Career support for researchers:

Understanding needs and developing a best practice approach

ACOLA
AUSTRALIAN COUNCIL OF LEARNED ACADEMIES
SECRETARIAT

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Prepared by
Toss Gascoigne and Associates
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Preamble

ACOLA Secretariat serves as a liaison body between the four Australian Learned Academies, helping to generate strategic ideas and resources that foster a public understanding of the importance of research and scholarship. ACOLA was contracted by the Australian Government to facilitate a call for input from individual researchers and relevant professional bodies nationwide, across a range of career stages, in order to gather a snapshot of their views on the progress and future prospects of careers in the Australian research sector.

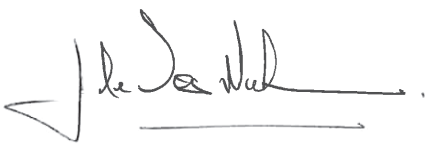
The Secretariat approached the task by inviting all individual researchers in Australia to provide their views through an on-line survey. Key institutions, including ARC, CSIRO, the universities and other institutes and research facilities were invited to make written submission. Selected respondents were then invited to attend focus groups in a number of cities, to flesh out the issues raised in the survey responses. The sample size of the online survey (1,203 respondents) and the workshops (55 participants) is a small cross-section of some 140,000 people working in the research sector in Australia.

Our task was to further contribute to the growing evidence base regarding career support needs for the research sector, with particular reference to the existing pressure points in career development, and to explore elements that may contribute to best practice. We have collected individual voices and institutional opinions from different career stages, without moderating those responses. Where appropriate, results have been pooled and summarised.

This report provides no policy analysis or critique of the views of respondents or participants, since that was not our role. Hence, the opinions expressed in this report and the pathways for action to enhance research career pathways in Australia captured here do not necessarily represent the views of ACOLA or its member Academies.

A literature review or annotated bibliography was not part of the brief for this report. The Secretariat is aware of a substantial body of policy analysis and other research on academic and research career pathways in Australia (not least the numerous projects undertaken within the Australian Government's *Research Workforce Strategy* initiative). This report is one further contribution to that ongoing process.

My thanks go to Toss Gascoigne and Jenni Metcalfe, who facilitated many hours of lively discussion. All our thanks are due to the hundreds of people who gave of their time to contribute the views presented here.



Dr Jacques de Vos Malan
General Manager
ACOLA Secretariat Ltd

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Summary

The pathway to a career in research is well mapped out in the early stages: honours degree, PhD, post-doc positions. Then follows a series of short-term contracts as budding researchers work to secure appointments and establish a career in an intensely competitive environment.

The 1,203 researchers who participated in an on-line survey and focus group discussions say the best thing about a career in research is working on interesting and important issues, and working in a stimulating environment. They appreciate the PhD program, which supports students as they work through their training; they feel encouraged to take up post-doctoral appointments; and they value the mentoring provided formally or informally by their institutions or their workplace.

Questions regarding the adequacy of salaries and assistance available to women re-entering the workforce draw mixed responses, rather more negative than positive.

On the less positive side are job security, uncertainty of funding and workload. Almost universally, respondents to the survey like their work but not the employment system in which they work. For many the reality is seen as a frustrating round of chasing grants and fellowships while trying to write papers and (for some) manage a heavy teaching load. Respondents say solutions to these matters require a greater investment in the system: more funding for fellowships and grants; more funding for universities so they can 'carry' researchers over the lean times between winning grants; more time to allow early career researchers to publish and establish themselves; and more support to reduce work loads in the mature stages of a career.

Almost universally, respondents to the survey like their work but not the employment system in which they work.

Survey respondents and participants in the focus group discussions also feel that there are ways in which the system can be improved at little or no cost: bolstering mentoring programs, adding flexibility to national funding programs, creating a web-based communication system to provide career information; and screening funding applications to weed out (at an early stage) proposals with a low chance of success. They say the cost of writing proposals is too high given the limited chance of success in a system they regard as overly competitive.

Respondents generally agree on what makes a career in research attractive irrespective of gender, age, career stage, employer or discipline.

But sectional differences emerge when respondents nominate the worst aspects of a career in research. Younger respondents are more concerned about uncertain job prospects; more senior respondents about work load issues. Men worry about salary levels, women about job prospects. University staff are more concerned about workload, while CSIRO staff identify career path as an issue.

The study group (respondents and participants together) identified ten broad elements which they believe contribute to best practice in career pathways in research.

These elements are explored in more detail in the report.

1. Support for researchers in the early stages of their careers
2. Articulated career pathways in research
3. Balanced workloads
4. Consideration of the teaching-research nexus in universities
5. Advice, mentoring and information for researchers
6. Effective and efficient national funding programs
7. Collaborations, mobility and industry linkages
8. Strong Higher Degree Research (HDR) training
9. Tenure, permanency and long-term contracts
10. Salaries and stipends

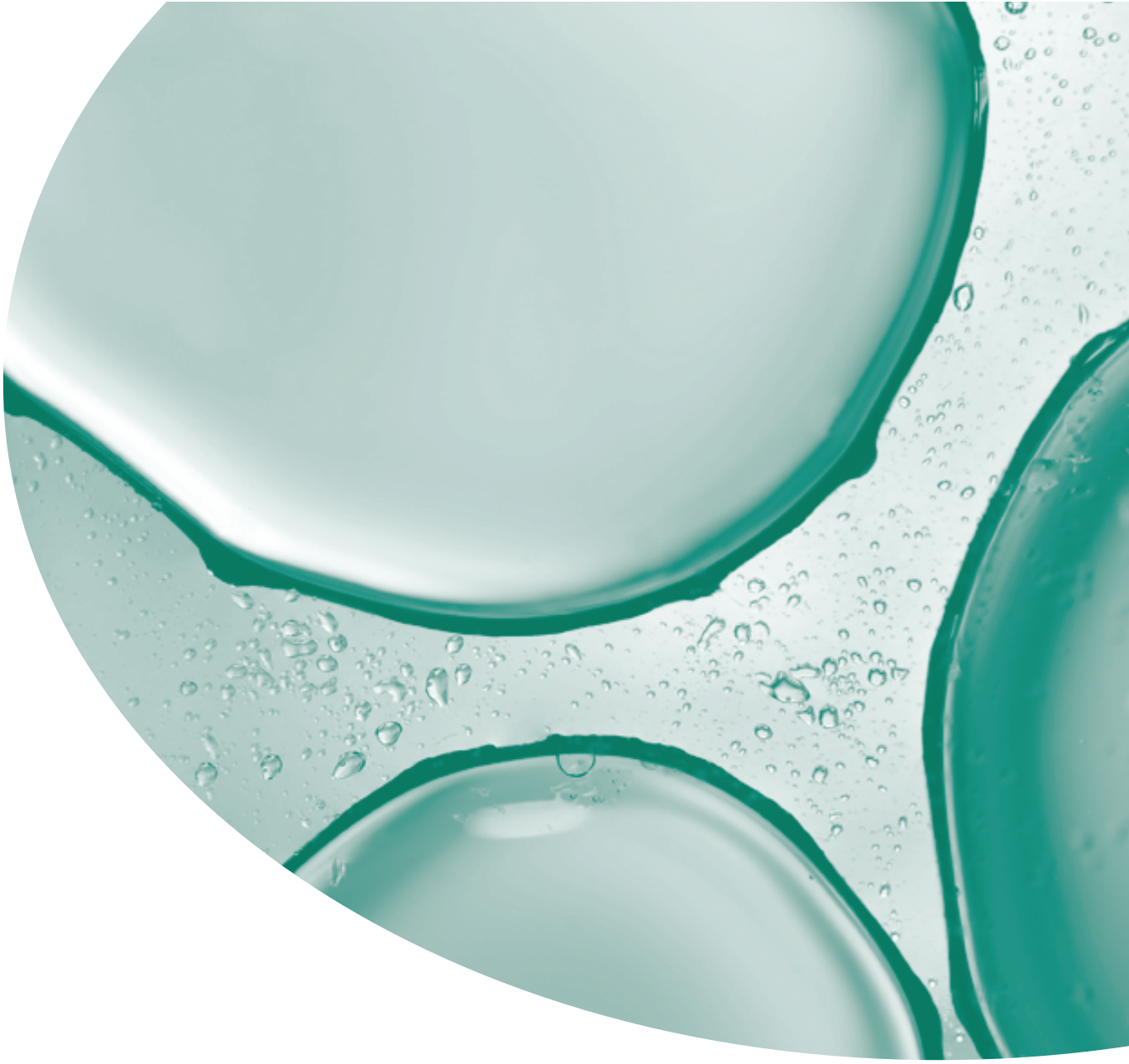
2

Introduction

The purpose of this project was to gain an understanding of the needs of Australian researchers; and following a consultation process with the research community, to develop a 'best-practice' approach to improve their career pathways. It was funded by the Department of Industry, Innovation, Science, Research and Tertiary Education (formerly the Department of Innovation, Industry, Science and Research).

The consultants were charged with exploring options for practical recommendations to meet one of the priorities of the *Research Workforce Strategy*: that researchers are 'supported to meet individual career needs and objectives'. An aspiration of this strategy is that researchers in Australia have clear and equitable pathways for career progression.

The project complements earlier work by the *Research Education Experience Workshop* (December 2009) and the *Research Career Pathways Roundtables* (January/February 2010), which culminated in the recent publication of the *Research Workforce Strategy*.



Issues were explored through an extensive consultation with researchers: through an on-line survey, a series of focus groups, and an invitation to leading organisations to make submissions. The survey was open to responses nationally; and the eight focus groups were held in four different cities.

The four Learned Academies helped lead this process. Between them the Academies have over 2,000 members; and academicians and Academy staff helped draft the survey questions, participated in focus groups, made written submissions, and assisted with practical arrangements.

3

Methods

3.1 Survey

A survey posted on the ACOLA website invited both qualitative and quantitative responses. In some questions respondents were invited to choose one option from a series of statements (the 'best feature' or the 'worst feature'). In others they could agree (or not) with a series of statements; and others again where they were asked to nominate problems they had encountered and solutions they recommended in open-ended responses.

The survey contained 23 questions, including demographic information to ascertain their status by career stage, employer, discipline, age, and gender. A copy is attached at Appendix A.

It was advertised through a media release and a direct invitation to a dozen prominent organisations to publicise it through newsletters and websites.

The report drew on qualitative data as well as quantitative in distilling the views of the respondents and participants on a best practice approach to support a research career. Note that respondents to the survey and participants in the focus groups were self-selecting. We recognise the possibility of bias because people with a particular set of views may be more inclined to participate or because processes can favour a certain group e.g. those with ready access to the internet.

The survey drew 1203 responses.

