

SIEF Impact Review

Appendix 2 – An Evaluation of SIEF's Performance

January 2017



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CSIRO also advises that the findings shared in this evaluation report is based on the performance data sourced from SIEF and that all the images shared in the report are stock images unless explicitly stated.

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1 Executive summary

Background

This report provides details of the results of an evaluation conducted of the performance of the Science and Industry Endowment Fund (SIEF).





An evaluation of impact created by SIEF was originally planned towards the end of the funding period in 2018. However, the need for such an evaluation was brought forward by the recommendations of an audit report prepared by the Australian National Audit Office

(ANAO) on the administration of the \$150 million gift made to SIEF by CSIRO in 2009. The audit report recommended that the impact and value of SIEF's activities should be evaluated. This report forms part of the implementation of that recommendation.

The evaluation assesses how SIEF has performed in terms of its key performance areas relating to its funding of research activities which promote world class science, foster collaboration, build science capacity and capability, and accelerate market adoption of research outputs.

Approach

SIEF's performance in each of its key performance areas was measured via the following metrics:

PROMOTE WORLD CLASS SCIENCE 	<ul style="list-style-type: none">• Alignment of SIEF's support with the National Science and Research Priorities• Number of patents• Number of publications by research field• Proportion of independent reviewers involved in SIEF activities
PROMOTE COLLABORATION 	<ul style="list-style-type: none">• Ratio of financial contributions from collaborators• Percentage of projects involving more than one organisation• Ratio of Research Projects that have received further co-funding (outside SIEF)• Proportion of co-authored publications• Percentage of co-supervised PhD students and Postdocs in Promotion of Science Program
BUILD CAPACITY AND CAPABILITY 	<ul style="list-style-type: none">• Ratio of co-investment in Research Infrastructure Program• Ratio of co-investment in Special Research Program• Number of Early Career Researchers supported
ACCELERATE MARKET ADOPTION 	<ul style="list-style-type: none">• Percentage of technologies that have enhanced technology readiness after completion of EDP• Percentage of teams that receive ongoing commercialisation support from their VC or industry sources after one year of completing the EDP• Number of market introduced ideas after two years of completing the EDP• Appreciation of innovation and entrepreneurship among EDP participants

SOURCE: CSIRO

Findings



PROMOTING WORLD CLASS SCIENCE:

- Over 98% of SIEF's research investments align with National Science and Research Priorities.
- SIEF-supported activities have produced 37 patents between 2010 and 2016, placing it ahead of other leading research-focused organisations such as Murdoch Children's Research Institute, Garvan Institute of Medical Research and the University of South Australia.
- SIEF research activities have resulted in the publication of 417 journal articles on various topics in the 2010-2016 period, almost a quarter of which have appeared in the top 5% of journals.
- A total of 63 independent reviewers from across the Australian Innovation System have participated in independent reviews of SIEF projects.



FOSTERING COLLABORATION:

- 73.5% of the \$500 million invested in SIEF activities has come from collaborating partners.
- 93% of SIEF activities involve collaboration with other organisations, with the majority of projects involving more than one collaborative partner.
- 47% of SIEF-funded Research Projects have received additional co-funding outside of SIEF to further progress research in the project or for the commercialising of project outputs. 35% of projects have received additional co-funding to use project outputs as inputs for new research.
- 83% of journal articles reporting on the results of SIEF-funded activities have been co-authored.
- SIEF's Promotion of Science Program has provided support for 47 PhD and postdoctoral candidates, all of whom have been co-supervised by more than one organisation.



BUILDING CAPACITY AND CAPABILITY:

- SIEF Research Infrastructure activities have attracted co-investment from other parties at a ratio of 4.5:1.
- SIEF Special Research Program activities have attracted co-investment from other parties at a ratio of 6:1.
- Between 2010 and 2016 across the Research Projects and Promotion of Science Programs, SIEF provided funding support for 302 Early Career Researchers (ECRs). This support has enabled these ECRs to gain valuable new skills, work experience, and opportunities for collaboration, thereby enhancing their career prospects in the research sector.



ACCELERATING MARKET ADOPTION:

- In 2016, SIEF launched the Experimental Development Program (EDP). The EDP is designed to improve the technology readiness of Australian PFRA innovation outputs to assist with their commercialisation and the acceleration of their uptake by the market. Given the recent commencement date of this program, it is not possible to assess its performance at this time. However, its performance will be tracked and reported by SIEF in the future.

Conclusion

Based on the evaluation presented in this report, SIEF has performed highly in its key performance areas. SIEF is funding high-quality, impactful research which is aligned with Australia's National Science and Research Priorities. SIEF-supported activities are effectively developing and fostering the next generation of Australian researchers; encouraging and promoting increased research collaboration both within Australia and overseas; and developing and maintaining leading-edge research infrastructure – all of which are vital for the Australian Innovation System's capacity to address the economic, social, and environmental challenges the nation will face in the future.



2 Introduction

The Science and Industry Endowment Fund (SIEF) is a trust established under the *Science and Industry Endowment Act 1926*. The Fund's strategic objectives are to invest in science that addresses issues of national economic, industrial, environmental, and social priority, and contribute to Australia's sustainable future, including:

- **fundamental research for sustainable resource use, environmental protection, and community health**
- **tactical research, seeking solutions to national challenges**
- **collaborative research among organisations working on solutions to national challenges**
- **scholarships sustaining young researchers capable of working on national challenges.**



The Trustee of SIEF, on the advice and recommendations of the SIEF Advisory Council, award funding to parties across the Australian Innovation System through the following programs:

- **Special Research Program**
- **Research Infrastructure Program**
- **Research Project Program (competitive)**
- **Joint CSIRO–Macquarie University Chair in Wireless Communications**
- **Promotion of Science Fellowships and Scholarships Program (competitive)**
- **SIEF–AAS Fellowships to the Lindau Nobel Laureate meeting, facilitated by the Australian Academy of Science (competitive)**
- **SIEF STEM+ Business Fellowships, facilitated by CSIRO**
- **Experimental Development Program (EDP).**



In the last 6 years these programs have supported an array of purposeful research, fostered collaboration, and developed exciting capability in the Australian Innovation System. The success of SIEF-funded research activities, and ultimately their impact in solving issues of national importance, can only be measured in the long term. However, in the interim this report presents the results of the SIEF research performance evaluation.





To add some context to this analysis, SIEF's performance has been examined against a set of key performance metrics to better understand how SIEF is performing in terms of delivering on its broader objectives in support of the Australian Innovation System.

