordable vacation care on CSIRO’s Lindfield site in 2018.</td>
<td>New initiative</td>
<td>Staff on CSIRO’s Lindfield site are exploring options to pilot vacation care on-site in 2018.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Human Resources, Health, Safety &amp; Environment</td>
<td>The pilot is run in 2018, and assessed within 6 months with respect to whether to offer again on the Lindfield site, and at other sites.</td>
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### Aim 2.2 Neutralise the “Carers’ Penalty”

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<td>affordable and convenient vacation care. Senior Managers at CSIRO have also noted that productivity falls during these periods and staff are away from work more frequently to care for children during the holidays. Exploring how CSIRO might facilitate access to affordable vacation care may alleviate these issues.</td>
<td></td>
<td>Work with CSIROCare facilities and CSIRO Business and Infrastructure Services to ensure that facilities are fit for purpose to meet demand from CSIRO families.</td>
<td>Builds on existing initiative</td>
<td>In progress.</td>
<td>Environment, CSIRO Business &amp; Infrastructure Services.</td>
<td>The pilot is run in 2018, and assessed within 6 months with respect to whether to offer again on the Lindfield site, and at other sites.</td>
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</table>

**Find in CSIRO SAGE Bronze Application Section 5.1(i)**
At least one CSIROCare facility has identified that it needs to expand to meet demand from CSIRO families, most particularly in the nursery room.

### Aim 2.3 Remove systemic barriers to workforce diversification

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<tr>
<td>Understanding the extent to which existing policies and procedures limit CSIRO’s intention to diversify its workforce will allow an evidence-based assessment of whether they are fit for purpose, or need to be renegotiated in the next round of Enterprise Bargaining. Furthermore, establishing a standing review of rewards and promotions policies, procedures and frameworks will ensure that CSIRO can be responsive to cutting edge best practice, as well as staff feedback on how existing policies are impacting their careers at CSIRO.</td>
<td></td>
<td>Establish a standing review of current policies and procedures ahead of each Enterprise Bargaining Agreement to ensure that they meet current best practice with respect to Diversity &amp; Inclusion, and do not unintentionally inhibit CSIRO’s ability to diversify its workforce.</td>
<td>New initiative</td>
<td>Not yet started</td>
<td>SAGE SAT, Diversity &amp; Inclusion Team, Human Resources, CSIRO Enterprise Bargaining Team, CSIRO Staff Association</td>
<td>Recommendations have been prepared and submitted for negotiation as part of CSIRO’s Enterprise Bargaining Agreement process, nominally in late 2020.</td>
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<td>Rationale</td>
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<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.1(i)</td>
<td>2.4(i)</td>
<td>Provide comprehensive information and guidelines regarding information about CSIRO’s flexible working conditions on all job advertisements.</td>
<td>Builds on existing initiative</td>
<td>Complete</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Balance Implementation Team</td>
<td>All job advertisements at CSIRO now contain the wording: We work flexibly at CSIRO, offering a range of options for how, when and where you work. Talk to us about how this role could be flexible for you. Find out more! A link to further information is included.</td>
</tr>
<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.1(i)</td>
<td>2.4(ii)</td>
<td>Formally include in assessment criteria for recruitment panels: &quot;What is best for team diversity?&quot;</td>
<td>New initiative</td>
<td>Not yet started</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Human Resources</td>
<td>Explicit consideration of &quot;What is best for team diversity&quot; is added as a formal step to the recruitment process by 1 July 2018.</td>
</tr>
<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.1(i)</td>
<td>2.4(iii)</td>
<td>Develop and promote good practice recruitment guidelines that includes independent representation (i.e. someone from a different Business Unit), gender-balance, and cultural diversity. Ensure that recruitment panels fully understand CSIRO’s KPIs, and D&amp;I aspirations, and the role they play in meeting those.</td>
<td>New initiative</td>
<td>Not yet started</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Human Resources</td>
<td>Good practice recruitment guidelines, including clear explanations of CSIRO’s KPIs and aspirations around D&amp;I are disseminated by December 2019.</td>
</tr>
<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.4(iv)</td>
<td>2.4(iv)</td>
<td>Run a communication campaign about the SAP and outlook tools staff can use to remind colleagues about their scheduled working hours if non-core, school holidays, and other regular events when meetings and other activities are being scheduled.</td>
<td>Not yet started</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, IM&amp;T</td>
<td>Work with IM&amp;T to ensure that tools are simple to use, and clear instructions are available by August 2018. Communicate to staff in September 2018.</td>
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### Aim 2.4 Enabling mechanisms