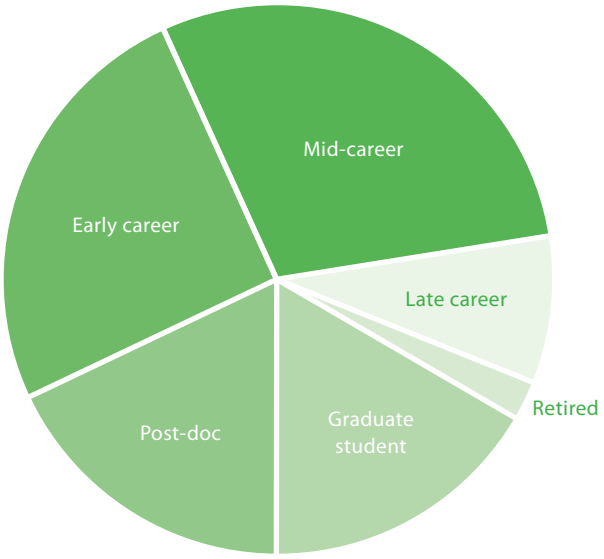
Table 1. Survey respondents by age

Age	Frequency	Percentage
20-29 years	182	15.1
30-39 years	447	37.1
40-49 years	270	22.4
50-59 years	171	14.2
Over 60	56	4.7
Skipped question	77	6.4
Total	1203	100*

*Percentage totals have been rounded to the nearest whole number. Percentages have been rounded to the nearest whole number throughout this report.

Further information on the demographics of the respondents is contained in Appendix D.

Chart 1. Survey respondents by career stage



Analysis

The survey's quantitative data was analysed using the functions of Survey Monkey. Responses were compared according to the circumstances of the respondents: by age, career stage, discipline, employer and gender.

3.2 Focus groups

Eight focus groups fleshed out the ideas which emerged in responses to the survey. Fifty-five people participated in eight separate discussions in four locations: Melbourne, Sydney, Brisbane and Canberra. Each discussion ran for about 90 minutes. Participants were broadly representative when measured by discipline, gender and age; and almost all had completed the survey. The groups included representatives of the Academies.

After describing their experiences, participants were asked to nominate actions to improve the career pathway for researchers, first by the Federal Government and second by their employers (universities and other research institutions).

Extensive notes of the discussions were sent back to participants for correction and for them to add further ideas. The participant-approved focus group reports were analysed to identify common themes. The moderator's guide and a list of session times are shown in Appendix B.

Throughout the report, those who completed the survey are referred to as 'respondents', and those who took part in the focus groups as 'participants'. The combined views of participants and respondents are referred to as 'the study group'.

3.3 Submissions

ACOLA wrote to leading research sector organisations advising them of the study, inviting them to publicise the survey among their members and to make an organisational submission.

Three organisations made a submission:

- The Australian Academy of the Humanities
- The Australian Research Council
- The Deans of Arts, Social Sciences and Humanities

There was also one private submission.

4

Findings

4.1 How attractive is a career in research?

Respondents are strongly attracted by a career in research, with 48% choosing 'very attractive' and 32% 'reasonably attractive' on a five-point scale. Enthusiasm for such a career increased in almost linear fashion as researchers progressed through career stages.

When invited to nominate the single best thing about a research career from a list of 6 options, respondents chose 'the satisfaction of working on interesting and important issues', and 'working in a stimulating environment'. Researchers enjoy the challenge of finding solutions to intractable problems, and they are attracted by the idea of making a difference, helping people, and being able to follow a problem from conception to solution.

> *The chance to seek truths and to improve human knowledge about ourselves and the world in which we live.*
>
> *(Humanities, no gender specified, retired)*

Other 'best thing' options such as 'working conditions' and 'career development and progression' drew some support, between one and five per cent.

The findings were broadly consistent across age, discipline, gender and full-time/part-time status but there were some variations: humanities researchers were more enthusiastic about a life in research; and natural scientists and those working in national research institutes less so. (This is consistent with other analyses showing enthusiasm for a career in research increased with age—respondents from the humanities were older on average than respondents from natural scientists.)

Table 2. Attractiveness of a career in research, by career stage

Response	Graduate student	Post-doc	Early career	Mid-career	Late career	Retired	Response totals
Very	82 (41.2%)	86 (40.2%)	143 (47.7%)	182 (52.4%)	60 (58.3%)	15 (57.7%)	568 (47.8)
Reasonably	66 (33.2%)	78 (36.4%)	94 (31.3%)	101 (29.1%)	31 (30.1%)	8 (30.8%)	378 (31.8%)
Mildly	22 (11.1%)	25 (11.7%)	34 (11.3%)	24 (8.1%)	6 (5.8%)	2 (7.7%)	113 (9.5%)
Not very	20 (10.1%)	17 (7.9%)	24 (8%)	30 (8.6%)	3 (2.9%)	0 (0%)	94 (7.9%)
Unattractive	9 (4.5%)	8 (3.7%)	5 (1.7%)	10 (2.9%)	3 (2.9%)	1 (3.9%)	36 (3%)
Answered question	199	214	300	347	103	26	1189
Skipped question*							14
Total							1203

*10 respondents skipped the question on what stage they were at in their career, and 4 respondents skipped the question on the attractiveness of a research career.

Chart 2. How attractive to you is a career in research? All respondents

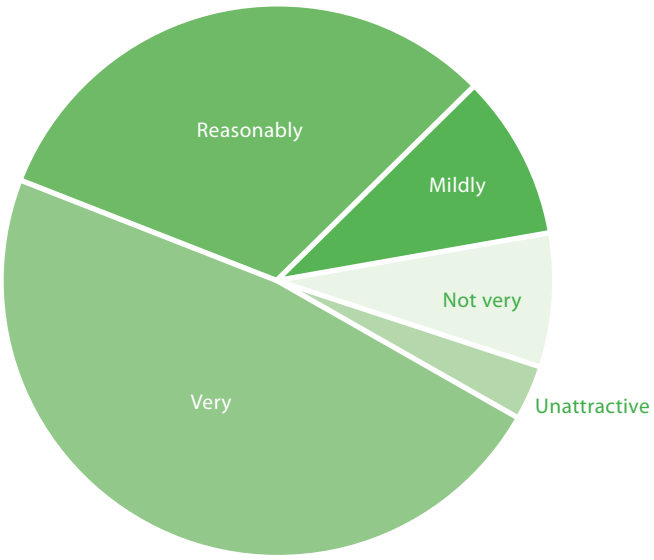


Table 3. The best thing about a career in research, by career stage

Response	Graduate student	Post-doc	Early career	Mid-career	Late career	Retired	Response totals
Salary	1 (0.5%)	1 (0.5%)	0 (0%)	1 (0.3%)	2 (2%)	0 (0%)	5 (0.4%)
Working conditions	7 (3.5%)	10 (4.7%)	8 (2.7%)	10 (2.9%)	0 (0%)	0 (0%)	35 (2.9%)
Working on interesting and important issues	141 (70.9%)	156 (72.6%)	222 (74.2%)	259 (74.2%)	80 (77.7%)	21 (77.7%)	879 (73.8%)
Stimulating environment	36 (18.1%)	41 (19.1%)	51 (17.1%)	61 (17.5%)	13 (12.6%)	1 (3.7%)	203 (17%)
Career development, progression	7 (3.5%)	5 (2.3%)	7 (2.3%)	5 (1.4%)	0 (0%)	0 (0%)	24 (2%)
Other (please specify)	7 (3.5%)	2 (0.9%)	11 (3.7%)	13 (3.7%)	8 (7.8%)	5 (18.5%)	46
Answered question	199	215	299	349	103	27	1192
Skipped question*							11
Total							1203

*10 respondents skipped the question on what stage they were at in their career, and 1 respondent skipped the question on the best thing about a research career.

4.2 The best and worst of a career in research

The study group liked their work but not the employment system in which they worked. Their enthusiasm was tempered by a number of factors. 'Uncertain job prospects' was the primary issue. Females were more concerned about this than males.

4.2.1 Job prospects

"Uncertain job prospects' stood head and shoulders above other issues when respondents were asked to nominate the single 'worst thing' about a career in research. Fifty three per cent of respondents selected this, from 6 options.

Most early career researchers face a succession of short-term contracts as they strive to forge a career in research. Their chances of winning grants or fellowships are slim, and even lower if they have a limited record of publications. The study group felt there are not enough positions for the available pool of researchers. Compounding the problem is the limited availability of institutional funds which might 'carry' a researcher from the end of one grant until they succeed in picking up another. Senior researchers face similar challenges because of the equally competitive race facing them.

When asked to nominate what the Australian system did well or did badly from 15 options (and able to choose as many as they liked), 83% of all respondents chose 'too much reliance on short-term contracts'. This was the top choice irrespective of discipline, age, gender or institution, with natural scientists most concerned. While short-term contracts may offer useful experience, they have limited value in allowing researchers to establish themselves.

> *I have had 3 jobs at 3 different universities across 3 states in 2 years. I have fixed term contracts and I have had to move states to find jobs. This is very expensive and setting yourself up with networks and friends is difficult. Every time you move and start a new job you have lost the ability for a while to write up past work as in a new job you're busy trying at getting your head around that. There is a lot of discontinuity.* *(Psychologist, female, 30-39)*

4.2.2 Work load

Thirteen per cent of respondents nominated 'work load' as the worst thing about a career in research.

It is a sharply increasing concern with age and seniority, barely mentioned by young researchers but nominated by more than one quarter of late career researchers. The study group said excessive workloads and job expectations meant they had to juggle teaching, supervising, maintaining an active research profile, managing projects and complying with administrative requirements. This was exacerbated by a low (and decreasing) level of administrative support.

> *It is almost impossible to carve out time to do research as the teaching workload is horrendous. I coordinate, lecture on and provide many tutorials for large courses (800+ students). The institution keeps playing with our workload model so that more and more teaching is dumped on us and our attempts to do research are not recognised within the model. It is sad and disheartening.*
>
> *(Social scientist, no gender specified, no age specified but mid-career)*

4.2.3 Career path

Ten per cent of respondents nominated 'lack of career path' as the worst thing about a career in research, while 2% choose 'career development' as the best. These views were broadly common to researchers at all stages of their careers, with minor variations by gender (more of an issue for men) and employment. Graduate students took a more positive view than all other groups.

Table 4. The worst thing about a career in research, by career stage

Response	Graduate student	Post-doc	Early career	Mid-career	Late career	Retired	Response totals
Salary	21 (10.6%)	18 (8.4%)	30 (10%)	26 (7.5%)	7 (6.8%)	2 (8%)	104 (8.8%)
Work load	12 (6.0%)	10 (4.7%)	43 (14.3%)	61 (17.7%)	28 (27.2%)	2 (8%)	156 (13.2%)
Uncertain job prospects	131 (65.9%)	150 (70.1%)	152 (50.6%)	153 (44.3%)	28 (27.2%)	8 (32%)	622 (52.4%)
Working conditions	8 (4.0%)	3 (1.4%)	6 (2%)	19 (5.5%)	5 (4.9%)	2 (8%)	43 (3.6%)
Lack of career path	10 (5.0%)	23 (10.7%)	34 (11.3%)	38 (11.0%)	10 (9.7%)	4 (16%)	119 (10.0%)
Other (please specify)	17 (8.5%)	10 4.7%)	35 (11.6%)	48 (13.9%)	25 (24.3%)	7 (28%)	142 (12.0%)
Answered question	199	214	300	345	103	25	1186
Skipped question*							17
Total							1203

*10 respondents skipped the question on what stage they were at in their career, and 7 respondents skipped the question on the worst thing about a research career.