The metrics were selected for the purpose of informing an assessment of:

- The quality of the science supported by SIEF
- The collaboration that was encouraged/enabled by SIEF funding
- The extent to which SIEF support has built Australia's research capacity and capability
- The extent to which SIEF support has accelerated market adoption.

Table 1 lists the metrics that will be used to measure SIEF's performance against each of the points above.

TABLE 1 PERFORMANCE EVALUATION METRICS

PROMOTE WORLD CLASS SCIENCE	
	<ul style="list-style-type: none"> • Alignment of SIEF's support with National Science and Research Priorities • Number of patents • Number of publications by research field • Proportion of independent reviewers involved in SIEF activities
PROMOTE COLLABORATION	
	<ul style="list-style-type: none"> • Ratio of financial contributions from collaborators • Percentage of projects involving more than one organisation • Ratio of Research Projects that have received further co-funding (outside SIEF) • Proportion of co-authored publications • Percentage of co-supervised PhD students and Postdocs in Promotion of Science Program
BUILD CAPACITY AND CAPABILITY	
	<ul style="list-style-type: none"> • Ratio of co-investment in Research Infrastructure Program • Ratio of co-investment in Special Research Program • Number of early career researchers supported
ACCELERATE MARKET ADOPTION	
	<ul style="list-style-type: none"> • Percentage of technologies that have enhanced technology readiness after completion of EDP • Percentage of teams that receive ongoing commercialisation support from their VC or industry sources after one year of completing the EDP • Number of market introduced ideas after two years of completing the EDP • Appreciation of innovation and entrepreneurship among among EDP participants

SOURCE: CSIRO

It is important to note that these indicators are designed to capture and report the outcomes being delivered by SIEF and not its internal administrative process¹.

¹ The Australian National Audit Office (ANAO) conducted an audit on the Administration of the CSIRO's gift to the SIEF for the purpose of evaluating the internal processes and administration of the Fund. The audit found that CSIRO's gift to SIEF was being transparently and efficiently managed. The report was tabled in Parliament in February 2016 and can be accessed here: <https://www.anao.gov.au/work/performance-audit/administration-commonwealth-scientific-and-industrial-research-organisations>

3 SIEF research performance evaluation

The sections below examine SIEF's performance against each of the metrics identified in Section 1.



3.1 Promoting world class science

3.1.1 ALIGNMENT WITH NATIONAL PRIORITIES

The Australian government has determined its Science and Research Priorities, and the corresponding Research Challenges. The aim of the Priorities is to channel investment into areas of critical importance to Australia and its place in the world. The headline National Priorities² are:

- Food
- Soil and water
- Transport
- Cyber security
- Energy
- Resources
- Advanced manufacturing
- Environmental changes
- Health

A key objective of SIEF is to support scientific research in these areas of National Priorities. One of the metrics for SIEF is the proportion of funds that align with one or more of these National Priorities.

Figure 2.1 shows that the alignment between SIEF funding and the National Priorities is extremely strong. Over 98% of SIEF's investment is aligned with the National Priorities. This result is higher than the Australian Research Council's 94% of investment aligned with the National Priorities for the period of 2010 to 2015³, and CSIRO's over 90% of resources aligned with the National Priorities for 2011 to 2012.⁴

All of the Research Projects, Research Infrastructure, and Special Research Programs are 100% aligned with the National Priorities. In the case of the Promotion of Science projects, just under 87% are aligned with Australia's Science and Research Priorities. The small number of Promotion of Science projects that do not align with the priorities are either undergraduate projects or in areas such as Astronomy.

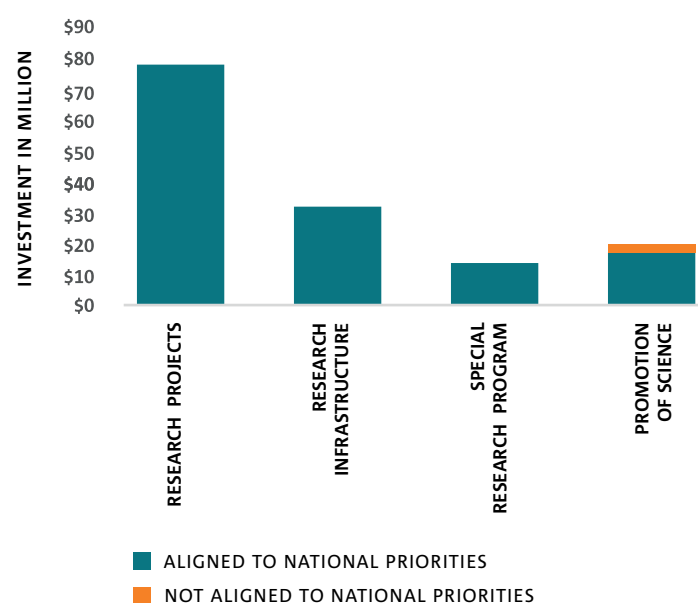


Figure 2.1 Alignment of SIEF investment with National Priorities

SOURCE: CSIRO

² The national Research Priorities change over time and are updated by the Australian government to reflect the current needs of the nation.

³ ARC Research Funding Trend Data (2002-2015) - available from <http://www.arc.gov.au/grants-dataset>

⁴ CSIRO Annual Report (2011-12) - available from <http://www.csiro.au/en/About/Our-impact/Reporting-our-impact/Annual-reports/11-12-annual-report/Part2/Measuring-our-performance>

SIEF separates Research Projects into the following categories:

- emerging research (research in new or emerging fields)
- strategic research (research aimed to advance knowledge in existing fields of interest)
- supporting research (research aimed at translating technology solutions to address real world problems).

Further examination of the \$77 million spent on Research Projects shows that 27% of the investment was in emerging research, 42% was for strategic research, and the remaining 31% was used for supporting research. SIEF aims to fund all three phases of research, with a slightly greater focus on strategic and supporting research (as they tend to be more collaborative with, and engaging for, industry). Figure 2.2 demonstrates that this aim has been achieved.

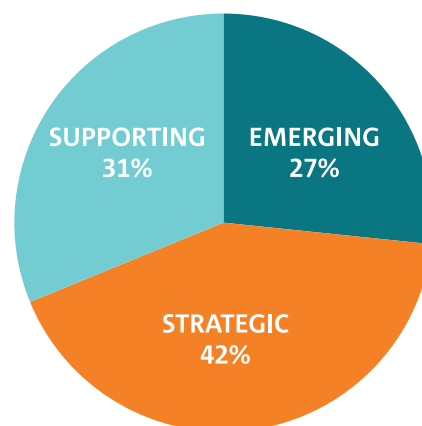


Figure 2.2 SIEF Research Project investment (by category)
SOURCE: CSIRO

Chemistry, Neuroscience & Behaviour, and Space Science account for 44% of the publications.