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<tr>
<td>maximise inclusive planning where possible. An organisation-wide technical solution would not be workable, but there are simple tools staff can proactively implement to let their colleagues know their working hours.</td>
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<td>Find in CSIRO SAGE Bronze Application Section 7(i)</td>
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<td>Whilst CSIRO has sought to educate staff about bullying and harassment via mandatory e-learning modules, it is clear that further work needs to be done in this space. Furthermore, we need to increase awareness that despite the majority of our staff being accepting of difference in their colleagues, some of our LGBTI+ and NESB staff are subject to conscious discrimination and/or unconscious bias, and impacted individuals do not always feel confident that raising a grievance will lead to a positive outcome for them.</td>
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<td>2.4(v)</td>
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<tr>
<td>Develop and disseminate blended learning resources (a combination of face-to-face and e-learning) to reinforce staff understanding of the legal discrimination framework, bullying, and harassment legislation and guidelines.</td>
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<td></td>
<td>Builds on existing initiative</td>
<td>Not yet started</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team</td>
<td>Training is updated by December 2020.</td>
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### Attainable Targets

#### Aim 3.1 Set aspirational targets

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<tr>
<td>Find in CSIRO SAGE Bronze Application Section 4.1(i)</td>
<td>3.1(i)</td>
<td>Work with Business Units to develop relevant gender diversity benchmarks, set targets to exceed those benchmarks by 10% by 2030, and develop strategies to achieve them.</td>
<td>New initiative</td>
<td>As MCC, CSIRO’s Chief Executive has committed to “review, set and implement gender equality targets at all stages of recruitment and promotion of women across CSIRO” (see MCC 2017-2018 Action Group Plans). CSIRO’s Board has also set an Enterprise KPI to reach &gt;40% females short-listed for leadership positions by 30 June 2021.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Human Resources, CSIRO Executive, CSIRO Leadership Team</td>
<td>1. Identify the projected internal and external pipelines of STEMM-qualified females and model against CSIRO’s percentage recruitment and turnover; 2. Use results to set Business Unit-specific short-term incremental aspirational gender equity targets by April 2019; 3. Monitor and support Business Units to achieve targets.</td>
</tr>
<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.1(iii)</td>
<td>3.1(ii)</td>
<td>Work with Business Units to agree on an aspirational target for the proportion of female promotion cases to be submitted, with a long-term view to gender-</td>
<td>New initiative</td>
<td>Not yet started.</td>
<td>Responsibility: SAT, Diversity &amp; Inclusion Team, Human Resources, Business Units</td>
<td>1. Aspirational targets are agreed by December 2019; 2. A proportional increase in the number of women submitting applications for promotion is...</td>
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<td>Rationale</td>
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<td>the number of women submitting a case for promotion to exceed their proportional representation in each Business Unit will pull more women through to higher CSOF levels than current state.</td>
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<td>balance at the application step.</td>
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<td>Minimal Effort: High Impact: High</td>
<td>implemented in the 2020 promotion cases; 3. Monitor whether any increase in proportion of promotions for women compared to the data presented here.</td>
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<tr>
<td>Find in CSIRO SAGE Bronze Application Section 5.4(iii)</td>
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<td>Women are under-represented in leadership positions as a percentage of the theoretically-qualified internal cohort. This means that CSIRO is not pulling through its male and female staff in equal proportions. Aiming to achieve equal representation at every stage of the recruitment process for leadership roles will provide greater diversity within the pool of short-listed candidates, and increase the speed at which CSIRO diversifies its senior leadership team.</td>
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<td>3.1(iii) Beginning in 2019, work towards equal representation at every stage of the recruitment process for leadership roles with a long-term view to achieving equal numbers of men and women being appointed to new or vacant leadership positions.</td>