When asked where the Australian system performed badly, issues related to the career pathway were top of respondents' concerns. Eighty three per cent chose 'too much reliance on short term contracts', and other career-related issues also concerned respondents:

- little assistance in career development as researchers become more experienced (61%);
- does not provide systematic advice on possible careers in research (53%);
- no system to encourage researcher mobility between universities, industry and government (49%)
- no systematic approach to renew an aging research community in universities (43%)

Table 5. The worst thing about a career in research, by age

Response	20-29	30-39	40-49	50-59	60-69	70 and older	Response totals
Salary	23 (12.6%)	42 (9.4%)	24 (8.9%)	6 (3.6%)	1 (2.3%)	2 (18.2%)	98 (8.8%)
Work load	7 (3.8%)	41 (9.2%)	43 (15.9%)	34 (20.2%)	11 (25.6%)	2 (18.2%)	138 (12.3%)
Uncertain job prospects	123 (67.6%)	265 (60.0%)	125 (46.3%)	68 (40.5%)	14 (32.6%)	3 (27.3%)	595 (53.2%)
Working conditions	6 (3.3%)	14 (3.1%)	12 (4.4%)	8 (4.8%)	2 (4.7%)	1 (9.1%)	43 (3.8%)
Lack of career path	12 (6.6%)	43 (9.7%)	35 (13.0%)	17 (10.1%)	5 (11.6%)	0 (0%)	112 (10%)
Other (please specify)	11 (6.0%)	40 (9.0%)	31 (11.5%)	35 (20.8%)	10 (23.3%)	3 (27.3%)	130 (11.6%)
Answered question	182	445	270	168	43	11	1119
Skipped question*							84
Total							1203

*76 respondents skipped the question on age, and 8 respondents skipped the question on the worst thing about a career in research.

4.2.4 Salary

Nine per cent of respondents nominated 'salary' as the worst aspect of a research career and only a negligible number as the best. Those working in nationally-funded research organisations and younger researchers had the most negative views. The level of dissatisfaction decreased in a linear fashion with age, from 13% (20-29 years) to 2% (60-69 years).

> *It is risible to hear politicians talk about attracting the 'best and brightest' when those with such rare potential eschew the 'low, hard road' of scientific research in Australian for better paying, but perhaps less imaginative pursuits.* *(Medical, male, no age specified)*

While this was a major issue for some, respondents had a divided response. Thirty-four per cent said the Australian system 'provides adequate salaries in universities and national research bodies', while 44% thought they were inadequate. Participants in the focus groups said salaries were inadequate considering their education and training, but discussions were more focussed on securing long-term employment. Some said they would be happy to trade off salary for job security, through measures such as longer contract periods.

Funding gaps was an issue, and participants reported having to forego substantial fractions of their salary—up to 28%—in order to take up a fellowship because the funding body would not meet the gap between the grant and the institutional salary. In other programs the full salary may be provided but there is no funding to do research.

4.2.5 Working conditions

'Working conditions' covers such matters as the organisation of work and work activities; training, skills and employability; health, safety and well-being; and working time and work-life balance.

Overall respondents had a balanced response to 'working conditions': 3% selected it as the best thing in a research career and 4% as the worst. But when responses were examined in detail, stronger views emerged.

On the question of where the Australian system performed well and badly, respondents chose aspects of the research training scheme on the 'does well' side including the stipend offered by the PhD program, and encouragement to take up post-doc positions. Positive views towards the PhD program heavily outweighed the negative, and clearly it is regarded as a powerful factor in launching people on a career in research.

Programs which trained research students in complementary skills important for a career in research (project management, managing IP, communication skills, etc.) also enjoyed support as an aspect where the Australian system performs well.

On the 'does badly' side, respondents made four times as many selections, many of them 'working conditions' issues. A constant theme in the survey and the focus groups was how difficult it was to start and sustain a career in research, with short-term contracts, highly competitive funding systems and an under-resourced system with increasing workloads.

> *Job uncertainty is appalling, we are the most educated people in the country and we can barely provide for our family and have at most 3-4 years job stability. This is extremely stressful.*
>
> *(Medical researcher, male, 30-39)*

Concerns were spread fairly evenly across all age groups on these 'does well, does badly' issues, although researchers in the 50-59 age group felt particularly strongly on working conditions, career development and advancement, mobility, and workforce renewal.

4.2.6 Other

Respondents were limited to one item when selecting the best thing and worst thing about a career in research, but some who wanted to comment chose the 'other' option.

On the 'best' side, 4% of respondents took the 'other' option. They talked about autonomy, the 'excitement and freedom in determining a course of study', the chance to make a difference by 'solving practical problems of public policy' and seek truths, and the intellectual challenge.

On the 'worst' side, 12% chose 'other' and nominated a range of issues: an 'utter lack of administrative support'; being pushed to publish mediocre papers in order to maintain research active status; hugely time-consuming processes to write grant proposals; administrative demands; and the absence of a culture sympathetic to research and scholarship. A common response was 'all of the above'.

> *I am on leave without salary from my current Australian University on a two-year post a university in East Asia. Here, my immediate supervisor tells me to focus on a high impact research monograph rather than a lot of little articles just to prove I am research active. How refreshing. I have been able to accomplish more here on the big project that has been accepted by Columbia University Press in two years than in four years in Australia.* *(Humanities researcher, male, 40-49 years)*

They complained that job prospects were uncertain and unreliable. Growing casualisation (implying uncertainty of ongoing employment) is named as a difficulty. Insufficient funding was said to lie behind many of the problems.

4.3 Research career mobility

The study group felt that a new richness could be introduced to Australian research life if it were easier to move between academia, government and industry.

4.3.1 Moving between research institutes

Geographical mobility is generally seen as an important and attractive part of building a research career, a 'fantastic opportunity' provided family circumstances allow it. Moving helps researchers gain wider experience and exposure to different work cultures. Many respondents welcomed the idea despite the costs, the potential loss of productivity, the upheaval: "I am a global citizen. I don't mind moving as long as I am single."

Modern technology does allow researchers to gain some of the benefits of mobility without having to make a physical move. It is possible to stay in Australia and still be orientated to the outside world, and published in the best international journals:

> *There are not the same opportunities in terms of scholarships overseas perhaps, but being internationally mobile now can be as much about the internet and email, about embedding oneself in the opportunities to be international and make one's research international.* *(Historian, female, 50-59)*

Moving geographically has a negative side. Families multiply the difficulties: finding jobs for trailing spouses; uprooting children from schools, friendship groups and extended families; court orders which prevent single parents relocating their families. Both participants and respondents resented being forced to move, because of an expectation upon completing a research degree or a post-doc position, or to secure a new position. Even moving from one part of an institution to another may cause a loss of productivity.

One participant said the hardest thing was setting up and establishing themselves in a new position quickly enough to begin the research before the contract drew to an end. A three year contract was characterised as: 'one year to learn the job, one year to do it, and one year to find a new job.'

Overseas experience is a double-edged sword. Changing institutions and working in a different country can be intellectually stimulating, but researchers may become trapped overseas, unable to return because of a lack of comparable positions in Australia, or because their children have become Danish or American and do not want to leave, or because there is a position for one partner but not the other.

4.3.2 Movement between industry, government and research institutes

Participants reported a cultural resistance to industry experience because it is not well-regarded in university circles. This sort of experience is valued in the US, but participants said they were 'looked down on' because they had built a career outside academia or received qualifications from an unconventional source. One said his years of research in industry were 'pretty much discounted by academia' and that he was not considered a 'real' researcher because he did not have a PhD.

The cultural resistance is reinforced by a systemic resistance, in that a strong publication record is an important factor in determining appointments, promotions and grant applications. A person who gained their PhD at the Garvan Institute said they found it hard to establish themselves as an independent researcher because their industrial background meant a 'less impressive publication record'. The system of measuring 'quality' primarily through publications was criticised as being too narrow.

> *Commercial work is contrary to working up the academic ladder. If you do stuff that is practical and applied to the industry, it is seen as lesser than something that is esoteric.*
>
> *(Commerce and marketing, male, 30-39)*

When asked if the Australian system 'encourages researcher mobility between sectors: university to government to industry', 49% of respondents said there was no system to allow these moves. Concerns increase with seniority, with researchers in the 50-59 age group frustrated by the difficulties of moving between sectors. They suggested borrowing from the interactive nature of the US system, where academics taking a break from academia may go to industry.

4.4 Other issues

4.4.1 The number of PhD students

The view that too many PhD students are being accepted by universities for the research and teaching positions currently available was a persistent sub-theme in the study group. They described the scramble for grants and positions as 'disheartening' and said too many people were competing for a limited number of positions.

Participants questioned the motivation of universities in recruiting students, saying the attraction is that students attract government funding and (in some disciplines) are a source of cheap labour in the laboratory or field. These incentives lead university staff to encourage more students to undertake PhDs, to 'crank out' graduates even though the employment outlook in research was bleak and the Australian economy currently lacks the capacity to absorb these graduates. How many PhD graduates does Australia need?

> *There are many reasons to do a PhD but too many people are being advised by older people who found it easier to get employment. I have friends who are extraordinarily qualified but can't get a job.*
>
> *(Archaeologist, female, 30-39)*

Participants suggested concentrating the existing resources on fewer students. This would increase the quality of the experience, by allowing them extra time to publish papers, develop teaching experience and acquire the skills to compete for positions. One supervisor said he told his students not to be in a hurry but to get some publications while doing their PhD; and others pointed to the benefits of the American system:

> *The entire American education system is focused on getting PhDs competitive in the US market. They graduate with a bunch of publications. They have whole conference sessions on getting ready for the job market. We have nothing like that. The people Australians are up against aren't local people but international scholars.* *(Archaeologist, male, 50-59)*

4.4.2 Sources of authoritative information and advice

The career pathway seems clear at the beginning of the process. Junior researchers thought of the PhD as the means to launch their career. Many instead discovered it entitled them only to enter a fierce competition for grants and positions, and that this would be a constant factor in their lives as researchers.

> *I had thought that the PhD would lead me into academia but this now looks much less certain because this doesn't appear to be a stable or dependable career pathway – I don't know that I want to bounce from contract to contract in the hope that one day I might land an academic position.*
>
> *(Social scientist, male, 30-39)*

Participants said they need guidance and advice to help develop their careers: mentoring, professional development and a definitive source of career information. They describe the career path of an academic as 'mysterious' and said the true picture should be available before people embarked on a PhD.

We are not doing our job explaining what happens when you enter a PhD program. ... There is a lot of misunderstanding of what you are getting into. A lot is based on fantasy and we are not presenting this information in a way that we need to. *(Research manager, female, 50-59)*

Mentoring is regarded as significant, not just in the early stages but also as researchers progress. Some participants said they lack the skills to cope with life as a researcher, and felt that a mentor's advice was very important:

ECRs need to build their networks and reputations. Need to train people to be researchers to live in a competitive world. We need to provide them with the skills to write a research grant, to cooperate and collaborate and be hungry for success. *(Research manager, female, 40-49 years)*

4.4.3 The process of winning grants

Early career researchers reported a paradoxical situation: they cannot win grants or fellowships because their publication record is not competitive, but it is difficult to research or write papers while they have heavy teaching loads, or are performing contract work on some senior academic's research project.