The number of publications is only a crude measure of research output, as it only conveys information about the quantity of research, not its quality. To better understand research quality, it is necessary to consider the quality of the journals in which the research findings are published. In the case of SIEF, almost a quarter (22%) of the published articles

3.1.2 PUBLICATIONS BY RESEARCH FIELD

Research publications are an indicator of the level of research output being produced and the significance of those outputs. Between 2010 and 2016, SIEF activities published 417 articles in various journals on a wide range of topics (see Figure 2.3). Journal articles on

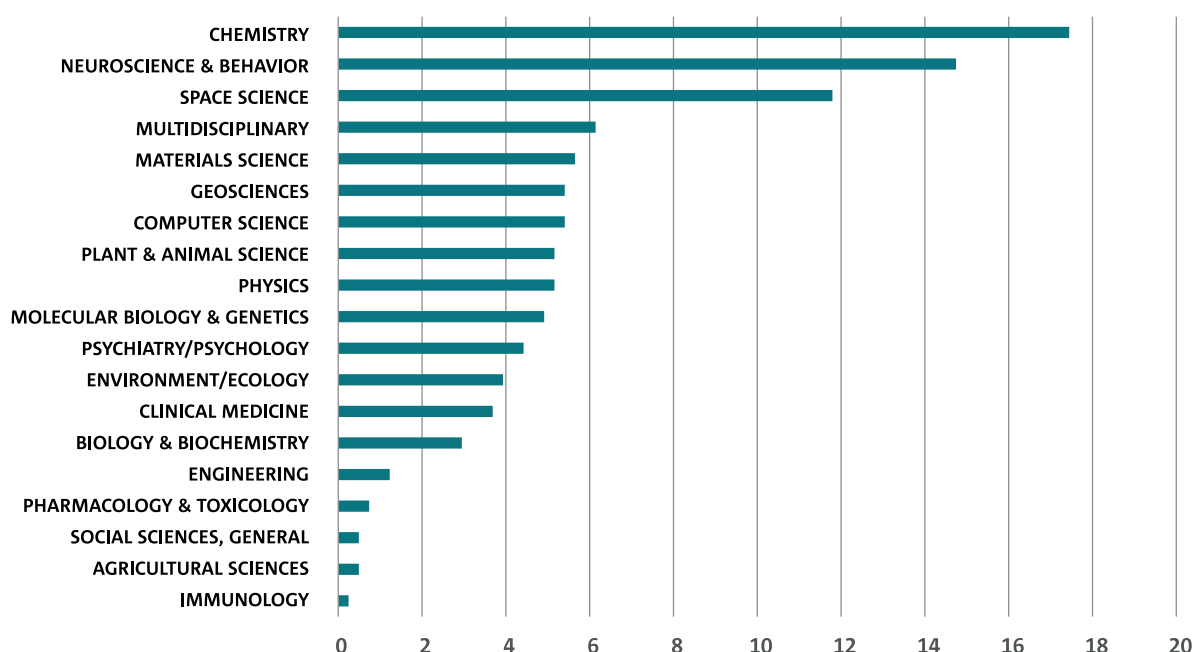


Figure 2.3 Publications of SIEF supported research (by research area)
SOURCE: CSIRO

appear in the top 5 % of journals. This compares favourably with the 11% of NHMRC-supported research which is published in the top 5% of journals.⁵ Given that medical research is an area where Australia has traditionally been a strong performer, these figures suggest that SIEF-supported research is producing some very high quality outputs.

This proposition is supported by the fact that journal articles about SIEF-supported research are over twice as frequently cited as the global average for journal articles. This compares well against CSIRO's and Australia's average citation rates which are 50% and 30% higher than the global citation average respectively. Further, it compares favourably to the 70% more citations than the global average for the NHMRC, and the 60% more than average for the ARC.⁶

3.1.3 PATENTS

Patents are a widely accepted measure of innovative output. Between 2010 and 2016, about a third of SIEF Research Projects generated at least one patent. In total, SIEF Research Projects produced 37 patents.

A comparison of SIEF's patent performance with that of the 60 PFRA's and universities who participated in the 2014 NSRC (National Survey of Research Commercialisation) survey shows that the patent performance of SIEF-supported activities is better than that of 40 of the PFRA's that participated in the survey. Based on patents filed between 2010 and 2014, SIEF's performance is at par or better than some of the leading Australian universities and research organisations such as RMIT and the University of South Australia.⁷ (See Figure 2.4)