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<td>New initiative</td>
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<td>As MCC, CSIRO’s Chief Executive has committed to “review, set and implement gender equality targets at all stages of recruitment and promotion of women across CSIRO” (see MCC 2017-2018 Action Group Plans). CSIRO’s Board has also set an Enterprise KPI to reach &gt;40% females short-listed for leadership positions by 30 June 2021.</td>
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<td>Find in CSIRO SAGE Bronze Application Section 7(iii)</td>
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<td>During data analysis, it became clear that CSIRO does not have good insight into the needs of its staff with a disability. Assessing current state, and running disability focus groups with a view to developing a Disability Action Plan will enable CSIRO to take an evidence-based approach to meeting the needs of its staff.</td>
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<td>3.1(iv) Develop a Disability Action plan</td>
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<td>New initiative</td>
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<td>Human Resources has conducted a Disability Employment project, resulting in 11 key recommendations to progress CSIRO’s employment, celebration, and support of staff with a disability.</td>
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<td>In small group SAGE discussions, it was identified that CSIRO did not have a domestic and family violence policy and procedure. Since those discussions, such policies and procedures have been introduced. Becoming White Ribbon accredited will build on the new framework, to ensure that CSIRO best supports its staff who are impacted by domestic and family violence.</td>
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<td>3.1(v) Become White Ribbon accredited.</td>
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<td>Builds on existing initiative</td>
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<td>CSIRO staff can access to up to 10 days of paid leave per annum (pro-rata for part time staff &amp; unpaid leave for casual staff) to attend to matters arising from domestic and family violence affecting them or members of their immediate family or household. CSIRO’s Domestic and Family Violence policy and procedure is available to staff on CSIRO’s intranet. CSIRO’s Employee Assistance Program has implemented a domestic and family violence helpline to assist staff impacted by domestic and family violence.</td>
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<td><strong>Find in CSIRO SAGE Bronze Application Section 4.1(v)</strong></td>
<td>3.2(i)</td>
<td>Develop best practice pay equity model, implement within CSIRO via annual reviews, and promote to other STEMM institutions.</td>
<td>New initiative</td>
<td>Development of the model is complete, and targeted analyses are in progress to more deeply investigate job roles where a gender pay variance was identified, with a view to understanding the causes and drivers of the variance, and intervening where appropriate.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Human Resources, Data61, Information Management &amp; Technology Cost: Moderate Effort: High Impact: High</td>
<td>1. Work with CSIRO’s digital scientists and engineers to design and develop a best practice model of pay equity assessments; 2. Set up a cross-functional taskforce to identify factors that have a substantial impact on gender pay inequity (e.g. historical part-time work, negotiating “up”) and put forward recommendations to CSIRO’s Executive Team to mitigate if possible; 3. Iterate model to become a central repository to capture and link remuneration and advancement with output, demographic profile, APA objectives and assessment, and application and success for rewards and promotions; 4. Implement fully refined pay equity model by 1 July 2022; 5. Make results of annual analyses available to staff.</td>
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<tr>
<td><strong>Find in CSIRO SAGE Bronze Application Section 4.1(v)</strong></td>
<td>3.2(ii)</td>
<td>Compile prior work experience of Postdoctoral staff and compare to starting CSOF level to determine whether the trend for females to start on lower pay grades reflects prior experience or not. Address any inequities.</td>
<td>New initiative</td>
<td>Not yet started.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Human Resources Cost: Minimal Effort: Moderate Impact: High</td>
<td>1. Compile prior work experience of Postdoctoral staff and compare to starting COSF level by December 2018; 2. Rectify any inequities by 1 July 2019; 3. Design and implement frameworks if an as appropriate, depending on outcome of assessment.</td>
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### Aim 3.3 Leverage our existing diversity for impact