The cost of writing an application is high. One participant said an ANU study showed the cost of submitting a bid for a Discovery grant is $50,000, and another reported spending 'a solid two months' on a DECRA application. These processes become zero-sum games when the chance of success is factored in: between one in six and one eight are successful.[1]

This is a black hole for time and energy as so few people get these grants and there is not the money. It takes a month to do these applications. I cheat because if I had to develop an entirely new project it would take me at least 2 months. *(Humanities, female, 30-39)*

The dilemma is that to win grants ECRs feel they need to be associated with a senior researcher, but if they continue this association it is difficult to establish themselves as independent researchers. They were welcome to write a grant proposal, but their name may not be included on the application because their CV is not strong enough.

Another problem is the inflexibility and opacity of the system—one application round a year and no feedback to unsuccessful applicants. Researchers want more flexibility to allow for their personal work and lifestyle needs, for part-time options or maternity or by being less prescriptive on how the funds may be used. One researcher said that all she needed was 'a computer and library access'; and that she was forced to 'pad out' her grant application and put in for things she did not need in order to meet the minimum requirements.

The NIH grant system, which has 2 rounds/year, works with researchers to perfect the grant over rounds and provides funding for 5 years - an adequate time for establishment of a project and productivity outcomes to be realised. It is a system that works with possibility and encourages research, not concepts that I associate with the Australian granting system. It is a rational and reasonable way to allocate funding that provides a degree of consistency and certainty for those planning their research careers. *(Natural sciences, female, 40-49)*

1. Published estimates of DECRA success rates vary but see for example www.uow.edu.au/content/groups/public/@web/@raid/documents/doc/uow099719.pdf. Here the DECRA success rates were based on figures supplied by the ARC. They received 2,159 applications and made 277 grants in 2011.

4.4.4 Work-life balance

Women felt the pressure of maintaining a research career and raising a family more strongly than men. Thirty-seven per cent of female respondents nominated 'penalises women who try to re-enter the workforce after taking family leave' as a defect in the Australian system, compared to 12% of males. (Interestingly, slightly more females [18%] than males [16%] selected the proposition 'systematically helps women re-enter the workforce after taking family leave' when asked what the Australian system did well.)

They talked of a lack of work-life balance and women said they felt confronted by a choice between career and family.

> *I am at the age when I am trying to decide to have kids or not. I am lucky that my husband is also an academic. I feel if I take time off in my five-year research position that I will be dead in the water, but if I don't then I won't have a family.* *(Humanities, female, 30-39)*

4.4.5 Bureaucracy and paperwork

The study group—particularly senior researchers—reported their frustrations with the demands of administration: paperwork, filing of returns, submitting lengthy applications full of unimportant detail. They said this was a burden on all activity, in a system increasingly concerned about accountability and compliance but oblivious of the effect on productivity. Participants said 'there needs to be more trust'.

> *There is a very Australian view that research has to be accountable to tax payers. In Germany you spend a lot identifying good people and then you leave them alone to do their research. There will be a small number of people who don't pull their weight under this system but it is worth it. I am wary of people who say you need more and more accountability.* *(Engineer, male, 30-39 years)*

Participants questioned how much of the information required in an application to ARC and NHMRC is actually used. The first step was to do away with all the things that make it difficult, then 'simplify process[es] and create more transparency with feedback'.

5

The needs and challenges at different stages of a research career

5.1 What does the Australian system do well? Do badly?

Establishing and maintaining a career in research is challenging. Funding is tight and workload pressures high, as institutions try to do more with less. Navigating each stage of a career path presents its own set of problems.

Table 6. The good and the bad: issues ranked by career stage

Worst aspect of a research career	What the Australian system does well	What the Australian system does badly
Graduate students		
• Job prospects • Salary	• Adequate stipend to PhD students (69 respondents chose this option) • Adequate salaries in universities, research bodies (47) • Good working conditions (45) • Trains post-grads in complementary skills (42)	• Too much reliance on short-term contracts (146) • Inadequate provision of employment and scholarships (119) • Limited jobs in universities and research bodies (118) • Scholarships do not allow time to complete PhD (111)
Post-docs		
• Job prospects • Lack of career path • Salary	• Adequate stipend to PhD students (119) • Adequate salaries in universities, research bodies (65) • Encourages new graduates to do post-docs (52) • Good working conditions (39)	• Too much reliance on short-term contracts (198) • Inadequate provision of employment and scholarships (173) • Limited jobs in universities and research bodies (158) • Little assistance in career development as researchers become experienced (135)
Early-career		
• Job prospects • Career path • Work load	• Adequate stipend to PhD students (120) • Adequate salaries in universities, research bodies (83) • Encourages new graduates to do post-docs (67) • Trains post-grads in complementary skills (55)	• Too much reliance on short-term contracts (253) • Inadequate provision of employment and scholarships (207) • Limited jobs in universities and research bodies (184) • Little assistance in career development as researchers become experienced (175)
Mid-career		
• Job prospects • Work load • Career path	• Adequate stipend to PhD students (151) • Encourages new graduates to do post-docs (99) • Adequate salaries in universities, research bodies (97) • Trains post-grads in complementary skills (70)	• Too much reliance on short-term contracts (277) • Little assistance to mid-career researchers to develop (252) • Inadequate provision of employment and scholarships (243) • Little assistance in career development as researchers become experienced (242)
Late career		
• Work load • Job prospects • Career path	• Adequate stipend to PhD students (36) • Adequate salaries in universities, research bodies (34) • Encourages new graduates to do post-docs (25) • Helps women re-renter the workforce after family leave (18)	• Too much reliance on short-term contracts (87) • Inadequate provision of employment and scholarships (77) • Little assistance in career development as researchers become experienced (75) • Limited jobs in universities and research bodies (72)
Retired		
• Job prospects • Career path	• Adequate stipend to PhD students (11) • Adequate salaries in universities, research bodies (8) • Encourages new graduates to do post-docs (6) • Assists mid-career researchers to develop their careers (6)	• Too much reliance on short-term contracts (26) • Poor working conditions (21) • Inadequate provision of employment and scholarships (21) • Scholarships do not allow time to complete PhD (19)

5.2 Concerns by career stage

The concerns of the study group depend on the stage in their career. The focus of early career researchers is on finding secure employment. For mid-career researchers, the issues are workload, career development and short-term contracts; while more senior staff are most concerned about workload and job prospects.

Chart 3. What the Australian system does well

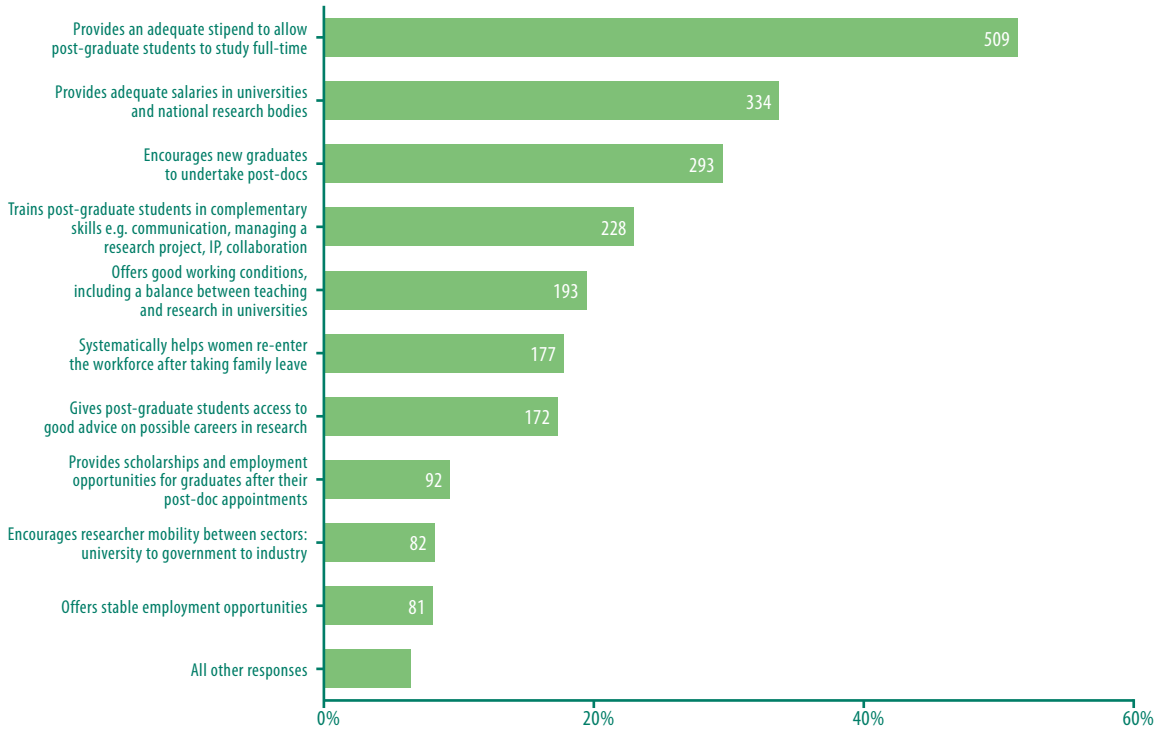
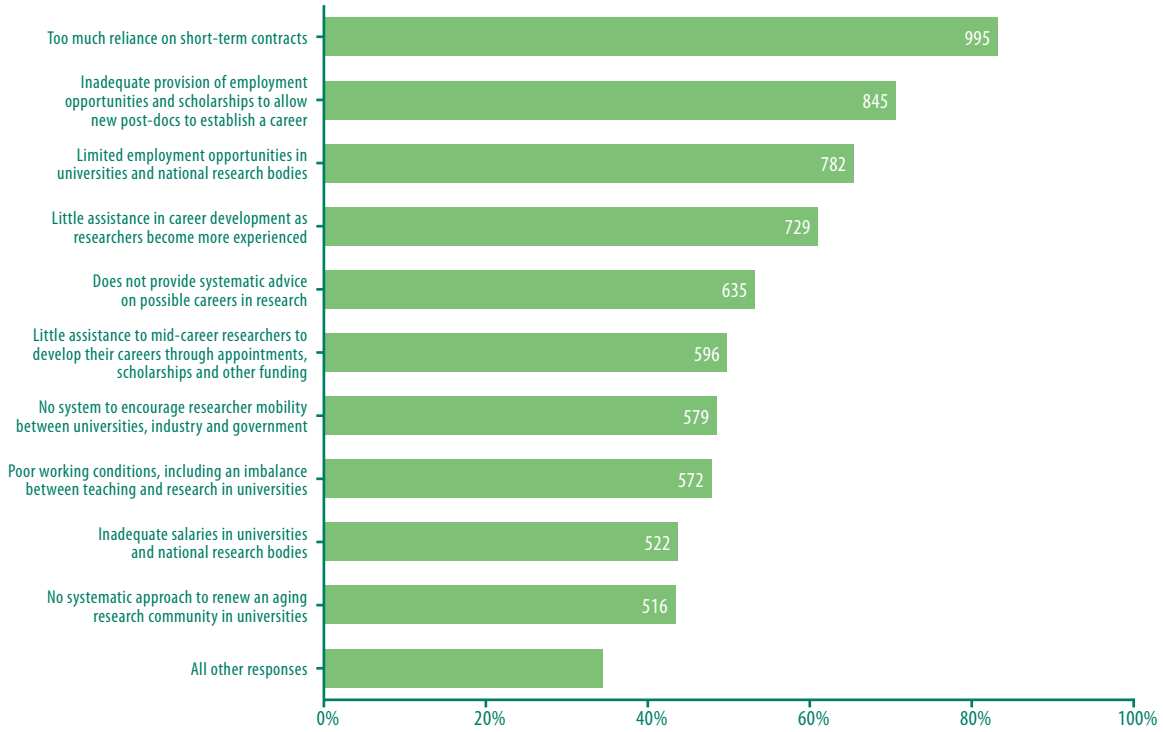


Chart 4. What the Australian system does badly



5.2.1 Graduate students

Graduate students feel they do not have enough support while doing their PhD. The stipend is low ('it's hard to be the sole breadwinner for a young family on under $30000 a year'); funding to attend conferences is minimal and they feel pressured to complete their PhD within the stipulated time.