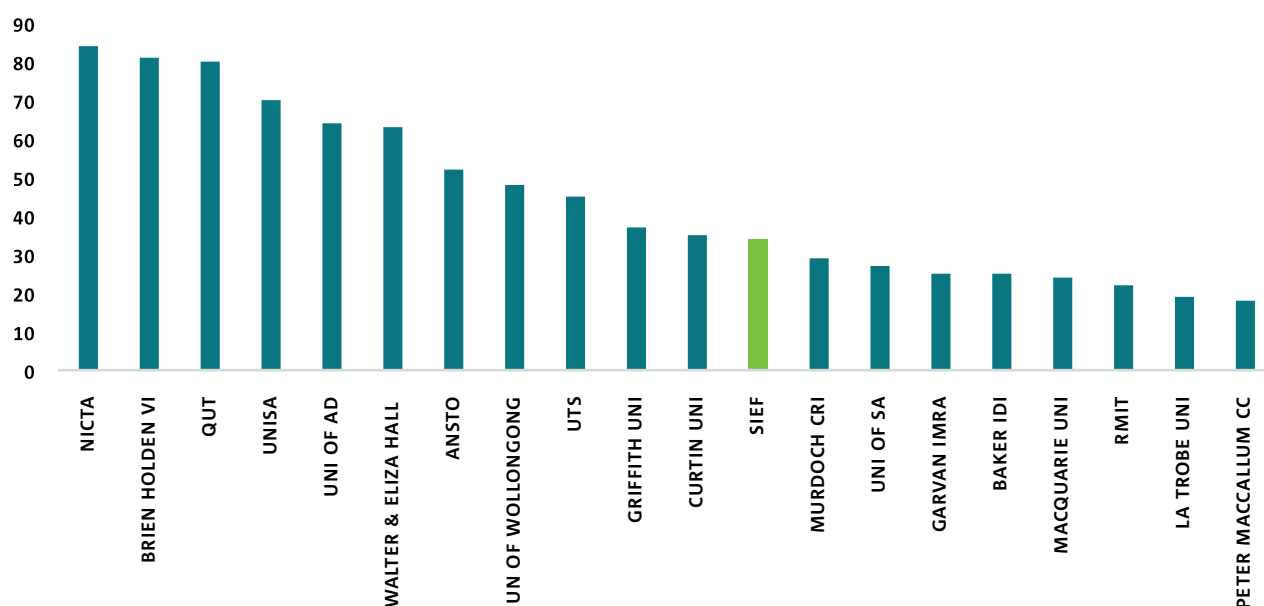


Figure 2.4 A comparison of patents filed between 2010 and 2014

SOURCE: CSIRO

⁵ <https://www.nhmrc.gov.au/media/newsletters/ceo/2014/measuring-impact-research-not-just-simple-list-publications>

⁶ These figures are drawn from Thomson Reuters InCites ratings. All of these calculations are based on the Relative Citation Index indicator used in the ARC's Excellence for Research in Australia and in best practice worldwide.

⁷ NSRC Patents 2000-2014 available from <http://www.industry.gov.au/innovation/NSRC/Data/Pages/default.aspx>

3.1.4 THE INDEPENDENCE OF SIEF REVIEWERS

To ensure the integrity and quality of the science produced by SIEF, all Research Projects are subject to independent review.⁸ To date, 63 independent reviewers have participated in independent reviews of SIEF Research Projects. Another 154 have reviewed the Promotion of Science activities. These reviewers represent all parts of the Australian Innovation System, as they are drawn from Australian universities, industry, and PFRAs.



3.2 Building scientific capacity and capability

Scientific capability and capacity lie at the core of innovation. They provide the framework within which complex problems can be solved; and are essential for building both resilient and sustainable communities, and the economies of the future. Building capacity is a long term process and requires a network of underpinning activities such as infrastructure development, talent retention, and mutually beneficial partnerships among different elements of the innovation system.

SIEF has supported improvements in the scale, breadth, and depth of innovation capacity in Australia. It has done so by funding leading-edge research infrastructure and high quality research projects; and by supporting ECRs in building the skills and capabilities necessary to engage in the world-class research that is needed to help address the challenges facing both Australia and the world as a whole.

3.2.1 RATIO OF CO-INVESTMENT

One of the key working principles of SIEF is not to fully fund projects, but rather to work to facilitate co-funding of project costs with other organisations. Co-investment helps to spread the imposition on any one organisation's resources and also helps to ensure collaborators' commitment to the project. With this in mind, SIEF actively favours activities with high levels co-investment when making funding decisions.

Research Infrastructure Program activities

SIEF has invested \$40.4 million in three Research Infrastructure activities. This investment helped catalyse a further investment of just under \$174 million from six other organisations (four universities, CSIRO, and the Pawsey Centre) (see Figure 2.5). In effect, SIEF's investment in these activities encouraged four-and-a-half times more investment by other parties.

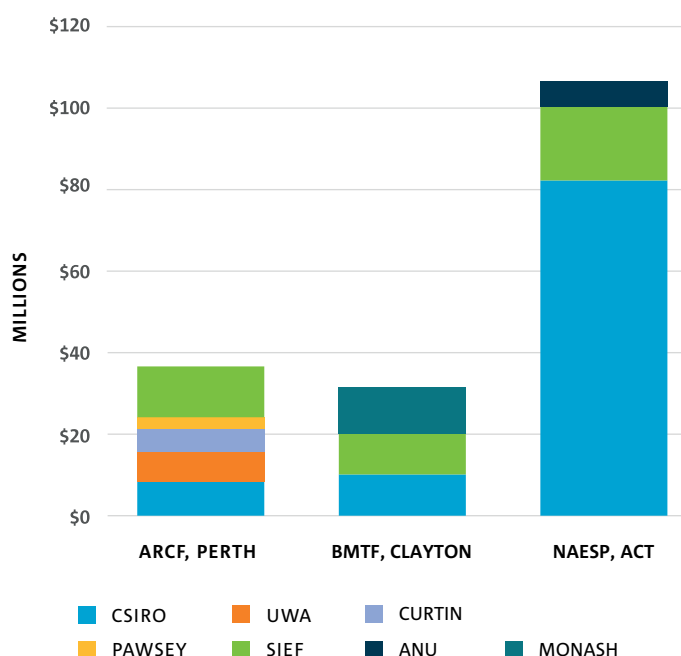


Figure 2.5 Co-investment in Research Infrastructure Programs

SOURCE: CSIRO

⁸ The Special Research Program and the Research Infrastructure Program are not subject to this requirement.

Special Research Program (SRP) activities

To date SIEF has funded two SRP activities, the Australian Square Kilometre Array Pathfinder (ASKAP) in Western Australia, and the Australian Synchrotron in Victoria. SIEF has contributed \$16 million to these two activities. This investment generated a further investment of \$96.2 million from other parties to create a total investment of \$112.2 million (see Figure 2.6). Therefore, SIEF funding successfully leveraged additional support worth more than six times its support.

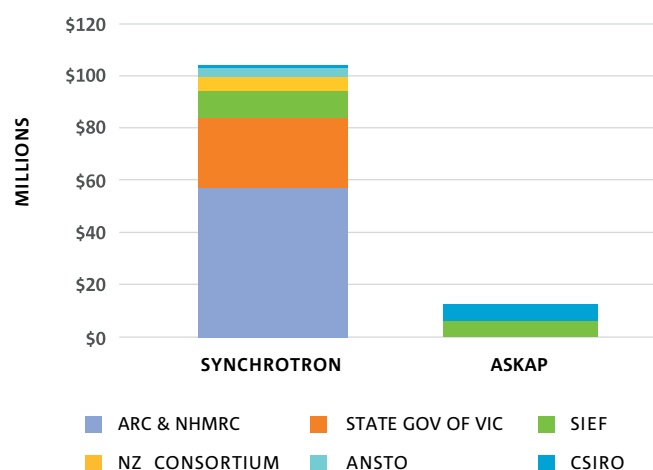


Figure 2.6 Investment in Special Research Program

SOURCE: CSIRO

3.2.2 SUPPORT FOR EARLY CAREER RESEARCHERS (ECRS)

High quality STEM training not only helps develop the nation's future researchers, but also ensures an innovative and flexible workforce of STEM practitioners, and facilitates the development of knowledge-based organisations, communities, and economies.