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<th>Rationale</th>
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<tr>
<td><strong>Find in CSIRO SAGE Bronze Application Section 5.4(i)</strong></td>
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<td>In research organisations, a response that is often heard for a cultural change is “what is the evidence that X is needed and will have the proposed outcome?” This question is entirely reasonable, but diversity and inclusion is a young field, and does not yet have robust representation in the scientific literature (although the business case is available in grey literature). Working with other SAGE and Male Champions of Change STEMM organisations, we propose that holding a conference every two years showcasing the latest science relating to Diversity and Inclusion will help to build the science case, and drive cross-organisational cultural change in a sometimes sceptical audience.</td>
<td>3.3(i)</td>
<td>CSIRO works with other SAGE and Male Champions of Change Organisations to co-sponsor a biennial Science of Diversity and Inclusion conference.</td>
<td>New initiative</td>
<td>Not yet started</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Corporate Affairs</td>
<td>Measurable Outcome: Inaugural conference held in 2020.</td>
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<td><strong>Find in CSIRO SAGE Bronze Application Section 7(i)</strong></td>
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<td>Male and female NESB staff expressed that writing grants and other formal documents was a significant source of stress for them, because they were working within the same time-lines as native English speakers, but took longer to write in English.</td>
<td>3.3(ii)</td>
<td>Provide targeted support and coaching in writing for staff from non-English backgrounds.</td>
<td>Builds on existing initiative</td>
<td>Writing support for non-English background staff is available but not widely known.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Learning &amp; Development</td>
<td>Measurable Outcome: 1. Identify internal support and training for grant writing with a focus on non-English speaking background by 2020; 2. Assess the feasibility of matching ESB staff with NESB staff as writing mentors by 2020; 3. Encourage internal assessment panels to focus on ideas in the first round, and if ideas are good, support refining the language if necessary by 2020; 4. If appropriate, support NESB staff to attend external English-writing courses by promoting vetted courses on the L&amp;D curriculum by 2020.</td>
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<td><strong>Find in CSIRO SAGE Bronze Application Section 7(i)</strong></td>
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<td>In SAGE focus groups, staff from non-English speaking backgrounds in non-research roles noted that their potential to provide cultural insight and networks for new markets and research projects was typically overlooked. Creating a diversity profile for the customers we work with and opening the conversation to be inclusive of all staff</td>
<td>3.3(iii)</td>
<td>Create a mechanism to consider a diversity value proposition for the customers we work with to leverage our existing diversity as a direct value proposition.</td>
<td>New initiative</td>
<td>Not yet started.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Business Development team, CSIRO Global, Human Resources EVP team</td>
<td>Measurable Outcome: Mechanism to assess diversity value proposition for customers to be available by 2021.</td>
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<td>Aim 3.3 Leverage our existing diversity for impact</td>
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<td>will better enable our existing workforce diversity to be leveraged as a direct value proposition.</td>
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<td>Find in CSIRO SAGE Bronze Application Section 7(iii)</td>
<td>3.3(iii)</td>
<td>Work with Science Excellence project to measure program innovation and impact, to quantify the diversity within each team, and cross-reference team diversity against innovation and impact metrics.</td>
<td>Builds on existing initiative</td>
<td>CSIRO's Science Excellence Team has begun an impact assessment project for research programs.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Science Excellence Team</td>
<td>Cost: Minimal Effort: High Impact: High</td>
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<tr>
<td>Find in CSIRO SAGE Bronze Application Section 7(iii)</td>
<td>3.3(iv)</td>
<td>Facilitation and coaching to support the co-creation of development plans for Aboriginal and Torres Strait Islander staff.</td>
<td>Builds on existing initiative</td>
<td>Coaching is available but not widely utilised.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Indigenous Engagement Implementation Committee, Learning &amp; Development</td>
<td>Cost: Moderate Effort: Moderate Impact: High</td>
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<tr>
<td>Find in CSIRO SAGE Bronze Application Section 8</td>
<td>3.3(vi)</td>
<td>Seek to attend an Aboriginal and Torres Strait Islander staff forum to establish a point of contact and engagement, with the aim to develop a future process of</td>
<td>Builds on existing initiative</td>
<td>Not yet started</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Reconciliation Action Plan Implementation Committee</td>
<td>Cost: Minimal Effort: High Impact: High</td>
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### Aim 3.3 Leverage our existing diversity for impact