They are concerned about limited employment opportunities: fellowships, scholarships, and post-doc positions, all often coupled with short-term funding. The pathway for a career in research and teaching is obscure, mentoring is inconsistent, and training opportunities limited.

> *Compared to other professional vocations, research careers are high stress (long working hours, travel, publication, technically challenging), high risk (in the sense that research outcomes are not assured), and low pay.* *(Natural sciences, no gender specified, 30-39)*

5.2.2 Post-docs

The challenge for post-docs is finding a job. They are most concerned about short-term contracts and the lack of employment opportunities; and least concerned about working conditions.

Post-docs said they did not have the experience or publications to win grants, and little time while employed on contracts to write up their research and publish. This makes it difficult to establish themselves as independent researchers.

> *The lack of continuing positions makes it very hard to enter and stay in a research career; so much time has to be expended on grant applications etc that it compromises the ability to publish and therefore your likelihood of getting grants!* *(Social sciences, female, 30-39)*

They need advice and support to make the difficult transition from a higher degree student to a job. Some said the true employment picture did not emerge until they had graduated:

> *I am yet to meet a single PhD student who was told how hard it would be to get a job at the other end.* *(Biochemistry, female, 30-39)*

It is very competitive and some members of the study group expressed concern at the number of PhD graduates in the system.

5.2.3 Early career researchers

Many early-career researchers reported they were frustrated and disillusioned by the constant battle to find a secure position. Many of them experience a succession of short-term contracts, often with a heavy teaching load or working on a more senior researcher's project, and they battle to become independent researchers.

Once they complete their PhD and post-doc, 'the funding funnel narrows enormously'. There may be little time to do meaningful research and the temptation (and incentive) is to churn out 'mediocre papers to keep up the numbers'.

> *After a wonderful post-doctoral fellowship at an Ivy League university in the US I came back to Australia and spent 3 years writing grant after grant and publishing mediocre papers to keep up the numbers and very little time was left to actually do any meaningful research. I work part-time as a medical practitioner and this was not taken into account when assessing grants.* *(Health sciences, no gender specified, 40-49)*

Quality, time and clarity are the missing ingredients in their new careers, and the absence of structured mentoring systems limits the sources of advice.

5.2.4 Mid-career researchers

Mid-career researchers are more concerned about workload, working conditions and career path than those less advanced in their careers, and lack advice on career development. While 82% said that a career in research was attractive, the group feels pressured by high workloads, time-consuming grant applications, heavy teaching requirements and limited job security.

> *To me it boils down to being asked to do a job and then getting almost no institutional support. Poorly maintained and inadequate equipment, too high a demand to keep doing more with less.*
>
> *(Natural sciences, no gender specified, 40-49)*

Their concerns include a sense of the diminishing quality of their work experience. Some think there should be fewer PhD students, but better trained, with a higher stipend and a longer period to finish their work. Their workload would be reduced by the introduction of a 'light-touch' grant review system. The difficulties are considerable:

> *I have a University medal, Frank Fenner medal, CJ Martin Fellowship, conducted postdocs in Cambridge and all over Australia, 22 publications in the last 5 years … I've never held a national grant and whilst the funding is allocated under the current framework, I never will. In the next year or two, without funding, I will be forced out of research.* *(Biochemist, male, 30-39)*

5.2.5 Late-career researchers

This group found a career in research most attractive, but were also most vocal when it came to identifying aspects where the Australian system performed poorly.

> *Luckily I am a senior academic with a strong international profile. Even then, the red tape and constant reorganisation of teaching and research programs and the focus on short-term productivity is worrying, and takes up too much time.* *(Humanities, no gender specified, 60-69)*

They feel the system has deteriorated: overcrowded, weighed down by bureaucracy and administrative work, and tightly squeezed for funds. Research assessment exercises based on publications and citations can force researchers into unproductive practices when their work could have outcomes more relevant to industry or society. One respondent said that most of his post-doc was spent at the bench, but post-docs today 'spend most of their time at their computers filling up regulatory forms and applying for grants.'

They are discouraged by the lack of secondments, exchanges and sabbaticals to move people and ideas between research, industry and government.

A planned approach to research careers would help:

> *Identify clear expectations for career progression, in the form of standards, inputs, outputs and outcomes these can form a template for both entry into research but also guide professional learning and development in research contexts.* *(Social sciences, female, 60-69)*

5.2.6 Retired researchers

Forty percent of retirees are still involved full-time in research and 52% part-time, with some teaching as well. Like late-career staff, they found a career in research highly attractive. The freedom of retirement allows them to concentrate on solving problems and seeking ideas; and they welcome relief from other duties.

Their main concern is an over-reliance on short-term contracts. They worry about early career researchers: too few opportunities for post-docs to establish a career, and not enough time for PhD students to complete their thesis. Poor working conditions, including an imbalance between teaching and research in universities, also rank high.

They are disheartened by a lack of respect for universities in society, and worried about funding: for the ARC, to provide tenure and grants for early career researchers, to allow for longer-term projects, and 'to allow staff to spend more time on research and less on teaching and admin'.

Administrative burdens irritate them and the drift towards casualisation is a concern. Staff need more time, more training and more support to carry out their work.

Elements that may contribute to best practice

The study group identified a number of broad elements, which they believe may contribute to best practice in career pathways in research.

In this section, these suggestions are presented first by career stage (for ease of reference) and then in consolidated form. Readers who wish to avoid the inevitable repetition should jump straight to section 6.3.

6.1 For Government

6.1.1 Graduate student

Graduate students want more certainty about their career. They advocate more positions, grants and fellowships so they can manage a smooth transition to the next stage in a research career, and less

reliance on short-term contracts. Contract positions should be longer, to give them time to settle into their new job and gain experience. To them the system is over-competitive.

They want more time (with accompanying funding) to complete their PhD and feel that early career appointments should be longer.

They want higher salaries.

There is some concern over the number of PhD scholarships awarded, and the consequent competition for positions in research.

6.1.2 Post-docs

This group is experiencing a sudden narrowing of the career funnel, from a wide mouth encouraging them to take up a PhD to a sharp constriction when it comes to jobs upon graduation. Careers and jobs are their top concern.

They want a greater degree of certainty in their lives, tenured positions, job security and a clearly defined career pathway. This would be helped if positions and grants had a longer time frame, 5 years instead of 3.

They want better provision of mentoring, career advice and access to professional development to help them build a research career, and they need support (and time) to take the first steps. There is an associated call for better schemes to help women make the transition back to the workforce after having children.

They want funding bodies to be reformed so the programs better fit the different circumstances of post-docs, including provision of smaller grants and travel grants, and more encouragement for collaborations between different players in the research sector

> *Here's my problem: I desperately want to stay in research but I'm am being pushed out due to: -student researchers being cheaper to employ to do the same thing I do in the lab. -No value placed on the other things I can do in the lab that students can't ie. helping to write grants, mentoring, teaching. -I've hit the top of my pay scale and can't move up the ladder without obtaining a grant. I can't get a grant because of a poor PhD mentoring experience in my early years left me behind the eight ball in my track record despite being highly productivity in my post-doc years. So I'm not valued in my role or my salary nor do I have any prospects of career progression or diversification of skills. I'm at the top of my game but I feel I'm being wasted in this role.* *(Natural sciences, female, 30-39)*

6.1.3 Early career researchers

Early career researchers feel their talents and capabilities are overlooked by a wasteful and stressful system, characterised by a lack of job continuity, constant chasing after funds, low salaries and heavy teaching demands.

They want more fellowships which include support for research activities, and greater access to national funding schemes through new programs to support ECRs who have not yet had the time to build a competitive publications record.

Training, mentoring, advice and small funding programs should all be provided to help the development of early career researchers, and contribute to a clear career path. Early career researchers need lengthier contracts and fellowships in their formative years, supporting them while they establish a track record.

They want programs and systems to encourage collaboration and mobility: with industry, with government, with colleagues overseas and with peers in Australia; and for cross-disciplinary work. Many of their recommendations would require additional funding.

There needs to be better funding for research! The fastest growing category of NHMRC grants is "fundable but not funded" which means there is a lot of quality research and researchers out there that are never given the chance. This would be a particular issue for early career researchers whose track records aren't as strong. *(Social sciences, female, 30-39)*

6.1.4 Mid career researchers

Mid-career researchers want job security and stability, through funding of more positions in research institutions, and a boost to the budget of the ARC and NHMRC.

They want increased job security: longer terms for fellowships and grants, an increase in tenured and permanent positions, and a better balance between teaching and research. These matters are heavily dependent on increased funding.

They want a career path which begins with a clear articulation of the purpose of research institutions at a national level, and translates into appropriate training and development programs.

Needs to start by articulating a clear vision for the University sector and the place of research, then look toward providing clear signals for those aspiring to research careers to remove some of the uncertainty and lack of systematic approaches to problems which currently exists. *(Engineering, male, 30-39)*

They want stronger links with industry to allow mobility, provide employment and a new source of research funding; and greater emphasis on programs to allow women to sustain a research career. Commonwealth action is required to remove structural impediments.

This is coupled with a recommendation for a series of reforms with national funding bodies: simpler applications and more transparency in the decision-making process.

6.1.5 Late career researchers

Late career researchers want more stability in employment, recommending that Commonwealth funding be lifted to provide for an increase in permanent positions and the introduction of five-year rolling tenure. This would further provide for more fellowships, higher salaries and more funding for the research sector.

They want stronger links between research and industry to encourage the spread of ideas, and new job opportunities.

They want government to extend the term of a PhD to four years, fund travel and increase the stipend, as well as expanding mentoring services.

6.1.6 Retired researchers

Retired researchers call for more funding for research institutions and national funding bodies, with one advocating a lift in ARC success rate to 66%. Such funding increases would allow a reduction in teaching loads and enable time provision for teaching staff to conduct research.

They want increased mobility to encourage a broader outlook, and an increase in long-term appointments.

6.1.7 Submissions

In its submission, the Australian Research Council set out the range of funding schemes it currently operates and other strategies it employs to support careers in research.