Over the period from 2010 to 2016, SIEF has supported 302 ECRs through its Promotion of Science and Research Program. Almost 40% of these ECRs were women. A survey of SIEF-funded ECRs conducted in October 2016 highlighted the benefits they believe they have obtained through their participation in the Program. The results of this survey are shown in Figure 2.7.

Of the 115 survey respondents, 64% rated the benefits of the mentoring received from their supervisors as *high* or *extremely high*, while 65% rated the benefits derived from the opportunity to develop collaboration as *high* or *extremely high*. The survey results suggest that there are two areas in which the program could be improved. The first is to provide greater support for ECRs to help them develop links with industry. This will be a challenging task, as a substantial portion of the Promotion of Science activities are fundamental research projects with little obvious connection to, or drivers for collaborating with, industry. Another area where there may be some scope to improve the program is in relation to supporting ECRs to

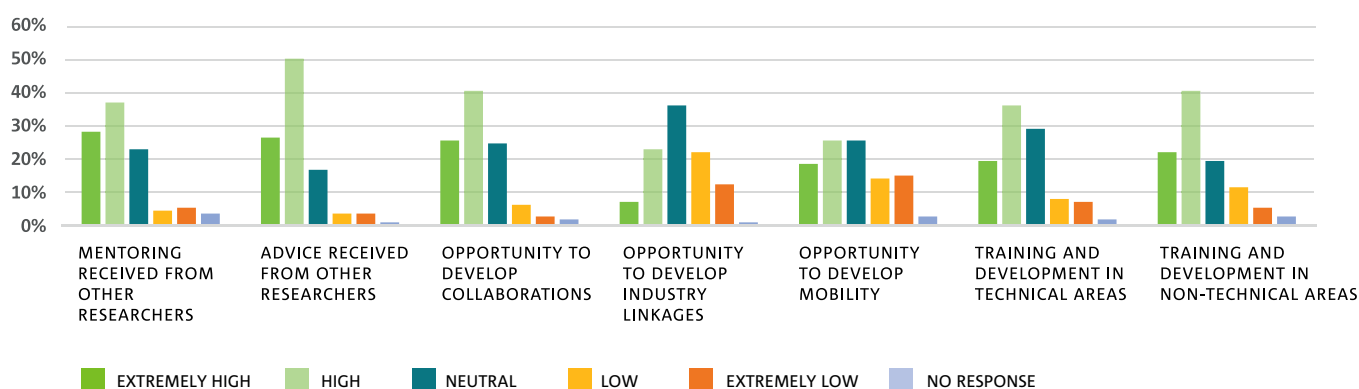


Figure 2.7 SIEF ECR Survey Response

SOURCE: CSIRO SURVEY OF ECRS WHO RECEIVED SUPPORT FROM SIEF

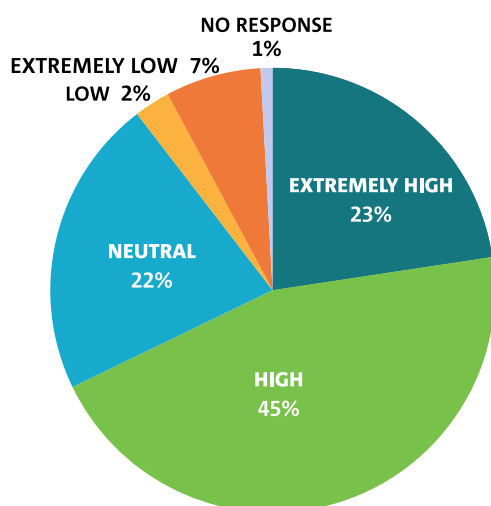


Figure 2.8 Impact of SIEF on ECR career progression

SOURCE: CSIRO SURVEY OF ECRs WHO RECEIVED SUPPORT FROM SIEF

improve their career mobility (although the survey results suggest that this issue is not as important as building industry linkages). Indeed, it is likely that other elements of the Program, such as mentoring, developing collaborations, and training will lead to improved mobility over time.

Figure 2.8 shows that 23% of respondents believe that the support they received through SIEF had an *extremely high* impact on their career progression. Another 45% said that support from SIEF had a *high* impact on progressing their careers.

Over half of the respondents (54%) reported that the support they had received from SIEF had helped them to secure further employment. Seventeen per cent of the respondents reported that they had progressed from being an ECR to become Mid-Career Researchers.

Overall, there is strong evidence that SIEF support has helped ECRs address some of the structural barriers they face in the early stages of their professional careers. It has assisted them to gain new skills, work experience, and opportunities for collaboration. This, in turn, has improved their prospects for obtaining further employment in the research sector, and has enhanced their longer term career prospects.

3.2.3 PARTICIPANTS' SATISFACTION WITH SIEF

As part of the completion report for each Research Project, participants are asked to provide feedback on SIEF management. To date, feedback has been provided by 16 out of 17 SIEF Research Projects. Of these, nine have expressed *high satisfaction* with the services provided by SIEF management (providing a rating of 5 out of 5), while the other seven respondents have expressed *satisfaction* with the services provided SIEF management (providing a rating of 4 out of 5). These results indicate that the management of SIEF is very well regarded by SIEF participants.

For example, the e-Reef project leader commented that:

"To-date, interactions with SIEF management have been very positive and constructive and we are pleased by the general support and specific feedback received from the SIEF office."

The Solar Cells project leader noted that:

"The SIEF funding provides the research team with a great opportunity to explore both the fundamental science and the industrial technology. The SIEF management has been very supportive and efficient... Through the SIEF management team, our NanoPlas solar technology has been promoted more widely."





3.3 Fostering collaboration

Studies of innovation have shown that collaboration is critical for improving effectiveness of translating research outputs into business innovation that delivers economic benefits. Collaboration helps businesses gain marketplace advantage by fostering creativity, developing new skills, transferring knowledge, managing risk, and attracting aspiring investors and partners. The Australian Innovation System Report 2015 shows that only 20% of Australian innovation-active SMEs and only 32% of Australian innovation-active large firms collaborated in 2012⁹. Australia ranked 24th and 29th respectively on these measures in 2009 (which is the most recent OECD international comparison available), suggesting that there is scope for Australian businesses to improve their rates of collaboration. Low collaboration rates could be one of the reasons why Australia is less efficient than similarly developed countries in transforming research outputs into outcomes.