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<tr>
<td>the SAGE team to better understand the intersection of gender and Aboriginal and Torres Strait Islander background on working at CSIRO.</td>
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<td>engagement that matches the needs and preferences of Aboriginal and Torres Strait Islander staff.</td>
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<td>Cost: Minimal</td>
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<td>Effort: Moderate</td>
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### Aim 3.4 Enabling mechanisms

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<tr>
<td>Find in CSIRO SAGE Bronze Application Section 2v.</td>
<td>3.4(i)</td>
<td>Identify and develop more relevant benchmarks to assess our performance in diversity and equity at CSIRO.</td>
<td>New initiative</td>
<td>1. MCC and SAGE are working together to develop a set of domestic STEMM benchmarks (see MCC 2017-2018 Action Group Plans); 2. We have identified several international organisations that CSIRO uses for internal benchmarking purposes and are seeking to establish relationships with their Diversity &amp; Inclusion Managers (or equivalent).</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Business Units, Human Resources</td>
<td>1. Benchmark against domestic STEMM metrics currently being developed by Male Champions of Change, when available; 2. Identify the international research organisations that are closest to CSIRO, develop a relationship with their D&amp;I Managers (or equivalent), and seek to share diversity metrics and best practice by December 2018.</td>
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<td>Find in CSIRO SAGE Bronze Application Section 3(iii)</td>
<td>3.4(ii)</td>
<td>Commit resources to the implementation of the Bronze Action Plan, assessment and monitoring of its impacts, and preparation of an Application for SAGE Silver accreditation.</td>
<td>Builds on existing initiative</td>
<td>SIRO's existing SAGE Project Manager is contracted until 2019. The Bronze Action Plan actions have been assessed for cost and feasibility, and endorsed by CSIRO's Executive Team.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Executive Team</td>
<td>CSIRO submits an application for a SAGE Silver Award when available and appropriate, demonstrating implementation and impact of the Bronze Action Plan.</td>
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<td>Find in CSIRO SAGE Bronze Application Section 4.(iv)</td>
<td>3.4(iii)</td>
<td>Develop a more robust process to engage with exiting staff to collect information upon exit, and when staff express that they would like to leave the organisation.</td>
<td>Builds on existing initiative</td>
<td>In 2017, CSIRO's Human Resources Team commenced a project to design a more comprehensive exit survey, and has engaged with the SAGE Project Team on this.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Human Resources</td>
<td>Exit surveys to be routinely offered by December 2019.</td>
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<td>Aim 3.4 Enabling mechanisms</td>
<td>Rationale</td>
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<td>Find in CSIRO SAGE Bronze Application Section 5.1(i)</td>
<td>It is difficult to determine whether CSIRO’s low rate of female research staff recruitment is due to CSIRO’s value proposition, or biases within our own system that disadvantage or discourage women. In order to target interventions appropriately, we need to understand the drivers.</td>
<td>3.4(iv)</td>
<td>Implement automated, de-identified demographic data collection at every stage of CSIRO recruitment.</td>
<td>New initiative</td>
<td>We are aware that Westpac collects demographic recruitment data in this way.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Human Resources, IM&amp;T</td>
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<td>Find in CSIRO SAGE Bronze Application Section 5.1(i)</td>
<td>CSIRO staff have requested easily accessible and regularly updated diversity metrics for each Business Unit. Currently, these metrics are available only to Human Resources staff for privacy reasons. Modifying the existing &quot;Diversity Dashboard&quot; to maintain individual privacy but provide useful metrics for interested staff will make progress in this area transparent and accountable.</td>
<td>3.4(v)</td>
<td>Create a live and regularly updated dashboard of diversity and inclusion metrics for each Business Unit, and update annually.</td>
<td>Builds on existing initiative</td>
<td>A Diversity Dashboard is available to CSIRO’s Human Resources staff, but not more widely.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Human Resources</td>
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<td>Find in CSIRO SAGE Bronze Application Section 5.1(iii)</td>
<td>A relatively large proportion of SAGE focus group comments related to uncertainty about the criteria, expectations, and procedures for promotion at CSIRO. Technical and professional staff in positions that had a CSOF ceiling also expressed frustration at seeing Research Scientist/Engineers able to grow their roles, an option that is not available to them.</td>
<td>3.4(vi)</td>