It suggested possible courses of action for government, universities and research institutions. These included the importance of maintaining funding programs for researchers at all stages of their careers. The Future Fellowships program supports up to 1,000 mid-career researchers and is funded only for the period 2009-2013. The ARC emphasised the fundamental need for continuing Government support:

> *Demand for government funding of research continues to increase (as evidenced by proposal numbers across ARC schemes) and without corresponding increases in government funding for research, success rates of funding schemes will continue to decline. The resulting uncertainty of securing on-going funding for their individual research is a significant disincentive for researchers deciding whether to continue a career in research or seek more stable and financially rewarding employment opportunities outside the research sector.* *(ARC submission)*

The ARC is supportive of researcher mobility between government, industry and research institutions, and sees this as a way to create career development opportunities and transfer knowledge.

The Australian Academy of the Humanities (AAH) lodged responses it had made to recent inquiries, to the Department of Innovation, Industry, Science and Research (DIISR) Consultation Paper, *'Meeting Australia's research workforce needs: A consultation paper to inform the development of the Australian Government's research workforce strategy'* (August, 2010) and the second to DIISR's Consultation Paper *'Defining Quality for Research Training in Australia'* (November, 2011).

In a covering note, the Academy made the point that Government and national funding bodies have a role to play in the development of early career researchers. They dubbed the current system as 'inadequate and ad hoc', and said responsibility for providing such training is shared by many groups.

> *There are many institutions with a role to play in addressing inadequate and ad hoc professional development of ECRs. In addition to Government, universities, and research funding agencies, the AAH would highlight the important function of peak bodies and professional associations, as well as the need for more cross-institutional approaches.* *(Covering letter, Australian Academy of the Humanities)*

Both the AAH and the Deans of Arts, Social Sciences and Humanities (DASSH) want to extend access to the R&D Tax arrangements to the disciplines they represent. As well as pointing to the fragility of some of the core disciplines it represents, the AAH calls for a greater national investment in interdisciplinary work:

> *Strategic investment in interdisciplinary training for researchers is crucial. The global direction is to bring all disciplinary perspectives to the table to find solutions to complex problems, yet this is an area currently under-developed in Australia.*

The submission from the Deans of Arts, Humanities and Social Sciences contained a number of recommendations to allow the HASS sector to figure more strongly in national discussions. These included a suggestion to create a Chief Social Scientist, to expand the definitions of government programs such as the R&D tax concession to allow the full participation of the HASS; and taking a number of steps to nurture and support researchers in the early stage of their careers.

> *We need to identify and facilitate pathways into and transitions within research careers in Australia. DASSH supports more flexible pathways to achieving a doctorate, increasing opportunities to attracting domestic students to early career research work and also increasing the ease of hiring excellent overseas researchers. We recommend expanding the DECRA scheme, for example, through targeted post-doctoral research training support.* *(DASSH submission)*

6.2 For universities and research organisations

6.2.1 Graduate students

Graduate students want a clearer articulation of a career pathway, supported by professional development and training programs. Mentoring is a part of this process. They felt they needed additional skills outside their research topics to become job-ready.

They want proper support mechanisms to help them manage the step between being a student, to taking up a research position. This might include employment, time for them to write up their papers and develop a publication record, and a small grants system to allow them to travel to conferences.

They called on universities and research organisations to create more positions to help early career researchers gain a foothold on the research ladder, and to broaden career opportunities by creating stronger collaborative links with industry.

> *Provide training in media relations, communication, career coaching, and other transferrable (non-research) skills at no or low cost to post-graduate students and early-career researchers. (should be provided by all universities and research institutes, not just the largest city-based universities, so perhaps this also requires some government initiative).* *(Natural sciences, female, 30-39)*

6.2.2 Post-docs

Post-docs wanted more support from research organisations, to help them bridge the gap between completing their degree and entering the research workforce. Some post-docs feel they lack the skills and the record to compete for positions.

They want more positions to allow them to establish themselves as researchers. These additional grants and fellowships should be for a longer contract period.

They wanted access to seed funding, and support with pilot projects and support to attend conferences.

They recommend mentoring, training in complementary skills, and an encouragement to collaborate with industry and other researchers should begin earlier in the career pathway, when students are completing their research degree.

They recommend training for supervisors in mentoring and supervision skills.

6.2.3 Early career researchers

Early career researchers want universities to provide more secure employment. Tenure track, stability and more grants and fellowships are key concerns. They want less reliance on short-term contracts.

The teaching-research nexus needs to be reviewed, to reduce heavy workloads and credit those staff in predominantly teaching positions.

They want research organisations to provide high-quality mentoring on a consistent basis, combined with clearer statements and advice on career paths, and training to make graduate students more employable over a range of occupations.

They feel the system would be improved with a more strategic approach, focusing on the bigger problems and freeing up researchers from restrictions and narrow bureaucratic requirements in applications and reporting.

The provision of a small grants scheme would provide funding for travel and time to write up papers. Research institutions should also provide support services in laboratories and for administrative tasks.

6.2.4 Mid-career researchers

Mid-career researchers (MCR) have many frustrations with the system, but recognise most solutions depend on an increase in funding and perhaps accompanied by a fresh look at the purpose and function of universities. Some raised concerns that universities are trying to do too much.

Teaching offers a degree of security but reduces or eliminates time to conduct research and the workload can be oppressive. MCRs want universities to revise teaching loads to allow time for research, and to value teaching and the validity of different career paths. While this is a matter for research institutions, the lack of funding causes these pressures; and one recommendation is for the university sector to lobby for greater funding to addresses issues such as workloads.

They call for the creation of a small-funds pool, to provide bridging funding over gaps, enable travel and allow people time to think. This is one element of a wider support system to give recent graduates time to develop and acquire the skills and record to allow them to compete nationally for funds.

They recognise the need for continuing professional development throughout all career stages, and want universities to increase their efforts in providing mentoring, advice and clarifying career pathways. One particular focus of these efforts should be to address the difficulties faced by women returning to the workforce after maternity.

Workload and administrative demands should be addressed by simplifying systems, reducing audit costs and providing assistance to allow researchers to concentrate on their work.

> *Oh Boy where do I start? Supply all women with a male appendage so that we at least start on equal footing. Provide support for new researchers in terms of administration and buddy them up with more experienced researchers. .I have been trying for 10 years to get a mentor but because of my heavy teaching load I am often not available for corridor meetings where informal groups are developed not do I have time to write grant applications that are not going to be successful. Until my teaching load decreases I will be caught in the downward spiral where those that have research [funding] get more and those that don't get more teaching. (Sic)* *(Humanities, female, 50-59)*

6.2.5 Late career researchers

Late career researchers want universities to encourage greater collaborations with industry and government, and more exchanges between those sectors as one possible component of a career path.

They see the benefits of stability and security and want universities to create more long-term or tenured positions, supported by sufficient funding to enable them to operate effectively. One improvement would be for a less managerialist approach, with consequent reductions in workload and bureaucratic processes.

They strongly favoured supporting ECRs to help them develop their careers, with research organisations providing more mechanisms for support, training and mentoring. They identified a bottleneck in career progression at the post-doc stage.

The nexus between teaching and research needs to be resolved.

> *Review the expectations of teaching and research academics in relation to research only staff. Provide targeted research grants for full teaching and research academics Enable teaching and research academics to be awarded prestigious research fellowships that enable them to continue the teaching component of their careers rather than becoming research only.* *(Engineering, male, 50-59)*

6.2.6 Retired researchers

Retired researchers want universities to reduce administrative requirements expected to be carried out by researchers, to allow them to focus on the main tasks.

They see value in training, mentoring and career advice, especially for junior researchers. There was a suggestion for the employment of 'brokers' to advise researchers on the nature, number and placement of books and articles. This could be extended to include assistance with the writing of grant proposals.

6.2.7 Submissions

The Australian Academy of the Humanities recommends that research institutions take steps to strengthen development and mentoring programs and career advice and support. In a note accompanying their submission, the Academy said the responsibility for offering this training was shared, with individual universities, learned societies, nationally-organised centres and the Academy itself all playing a role. The Academy characterised current activity as haphazard and called for a more coordinated approach which captured the contributions of all these players. It gave the example of a workshop called 'Survival Skills for A Successful Career in the Humanities' run by the Institute for Advanced Studies at the University of Western Australia in September 2011.

Both the Academy and the Deans of Arts, Social Sciences and Humanities advocate more interdisciplinary work, and research institutions could take a number of steps to encourage activity in this undeveloped area.

The Deans of Arts, Social Sciences and Humanities picked up issues raised by respondents to the survey and in the focus groups. They want a national strategy to handle the large number of impending retirements in research institutions and career development through mentoring and succession planning.

Other recommendations include improved working conditions, a relaxing of workload pressures and support for research publications. They see opportunities to generate mobility:

> *Although there will be significant opportunities for ECR academics to enter the university workplace with the aging of the academic demographic, ASSH disciplines have yet to promote strongly the research career opportunities outside universities. There is a need for ASSH disciplines and universities to develop their ability to assist ECRs to transition across university, so as to promote research career possibilities and strengthen research skills, new thinking and innovative approaches across all sectors.*
>
> *(DASSH submission)*

The ARC sees a role for research institutions to work with other sectors to remove the barriers which prevent the mobility of researchers between government, industry and research institutes.

A private submission called for more permanent positions to be created in Australian universities, saying that Australian levels had fallen below those in institutions in comparable countries. It was a point also made by respondents to the survey:

> *The entire manner in which universities are now funded means, among other things, that comparatively little money is available for the appointment of permanent academic staff. Only around 30% of university budgets ends up being available for all directly academic expenditure, which is insufficient for the creation of sufficient academic staff appointments. Add to this an interest in cost-cutting and the excessive use of contract staff, and you have a situation in which there are far too few permanent appointments.*
>
> *(Dr Stephen Lake)*

6.3 Possible actions: a consolidated list

1. Support for researchers in the early stages of their careers

New graduates and post-docs find themselves in the difficult position of trying to win grants and positions at a time when they have yet to develop a track record in publications, and lack some of the skills new positions demand. They want assistance to manage the transition from being a student to taking up a position in a research institute.

Measures they called for were:

- supporting new graduates to establish themselves
- allow new graduates time to write up their research and develop a publication record
- create more positions for people at their level, to allow them to gain skills and experience
- mentoring
- provide a small grants system to fund expenses such as conference travel
- provide training in generic research skills to make them more employable
- provide publication subsidy schemes

These measures of support need to be extended to researchers at later career stages.

2. Articulated career pathways in research

The study group want a clearer articulation of the career pathway in research. They said it is difficult for those both entering and in the system to see how careers might develop and what opportunities are available. What are the stages of a career in research? What are the expectations and skills required to move to the next level? What jobs are available? Careers need to be supported by professional development, training programs and mentoring. The skills and experience of people both teaching and research should be measured, recognised and rewarded.

The career pathway should address bottlenecks in the system where there are too many applicants for a limited number of jobs.

One particular focus should address the difficulties faced by women returning to the workforce after maternity. A second should address the position of people with industry experience.

3. Balanced workloads

Many in the study group report heavy workloads. The demands of teaching, administrative duties, combining teaching with a career in research, and completing applications for fellowships and grants are components of an excessive workload.