Improving collaboration across the Australian Innovation System is one of the primary objectives of SIEF.

3.3.1 ACTIVITIES INVOLVING MORE THAN ONE ORGANISATION

Out of the 73 SIEF-funded activities, 68 (93%) have involved collaboration with other organisations (see Figure 2.9). To date, over 60 different organisations have been formally involved in collaborating with SIEF-supported researchers. These collaborators represent a mix of Australian universities, governments, industry, and overseas organisations.¹⁰ While the majority of the organisations have been involved in the Promotion of Science and Research Programs, a number have also participated through the Research Infrastructure and Special Research Programs.

Establishing a collaboration can be challenging. There are a number of barriers that first need to be addressed, such as transaction costs, legal arrangements, and commercial and technical risks. By helping governments, businesses, and industries overcome these barriers, SIEF is improving the prospects that research outputs will avoid the ‘valley of death’ between discovery and commercialisation, thereby delivering innovation dividends to business and the economy in general. In this context, the fact that almost a quarter of the collaborators are from industry is particularly important.

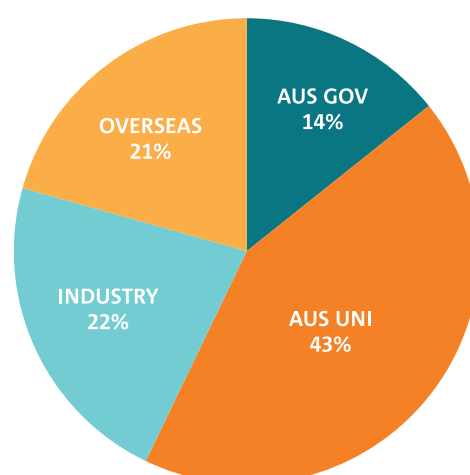
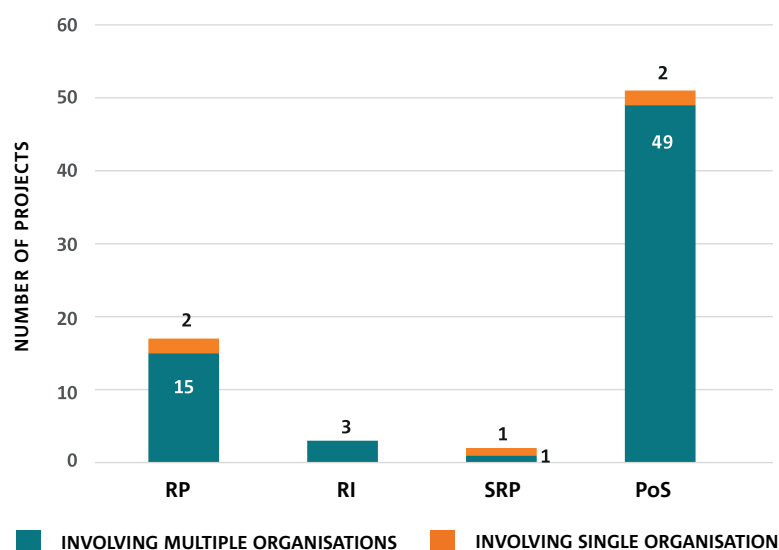


Figure 2.9 SIEF-supported collaboration (by activity and by sector)

Note: LHS of figure shows collaboration by SIEF program and RHS of figure shows the composition of the collaborating parties.

SOURCE: CSIRO

⁹ <https://industry.gov.au/Office-of-the-Chief-Economist/Publications/Documents/Australian-Innovation-System/Australian-Innovation-System-Report-2015.pdf>

¹⁰ ‘Industry’ includes industry associations, and ‘overseas organisations’ includes overseas universities.

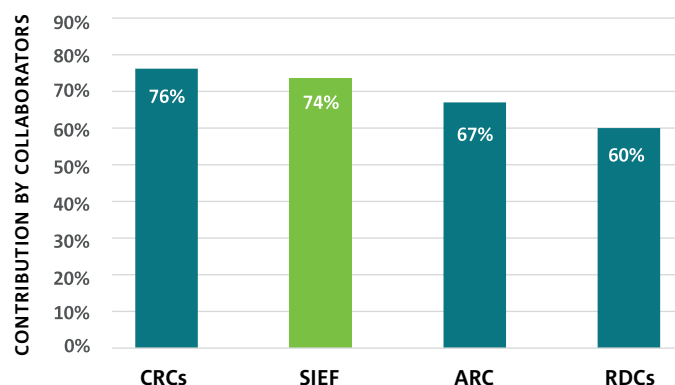


Figure 2.10 Financial co-contributions by partners to R&D programs

SOURCE: CSIRO

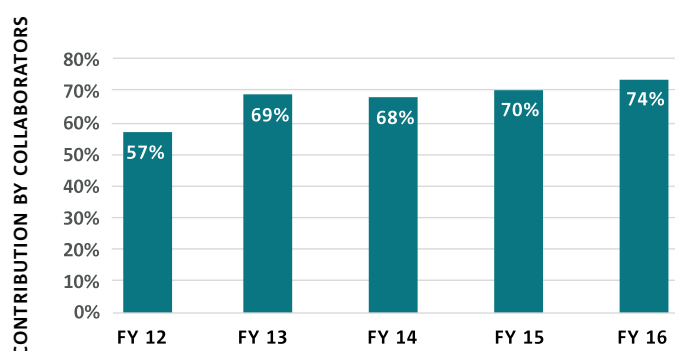


Figure 2.11 Share of co-contributions over time to SIEF programs

SOURCE: CSIRO

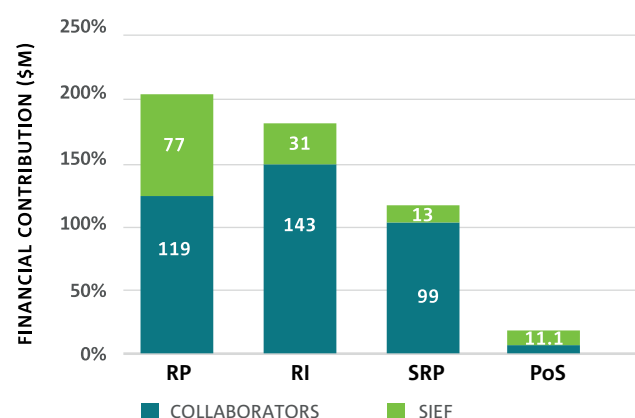


Figure 2.12 Relative financial contributions by SIEF Program

SOURCE: CSIRO

3.3.2 FINANCIAL CONTRIBUTIONS FROM COLLABORATORS

Another key benefit of collaboration is that it increases the research team's ability to access the resources and capital it needs to complete a project. A key principle of SIEF is that it will not fully fund projects. Rather it will commit funds to help stimulate investment by partner organisations.