<td>Improve staff understanding of requirements for promotion, and increase uptake of rewards for staff at career ceilings.</td>
<td>Builds on existing initiative</td>
<td>CSIRO Human Resources has been offering webinar training for the past two years relating to promotions and rewards.</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team, Human Resources</td>
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<td>Rationale</td>
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<td>Find in CSIRO SAGE Bronze Application Section 5.4(i)</td>
<td>3.4(vii)</td>
<td>Strengthen and regularly communicate the business imperative for diversity and inclusion via ongoing targeted campaigns.</td>
<td>Builds on existing initiative</td>
<td>In progress</td>
<td>Responsibility: SAGE SAT, Diversity &amp; Inclusion Team</td>
<td>Prepare and communicate across the organisation a clear summary of the evidence base where diversity and inclusion initiatives have had a positive business and workplace impact, particularly within a STEMM environment by July 2019.</td>
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<td>Table 29: CSIRO Future Science Platforms (CSIRO 2017i, n.p.)</td>
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<td><strong>Active Integrated Matter</strong></td>
<td>Combining materials, robotics, processing and sensing technologies and autonomous science to lead ground-breaking advances at the interface of big data, advanced autonomous systems, and materials science. These inventions and advances will drive the i-manufacturing or manufacturing 4.0 revolution and put early adopter industries ahead of the competition.</td>
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<td><strong>Deep Earth Imaging</strong></td>
<td>In the future, Australia’s minerals, energy and water resources will come from far greater depths in the Earth and from deep offshore sources, but our ability to find and exploit these resources is limited by the deep and complex cover of sediments and weathered material that covers 80 per cent of Australia’s land mass. The science of Deep Earth Imaging will help us more precisely image subsurface rock properties to unlock the potential of this vast and relatively under-explored area.</td>
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<td><strong>Digiscape</strong></td>
<td>Digiscape is about harnessing the digital revolution for Australian farmers and land managers. We will solve multiple real-life knowledge shortfalls in the land sector simultaneously by building a common big data infrastructure that will support next generation decision making and transform agricultural industries and environmental action.</td>
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<td><strong>Environomics</strong></td>
<td>Environomics aims to reinvent how we measure and monitor ecosystem health, predict biodiversity responses to environmental change, manage biological resources, detect biosecurity threats and more. This next generation of environmental science will be based on genomics, phenomics, big data informatics and simulation.</td>
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<td><strong>Hydrogen Energy Systems</strong></td>
<td>Australia has access to vast energy resources through sun, wind, biomass, natural gas and coal, all of which can be used to produce hydrogen and/or the desired energy carrier compound. The fuel could be used domestically in transport, power generation and to offset more carbon-intensive resources, and Australia could also become a world-leading exporter of low emissions hydrogen.</td>
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<td><strong>Precision Health</strong></td>
<td>Australia’s current healthcare system is focussed on treating illnesses, but to keep up with our ageing population the focus needs to switch to keeping healthy people healthy. Through engagement with the community to understand their expectations and attitudes to a more tailored healthcare paradigm, and building on programs and developments already underway in the medical field, Precision Health will focus on creating an integrated platform that can be used to proactively manage a person’s health throughout the course of their life through highly tailored food, nutrition and lifestyle interventions.</td>
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<td><strong>Probing Biosystems</strong></td>
<td>A revolution in healthcare through devices and systems to obtain real-time information from living organisms about their health and well-being. This will lead to the ability to provide health and medical interventions that are timely, customised and highly specific. Innovative autonomous sensing technology also strengthen future biosecurity control for the nation.</td>
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<td><strong>Synthetic Biology</strong></td>
<td>Our Synthetic Biology Future Science Platform is positioning Australia to play a role in one of the fastest growing areas of modern science so that we can understand global developments and contribute to advances in areas including manufacturing, industrial biotechnology, environmental remediation, biosecurity, agriculture, and healthcare research.</td>
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F.7 Research Investment Process