Solutions to high workloads are:

- distribute the teaching load equitably, and allow teachers who wish to conduct research time and space
- appoint support staff to handle paperwork and as lab technicians, to allow those in teaching and research positions to focus on their jobs
- reduce audit and reporting requirements
- simplify application processes for grants and fellowships, and introduce 'light-doc' funding applications

4. Consideration of the teaching-research nexus in universities

Many were concerned about by the difficult choice between teaching and research. Teaching offers a degree of security but reduces time to conduct research and the workload can be oppressive. The alternative was to opt for a career in research, where securing continuing funding can be difficult.

The study group considers the teaching-research nexus needs re-examination, to affirm the value of teaching, reduce heavy teaching loads, and share responsibilities for teaching more equitably so that those in teaching-research positions have time to conduct research.

5. Advice, mentoring and information for researchers

Mentoring programs are most important to young researchers, but should be available to researchers throughout their careers, especially as they transition from one career stage to the next.

One approach would be to convene a meeting of bodies such as the Deans and Directors of Graduate Studies, Government, funding bodies and representatives of peak councils and learned societies, to consider how a best-practice approach to mentoring might be developed. Potential approaches include training, a 'best-practice' manual, and a website.

The provision of better information would supplement mentoring as a source of advice. In the early career stages, many respondents confessed they were confused and unsure about systems and processes, from what was involved in a PhD to applying for grants. Younger researchers in particular support the creation of a new website with information and advice about careers in research, to include information on:

- what doing a PhD entails
- job prospects upon graduation
- grants, fellowships and other sources of funding
- international opportunities and other data important for researchers

6. Effective and efficient national funding programs

The study group recognised the pressure the ARC and NHMRC are under to satisfy the demand for grants and fellowships. The larger solution, they argue, lies in providing more funds for these bodies to disburse, but there are smaller reforms which it is felt would improve the life of researchers:

- providing feedback on unsuccessful applications
- announcing the results of funding programs at such a time (not December) to allow both successful and unsuccessful applicants time to adjust to and plan for their new circumstances
- introducing a new flexibility to cater for the individual needs of applicants such as scholars with limited needs, and those who want to work part-time or to spread their grant over a longer period
- introducing several funding cycles over the year, so applications can be handed in at any time and assessments are made and announced several times in the year
- introducing a funding pool where only younger researchers are eligible to apply, and where they do not compete with senior researchers with strong track records[2]

The time and effort required to prepare a bid for a Discovery Grant or DECRA application are considerable, to the extent that the collective effort in mounting such bids is approximately equal to the funding on offer. The question of efficiency was raised: is there a better way? One step would be to invite the Productivity Commission to investigate the effectiveness and efficiency of national funding programs.

7. Collaborations, mobility and industry experience

Many researchers see potential benefits in closer collaborations with industry and government, and are frustrated that mobility between the sectors is so difficult. Mobility offers the potential of joint work and new sources of jobs and funding.

Those with industry experience reported that academia places little value of their previous experience and their prospects are hampered by a lack of scholarly publications in their record.

2. Respondents were aware of the DECRAs but cited what they regarded as low success rates.

They recommend actions government and research institutions could take to encourage mobility:

- recognise the value of industry experience and collaborations in grant applications, assessment processes and promotions
- encourage mobility between industry, government and the research sector by removing formal impediments and rewarding industry experience in research institutions
- build stronger links between research and industry to encourage the spread of ideas, and generate new job opportunities
- encourage cross-disciplinary collaborative work

8. Strong Higher Degree Research (HDR) training

The PhD program is recognised as the best feature of the Australian research landscape by the study group. They applaud the accompanying stipend but despite this, they feel there are possible improvements which would result in graduates being more 'work-ready' when they graduate. Some respondents point to the American system which encourages students to develop their teaching skills, publish papers and acquire generic skills while doing their training.

They recommend:

- an increase in the time to complete a PhD, enabling the student to build up a publishing record and (perhaps) gain teaching experience
- the provision of training in complementary skills such as project management, presentation and media skills, handling IP, writing a research grant, and collaboration

There was support for an increase in the PhD stipend.

9. Tenure, permanency and long-term contracts

Instability and lack of security were nominated as two of the stressful and inefficient aspects of the Australian system. The study group said short-term contracts gives early career researchers no opportunity to establish themselves, and forced moves are disruptive both professionally and personally. More senior researchers complain about the interruption to research programs because of the uncertainty of the competitive grants programs and said the lack of continuity hindered good projects.

They advocate:

- a general lengthening of contracts and grants, typically from three years to five
- the creation of more tenured and permanent positions
- more consideration for security and stability within research organisations
- more positions for younger researchers

Some of the fluctuations in funding could be smoothed by the establishment of a small funds program to provide bridging funding over gaps between fellowships and grants, enable travel and allow people time to think.

10. Salaries and stipends

Low salaries are a concern to younger researchers, and with job insecurity, made a career in research less attractive. They point out that research positions required many years of training and that salaries in industry and government are higher even though the required qualifications are lower.

The position is felt particularly by mature-age students, often coming from industry or government and finding their previous experience counts for little in academia. They said the focus on publications as a sole measure of achievement leads to imbalances in the system.

7

Examples of programs which help researchers develop their careers

Survey participants were asked two open-ended questions about the best Australian and best international examples of programs or initiatives that help and encourage researchers to develop their careers. Of the 1,203 survey respondents, 810 provided comment on an Australian example and 634 on an international example. Focus group participants added further suggestions.

7.1 Australian programs

The programs mentioned most frequently as examples of good practice included:

- Fellowships and scholarships including PhD scholarships, university-based schemes (from Melbourne, ANU, Queensland, Curtin,

Monash, Sydney and Queensland University of Technology) and special schemes like the CJ Martin Fellowship and Nuffield scholarships

- The PhD program was widely supported by all groups in the survey
- ARC and NHMRC fellowships
- Support and mentoring programs from universities and learned societies like the Australian Society for Medical Research and the Australian Society for Parasitology

Graduate students and late career researchers are most likely to nominate institutional support and mentoring programs; post-doc researchers NHMRC and other fellowship schemes; and early career researchers fellowships and scholarships in general. Mid career researchers particularly noted the ARC Future Fellows scheme.

Other programs were recommended as well, but less frequently. A full list of all programs and support schemes is contained in Appendix D.

Respondents spoke positively of the assistance they had received. This might involve financial support, mentoring, or access to short training courses. In some programs the dollar figures were not large but enabled attendance at a conference, provided a vital piece of equipment, or encouraged women to re-enter the workforce after maternity leave. Others focused on mid-career researchers had 'a great combination of funding support, mentoring, and a structured program of activities'.

People appreciated programs which bridged the divide with industry (such as the CRC Program) or helped ECRs establish a publications record by providing a desk and a salary before expecting them to win grants. The Walter and Eliza Hall Institute allowed early career researchers time to prove themselves and establish their careers without having to obtain initial funding themselves. The benefits of the PhD stipend were warmly recognised.

> *Fee-free PhDs—not having to pay tuition etc to get your qualification is such an amazing opportunity in and of itself.* *(Public health, female, 30-39)*

Respondents frequently nominated ARC or NHMRC fellowships, often with a rider: "there are not enough of them'. About 15% of respondents could not identify any 'best practice' programs and instead complained about the scarcity and level of competition for such schemes leaving 'leaving the majority of Australia's skilled and talented researchers to muddle through as best they can'.

> *Unfortunately, far too few are able to enter the fellowship scheme, which results in the vast majority of researchers unable to progress past mid-career, at best. There are nearly no alternatives for researchers which enable career progression and as careers stagnate, many have to or chose to leave science entirely.* *(Natural sciences, female, 40-49)*

7.2 International programs

A wide range of international programs, fellowships, scholarships, training programs were identified by the study group. Those from the USA, Germany, the UK and Europe were most frequent: the National Institutes of Health, the Marie Curie Fellowships, Humboldt, Max Planck and Wellcome Trust. Examples from Canada, Japan, France, South Africa and New Zealand were raised, and a full list is included at Appendix D.

The programs offer a wide range of benefits. Some pay the full costs of research, including stipend, project costs, and travel. Others provide positions unencumbered with other duties (teaching, administration, supervision) and allow the researcher to concentrate full time on the project at hand. 'No strings' funding is provided through programs such as the Rachel Carson Centre in Munich, the UNESCO-L'OREAL International Fellowships Programme for Young Women in Life Sciences (2012) and Fulbright Fellowships.

The flexibility and patience of some programs wins warm approval: the NIH system provides two funding rounds per year and ability to work with researchers to re-shape their proposals. Programs which offer funding over five years rather than three are favoured. This is particularly valued at the early stages in a career, providing the time and space for ECRs to become established, and funding over these extended periods is offered by programs including Singapore's research institutes, the Max Planck Institute, NIH post-doctoral fellows and the European Molecular Biology Laboratory.

> *The Swiss Government provide funding for 6 years for PDFs who they deem to have a strong future in Science—as a scientific researcher from Australasia this length of funding is unheard of and would allow a scientist time to set up a proper research project.* *(Natural sciences, female, 30-39)*

These programs may be coupled with the possibility of continuing employment. The provision of longer terms overcame the main issue respondents had with the Australian system: too much reliance on short-term contracts.

> *The German Heisenberg program (administrated by the DFG). As an early/mid career researcher you apply for a 5 year fellowship. Award of this fellowship is coupled to the host institution agreeing to convert the fellowship into a permanent professorship (after successful evaluation). This is an award prestigious for both, fellow and host institution and the success rate has been quite high >30%.*
>
> *(Natural sciences, male, 30-39)*

One respondent pointed out that the early stages are often the most productive period of a researcher's career, but in Australia it is the time when a researcher is least likely to gain any form of competitive funding. The lack of a distinguished research profile in an early career researcher is not an indication of a lack of talent, he said, but it does negate the ability to gain research funding. He feels the Australian system wastes this resource.

Some international programs have a structured approach to career development. They provide an entry point to the escalator of a career in research, funding post-docs and encouraging them to 'write, mentor and teach in the lab and the lecture hall. They could optionally take on guest lecturer or full lecturer status.'

> *While undertaking 5 years of post-doctoral training at the US NIH, I had access to fabulous training opportunities provided by the NIH Office of Intramural Training and Education. There were courses on grant writing, career development, career options, job applications, mentoring programs etc. This was provided for free to all post-docs. There is nothing like this in Australia.*
>
> *(Scientific sales, no gender specified, 40-49)*

Others are identified as examples of best-practice for smaller-scale assistance: travel grants, training workshops, access to libraries. These include research fellowships available at many US universities and allowing scholars to focus on research for 6 to 12 months; and 3-6 month scholarships offered by the Japanese Scholarship Program enabling recipients to 'learn techniques off well established researchers [and] exchange ideas'.

Programs which encourage collaboration and commercialisation activities (and thus addressing a concern expressed in the survey, the lack of interchange between researchers, industry and government) were also identified. Europe's COST Program and the Robert Wood Johnson Foundation in the USA fund meetings to scope out new research programs. Stanford, the Massachusetts Institute of Technology and other universities in the USA encourage academics to move into the private and government sectors.

In the USA, the NSF Innovation Corps (I-Corps) programme encourages the participation of researchers in commercialisation of their research. By contrast the Australian system effectively penalises researchers at universities for undertaking commercialisation. *(Technology, male, 30-39)*

A list of all programs and schemes mentioned by respondents is contained in Appendix E, along with a summary of the main features of a representative selection of these programs.