To date, SIEF investment has supported the creation of a portfolio of research activities with a total investment of \$500 million. Collaborating partners in this research have contributed almost three quarters of the total funding (73.5%), with SIEF contributing the remainder. Figure 2.10 shows that the contributions by partners in SIEF activities is slightly lower than that of the CRC program (where the Commonwealth committed \$3.3 billion and partners committed \$10.8 billion between 1999 and 2012). However SIEF's partner contribution level is higher than both the RDC Program (where on average for every \$1.00 contributed by the Australian Government, partners contributed a further \$1.50 over the 20 years till 2007)¹¹, and the rate for ARC projects (which committed \$81.2 million and its partners committed \$162.9 million to 2016 Linkage projects).

Figure 2.11 shows that the share of co-contributions to SIEF activities has increased over time. One interpretation of this might be that the level of confidence among SIEF's collaborating partners is growing over time.

Figure 2.12 indicates that the rate of co-contribution by the partners in SIEF activities is considerable for most of the SIEF programs. The stand outs are the Research Infrastructure activities and the Special Research activities. The high share of co-contributions for these programs (82% and 88 % respectively) suggest that the co-contributors see considerable value in investing in activities under these Programs. The level of co-contribution for the Promotion of Science Program is lower; however, this is to be expected as this Program involves relatively low-level grants, and there is limited need for co-investment as the research is still in its early stages.

¹¹ Measuring economic, environmental, and social returns from Rural Research and Development Corporations' investment - available from: <http://www.ruralrdc.com.au/wp-content/uploads/2016/04/Rural-RDC-Eval-Report-low-res.pdf>; and Peak ag R&D group welcomes continuity, commits to R&D for Profit Programme - available from <http://www.ruralrdc.com.au/peak-ag-rd-group-welcomes-continuity-commits-rd-profit-programme/>

BOX 2.1

The Gates Foundation's investment in plant yield research

The world's population is expected to reach nine billion by 2050. Feeding this rising population requires the current level of food production to be significantly increased. To help address this societal challenge, in 2010-2013 the SIEF-funded Plant Breeding project, under the supervision of Dr Anna Koltunow, investigated Apomixis as a technique for increasing food production. The project sought to induce and control the expression of asexual seed formation by identifying the causal sequences involved.

As a result of this work, in 2014 Dr Anna Koltunow received a \$14.5 million grant from the Melinda

Gates Foundation. The five year humanitarian project called "Capturing Heterosis" now has a team of world-leading experts from Australia, Switzerland, USA, Germany, and Mexico investigating novel reproductive technologies for delivering increased crop yields in the subsistence crops cowpea and sorghum.

The reliable production of greater quantities of these staple crops would help ensure more secure food supplies for over 200 million impoverished Sub-Saharan Africans, as well as potentially improving the income of smallholder farmers through the sale of surplus crops and seed.

SOURCE: CSIRO

3.3.3 RESEARCH PROJECTS THAT HAVE RECEIVED FURTHER CO-FUNDING (OUTSIDE SIEF)

The participants in SIEF-funded research activities appear to regard the results being delivered as worthy of further investment. The collaborators in 8 out of the 17 Research Project activities have already obtained further funding, support, or partners with the intention of further progressing their research or commercialising

the outputs of the project. The remaining 9 are seeking further funding or partners for the same purpose. **Box 2.1** describes the investment by the Gates Foundation in furthering the research carried out under the SIEF-funded Plant Breeding Research Project.

In addition, collaborators in 6 of the 17 Research Project activities have obtained funding to use the outputs of the project as inputs for new research.

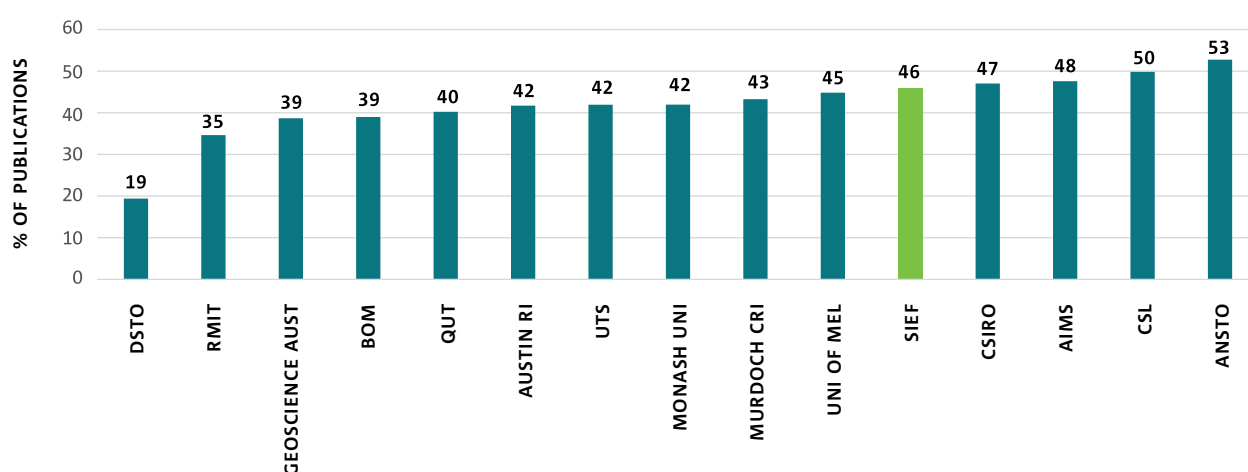


Figure 2.13 Percentage of publications with international collaborators

SOURCE: CSIRO

CO-AUTHORED PUBLICATIONS

The number of publications co-authored with other organisations reinforces the strength of a collaboration as well as demonstrating that both parties recognise the value of the research outputs. Co-publication can occur not only with formal collaborators, but also with other organisations who are undertaking related research under different funding arrangements. Co-authorship can therefore also provide insight into the broader scope of collaborations.

Almost 83% of articles reporting on the results of SIEF-funded activities are co-authored. Almost 69% of these have Australian co-authors, while 46% have at least one or more international co-author. The proportion of

publications with international authors is at the upper end of the scale compared to the proportion for a range of other research organisations (see Figure 2.13).