**Science, Strategy, Investment and Impact Committee (SICOM) (From (CSIRO 2017))**

**Preamble**

The CSIRO Science, Strategy, Investment and Impact Committee (SICOM) is a sub-committee of the CSIRO Executive Team under the authority of the Chief Executive. CSIRO’s overall planning, investment and review processes are managed by the Deputy Chief Executive, who is the Chair of SICOM.

SICOM focuses at the Enterprise, Line of Business and Business Unit levels. It may, if necessary, consider matters below these levels to inform decision making and confirm alignment and integration of planning. Executive Directors and Business Unit Directors are however responsible for the management of their areas of accountability to deliver against SICOM agreed goals and key performance indicators.

SICOM operates on a consensus model. If a matter is not agreed by consensus the Committee Chair will refer the matter to the Chief Executive for consideration.

**Purpose**

The purpose of SICOM is to support the Executive Team (ET) to direct and control the Organisation’s strategic science, capability, capital, support and impact planning, investment and performance management.

In addition, the Committee will:

1. recommend to the ET specific investment options, preferably at strategic or concept stage;
2. oversight the science standing and preparedness of CSIRO;
3. oversight delivery against Business Unit impact and capability goals;
4. oversight delivery against Business Unit plans.
5. monitor and review organisational performance against strategic investment decisions and plans; and
6. provide advice on other matters related to science and innovation, as required.

**Specific responsibilities**

In respect of planning, investment and review, the Committee will:

1. **Strategic investment planning**
   - Oversight the overall medium to long term CSIRO investment profile to ensure balanced strategic science, capability and impact perspective, with a focus on the strategic alignment, financial sustainability and effective integration and coordination of the overall investment profile.
   - Make recommendations regarding:
     - broad science and impact direction of CSIRO’s investment profile including implications for Enterprise Services and
     - specific categories of investment and relative levels of investment.

2. **Capital and strategic procurement planning**
• Consider and make recommendations regarding CSIRO’s medium to long term strategic capital plan and strategic procurement, including the relative levels of investment in different classes of research and support infrastructure and the development of major facilities and precincts.

3. Investment process and operational planning

• Conduct a systematic investment process and translate medium term strategic priorities into investment decisions reflected in annual budgets and three-year budgets and operational plans:
  1. Articulate and effectively communicate to all stakeholders the principles/criteria for the development and consideration of investment cases;
  2. Identify specific measures to achieve strategic investment goals and address challenges;
  3. Evaluate and prioritise science, capability, support and capital investment cases to develop an overall integrated, strategically aligned investment profile for CSIRO.

• Make recommendations regarding:
  1. science and capability prioritisation for medium to long term investment;
  2. investment cases for Business Units including the objectives (deliverables), level and balance of investment with one to four year projection (not at transaction level), within context of the overall CSIRO investment profile, including:
    o funding assigned to supporting development of future platform capabilities of enterprise scale and significance;
    o funding applied for development of future capability required for sustained impact delivery, for national preparedness, and for development and support of science excellence; and
    o funding applied to internally operated competitive and discretionary schemes that otherwise support science excellence, capability, impact, collaboration, culture and diversity.
  3. conditions and arrangements that must be in place to support the investment and strategies to mitigate investment risks;
  4. level and form of co-investment in areas.