International co-authors are drawn from 43 different countries. Figure 2.14 shows the distribution of co-authors around the world. The large percentage of publications with international co-authors is a strong indicator of the high level of international connectedness of SIEF-supported research. It is also a strong indicator of the high level of regard that the international community has for the research.

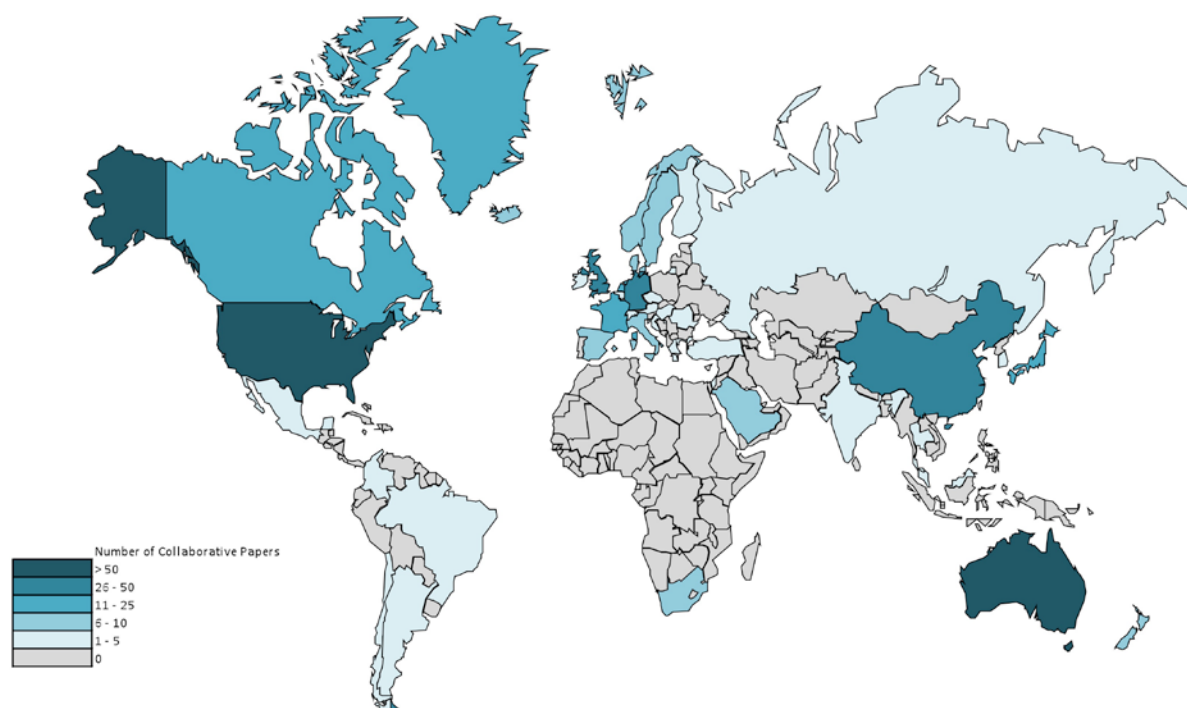


Figure 2.14 Distribution of co-authors

SOURCE: CSIRO

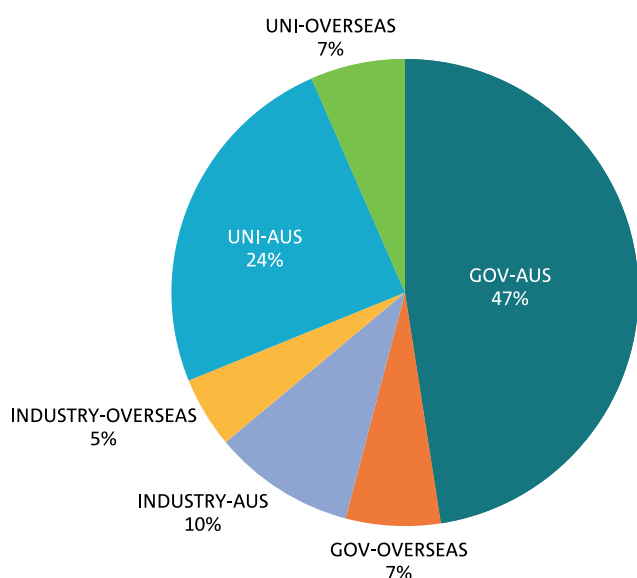


Figure 2.15 PhD and postdoctoral supervisors (by sector)

Note: Information in the figure is based on data from the SIEF Promotion of Science program.

SOURCE: CSIRO

3.3.4 CO-SUPERVISED PHD STUDENTS AND POSTDOCS

A PhD student or postdoctoral researcher who is co-supervised by researchers from more than one organisation is better placed to develop connections with other organisations, increase their mobility, and identify future career paths.

Through the Promotion of Science Program, SIEF has provided support to 47 PhDs students and postdoctoral fellows. All of these were co-supervised by more than one organisation, while 32% were co-supervised by more than two organisations. These students and postdocs came from across Australia and were supervised by staff working for leading Australian and international organisations (see Figure 2.15).

3.4 Accelerate market adoption

In 2016, SIEF launched the Experimental Development Program (EDP). The Program is designed to improve the technology readiness level of Australian publicly funded innovation, with the view of encouraging commercialisation and accelerating market uptake. The Program addresses a significant gap in the current funding options available to PFRA and universities for progressing technology commercialisation, and complements the current SIEF programs and activities.

The key metrics associated with the EDP are:

- the percentage of technologies that have enhanced their technology readiness level after their participation in the EDP
- the percentage of research teams that receive ongoing commercialisation support from venture capital or industry sources one year after completing EDP
- the number of technologies that have been transferred to the market two years after completing their participation in the EDP
- improved appreciation of innovation and entrepreneurship among program participants.

As the EDP has only recently been launched, it is too early to assess the performance of the program against the above metrics. However, its performance will be tracked and reported by SIEF in the future.



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We innovate for tomorrow and help improve today – for our customers, all Australians and the world.

Our innovations contribute billions of dollars to the Australian economy every year. As the largest patent holder in the nation, our vast wealth of intellectual property has led to more than 150 spin-off companies.

With more than 5,000 experts and a burning desire to get things done, we are Australia's catalyst for innovation.

WE IMAGINE
WE COLLABORATE
WE INNOVATE