• Review and endorse Business Unit plans to ensure:
  1. integration and alignment with strategic investment decisions;
  2. transparency of the alignment between capability investment and strategic priorities; and
  3. coordination across CSIRO (i.e. a portfolio perspective to impact and capability priorities);

• Conduct annual recalibration at Business Unit level to identify areas for possible investment shifts (e.g. due to changed circumstances, etc.) and options should savings measures be required.

4. Advice
• Provide advice, as requested, on policy matters related to CSIRO’s science, strategy, investment and impact, including:
  1. the policy and investment implications of CSIRO’s potential involvement in major projects and government programs including recommendations regarding conditions for involvement in such programs;
  2. policies with respect to the responsible conduct of scientific research.

5. Review
• Monitor and evaluate performance against strategic and operational plans and related investments, at Line of Business level, to inform future planning and investment decisions; and make recommendations to the Executive responsible and/or ET, as appropriate.
• Maintain a portfolio view of the relevance and performance of Business Units, and make recommendations to the ET regarding the direction and operations of these.
• Monitor and evaluate the standing of CSIRO’s science and contribution to Australia’s national scientific capability; and monitor investments in scientific preparedness including the scientific breadth and depth required to deliver against Business Unit impact goals.

Major Transactions Committee (MTC) (From Purpose
The purpose of the Major Transactions Committee (MTC) is to support the Executive Team (ET) direct and control CSIRO’s involvement in major transactions and related matters and investment.

Specifically, the Committee will review and recommend to the Chief Executive major transactions that require approval by the Chief Executive or Board. If a transaction is not aligned strategically or involves broader policy, financial sustainability and coordination issues the Committee will refer the transaction to the ET for consideration.

Major transactions include:
• Commercial
• Procurement
• Capital (property and major equipment)

See Appendix below for further details.

Specific responsibilities
The Committee will:
• Make recommendations to the Chief Executive regarding major transactions and in doing so review:
  o Soundness of the commercial strategy;
  o Strategic alignment, including financial and capital implications;
  o Details of transaction;
  o Compliance with policy, standards and procedure; and
  o Risk mitigation strategies, including proposed management and financial controls.
• Provide advice and feedback to transaction proponents with the aim of improving the quality and impact of CSIRO’s business development and technology transfer activities.

• Monitor the pipeline of major transactions to identify and address strategic and other implications and so the approval process may be managed efficiently. Raise implications, as required, with the ET or ET member responsible.

• Provide advice to the ET or ET member/senior manager responsible, as requested, on matters related to proper and efficient performance of business development, Intellectual Property management and technology transfer activities in CSIRO, including advice on:
  o Delivery of agreed investment strategies;
  o The delivery of the 2011-15 CSIRO strategy with respect to the ‘deep collaboration and connection’ strategic objectives;
  o The implications of CSIRO’s involvement in potential commercial ventures, major projects and government programs (e.g. CRCs) including recommendations regarding conditions for involvement in programs;
  o Related new directions and/or policies and standards.

• Review the delivery of major transactions or sets of transactions, as appropriate, in order to improve processes and inform future decision making.

Appendix

• Major Transactions considered by the Committee are defined by CSIRO Commercial and Legal delegations and authorities and related financial and risk thresholds (see Chief Executive & Board Major Transactions Threshold Table).

• The MTC may make recommendations to the ET, and provide advice and direction to line management, on matters within the Charter.

• The proponent is accountable for ensuring the aspects in Specific Responsibility 1 (above) have been effectively addressed in the transaction and related issues and sensitivities have been brought accurately and effectively to the attention of the Committee.

• MTC will encourage early engagement with proponents to identify issues and to enable the MTC and Board, as appropriate, to add value earlier at concept stage.