It is not the role of this report to examine in detail the programs that support the development and continuation of careers in research. It may well be appropriate to conduct a separate study, which compares the features of these programs with a view to incorporating desirable features into the system in Australia. Similarly, it may be appropriate to conduct a specialised study that considers Indigenous issues, which have not been targeted in this report.

8

Conclusion

The central issue for the study group is jobs. Early and even mid-career researchers are concerned about the challenges of finding a position or winning grants and fellowships in a very competitive environment. Insecurity and lack of stability is a constant factor in their lives. A specific study of the impact on the sector of casual and short-term contracts at all career stages may be called for.

While a resolution of these issues will largely depend on providing additional funding for the system, the study group has identified adjustments and refinements to the system governing their work. They have nominated features of the Australian system, which they identify as working well (such as the PhD program), and programs from within and outside Australia which might be incorporated domestically, as part of a 'best practice' approach to the conduct of research in Australia.

Further work will be required to verify the effectiveness of these programs and assess the suitability of the international programs for incorporation into a revised Australian system.

Other suggestions would require only relatively modest amounts of funding: the provision of mentoring on a more consistent basis, the establishment of a website carrying information and advice about careers in research, and refinements to the way the national funding institutions operate.

A more complex (and expensive) issue for Australia would be a strategy to increase the capacity of the economy to absorb the number of new graduates being generated. A less challenging recommendation from the study is to increase mobility across other sectors (government and industry) thereby expanding employment opportunities and maximising the ways in trained analytical thinkers (PhDs) are able to contribute.

Researchers responding to the survey were generally attracted by a career in research – they said liked their work but not the employment system in which they worked. The enthusiasm for a position in research, though, was weakest amongst those just entering the system. Early career researchers are conscious of the difficulty of finding positions, of the unsatisfactory nature of working through a series of short-term contracts, and the relatively low salary levels on offer.

For the moment people are attracted by research careers because of the interesting and important issues involved and the stimulating environment, but concerns over working conditions and workload cannot be ignored in the interests of the long-term prospects for the sector.

9 References

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Glossary

AAH	Australian Academy of the Humanities
ARC	Australian Research Council
CRC	Cooperative Research Centres
DASSH	Deans of Arts, Social Sciences and Humanities
DECRA	Discovery Early Career Researcher Award (ARC)
DFG	Deutsche Forschungsgemeinschaft
ECR	Early Career Researcher[3]
HASS	Humanities, Arts, Social Sciences
HDR	Higher Degree Research
MCR	Mid-career Researcher
NHMRC	National Health and Medical Research Council
NIH	National Institutes of Health (USA)
NSF	National Science Foundation (USA)
PDF	Post-doctoral Fellow
PhD	Doctor of Philosophy
R&D	Research and Development

3. Defined by the ARC as a researcher awarded a PhD or equivalent research doctorate within five years, however, an extension to this limit may be approved owing to significant career interruptions. A mid-career researcher is then one with generally 5-15 years post-doc experience.

12

Appendices

Appendix A	The Survey
Appendix B	Focus Group Moderator's Guide
Appendix C	Demographics
Appendix D	Examples of 'best practice' programs to support research careers
Appendix E	Biographical notes on the consultant

Appendix A: The Survey

ACOLA RESEARCH CAREERS SURVEY

Funded by the Department of Innovation, Industry, Science and Research (DIISR)

BACKGROUND

Researchers in Australia face many hurdles in establishing a stable career in their chosen field of research. In 2011/12, a new study to develop solutions and recommendations is being undertaken by the Australian Council of Learned Academies (ACOLA). The study aims to ensure that researchers are supported to meet individual career needs and objectives.

The study begins with a national on-line survey, where researchers of all ages and disciplines are asked to identify the issues they have faced in establishing a research career. They are also asked to identify possible solutions. The initial survey is followed by a series of workshops, where researchers from different disciplines and age groups are brought together to flesh out the issues and identify possible solutions. These workshops will be held in capital cities but on-line participation is being explored. In addition, ACOLA invites written submissions from key stakeholder groups to enable them to help identify pressure points and develop guidelines regarding solutions.

ON-LINE SURVEY QUESTIONS

The survey below is to collect the views and experiences of researchers. The information will be used to develop recommendations to improve the career path of researchers in Australia, and remove impediments that make career development difficult.

Win a dozen bottles of wine! One respondent selected randomly will win a quality dozen bottles of wine (or a book voucher to the equivalent value). Please nominate your preference for red or white wine at the bottom of the survey.

1. What is your highest qualification to date?

- Bachelors
- Honours
- Masters
- PhD
- Other (please name)

2. In which year did you complete your highest qualification?

3. Are you currently undertaking study? If so, at what level?

- Bachelors
- Honours
- Masters
- PhD
- Other (please name)

4. Are you actively involved in research?

- Yes, full-time
- Yes, part-time
- Yes, along with other job duties (like teaching)
- No

5. What stage are you at in your career?

- Graduate student
- Post-doc
- Early-career
- Mid-career
- Late career
- Retired

6. Which field best describes your current position?

- Arts
- Humanities
- Social sciences
- Engineering
- Natural sciences
- Technology
- Other (please name)

7. What is your area of expertise within that field (e.g. history, chemistry, law, health, climate change)

8. Where do you currently work?

- University
- CSIRO
- Nationally-funded research institute (e.g. AIMS)
- Other non-teaching research institute
- Private sector
- Other (please name)

9. How attractive to you is a career in research?

- Very
- Reasonably
- Mildly
- Not very
- Unattractive

10. What is the best thing about a career in research? Choose one option only

- Salary
- Working conditions
- Working on interesting and important issues
- Stimulating environment
- Career development, progression
- Other (please specify)

11. What is the worst thing about a career in research? Choose one option only

- Salary
- Work load
- Uncertain job prospects
- Working conditions
- Lack of career path
- Other (please specify)

12. What do you think the Australian system does well in helping people establish careers in research? (Tick as many options as apply)

- Provides an adequate stipend to allow post-graduate students to study fulltime
- Trains post-graduate students in complementary skills e.g. communication, managing a research project, IP, collaboration
- Gives post-graduate students access to good advice on possible careers in research
- Encourages new graduates to undertake post-docs
- Provides scholarships and employment opportunities for graduates after their post-doc appointments
- Assists in the transition from early-career to mid-career researchers
- Provides adequate salaries in universities and national research bodies
- Offers good working conditions, including a balance between teaching and research in universities
- Systematically helps women re-enter the workforce after taking family leave
- Offers stable employment opportunities
- Encourages researcher mobility between sectors: university to government to industry
- Assists mid-career researchers to develop their careers through appointments, scholarships and other funding
- Takes steps to allow for the renewal of an aging research community in universities

13. What do you think the Australian system does badly in helping people establish careers in research? (You may nominate as many as you like)

- Scholarships do not allow enough time to complete PhD
- Stipend is inadequate to allow post-grad students to study fulltime
- Little training for post-grad students in complementary skills e.g. communication, managing a research project, IP
- Does not provide systematic advice on possible careers in research
- Does not encourage new graduates to undertake post-docs
- Inadequate provision of employment opportunities and scholarships to allow new post-docs to establish a career
- Little assistance in career development as researchers become more experienced
- Inadequate salaries in universities and national research bodies
- Poor working conditions, including a imbalance between teaching and research in universities
- Penalises women who try to re-enter the workforce after taking family leave
- Limited employment opportunities in universities and national research bodies
- Too much reliance on short-term contracts
- No system to encourage researcher mobility between universities, industry and government
- Little assistance to mid-career researchers to develop their careers through appointments, scholarships and other funding
- No systematic approach to renew an aging research community in universities

14. What's the best example you know of an Australian program or initiative which helps and encourages researchers to develop their career? (e.g. a fellowship program/ a grant scheme/ mentoring/ institutional programs for career support and development/ provision of transport and accommodation/etc.)

15. What is the biggest impediment to Australians seeking to establish a career in research? (e.g. lack of positions/ few programs to train researchers to develop their careers/ lack of part-time opportunities/ proliferation of short-term contracts/ difficulties of gaining research grants/ little interchange between positions in government, universities and industry)

16. What is the best international example of a program or initiative which encourages researchers in their career development? (e.g. a fellowship program/ a grant scheme/ mentoring/ institutional programs for career support and development/ provision of transport and accommodation/etc.)

17. What steps should the Australian Government take to improve the career development of researchers?

18. What steps should universities and research institutions take to improve the career development of researchers?

19. I think that the establishment of a web-based communication platform to promote research career opportunities and support in Australia (as one of a number of possible initiatives) would be:
Very useful
Somewhat useful
Not much use

20. Are there any other comments or ideas you would like to add?

21. Please provide your personal details, including: Honorific/First name/Surname/Email/ Phone/Postcode

22. I am interested in receiving an invitation to attend a two-hour workshop to flesh out this discussion and help develop guidelines for improving the research career structure in Australia
Yes
No

23. A cross-section of researchers will be invited to attend workshops to discuss these matters in more detail. In order to balance workshop participants by discipline, career stage, gender, etc. we need to collect these demographic details. My demographic details are:
Male
Female
20-29
30-39
40-49
50-59
60-69
Over 69

24. I would like to receive (by e-mail) a copy of the draft report to make comments and suggest revisions. I have provided my e-mail address for this purpose
Yes
No

25. I would like my details added to the ACOLA mailing list using the e-mail address listed above:
Yes
No

26. If my name is selected in the random draw, I would prefer to receive:
Red wine
White wine
Book voucher

Appendix B: Focus Group Moderator's Guide

Introduction

Welcome to participants

Introduce moderator (Toss Gascoigne) and recorder (Jenni Metcalfe) and method of recording

Thank participants; reiterate value to them from participating

Process of focus group discussion—like a dinner table conversation without the wine and food

Role of moderator is to guide the discussion but not contribute to it or answer any questions.

Focus of discussion—cost neutral recommendations for improving research career pathways

Confidentiality of information (no attribution of names), and how it will be used—thematic analysis of the transcribed data and included in a report to the Department

Let's start by introductions, please tell us who you are and what your career pathway has been like to-date

Main section

Discussion guided by following questions:

1. Tell us about your progress in your research career? Things that have helped or hindered?
2. Which steps in your career have you found most difficult to-date?
3. Has mobility—moving geographically and/or institutionally—in your research path been an issue?
4. What could governments do to help?
5. What could research institutes or universities do to help?

Conclusion

Thank the participants. Remind them that they will be sent a transcript of the discussion for them to check and to which they may add extra ideas.

Table 7. Schedule of focus group discussions

Date/time	Location	Number of participants
10/11/11 – 9.30am	Melbourne	6
10/11/11 – 1.30pm	Melbourne	5
1/3/12 – 9.30am	Sydney	8
1/3/12 – 1.30pm	Sydney	3
7/3/12 – 9.30am	Brisbane	7
7/3/12- 1.30pm	Brisbane	4
22/3/12 – 9.30am	Canberra	12
22/3/12 – 1.30pm	Canberra	10
TOTAL		55

Appendix C: Demographics

Table 8. Survey respondents by career stage

Career stage	Frequency	Percentage
Graduate student	199	16.6
Post-doc	215	17.9
Early career	300	24.9
Mid-career	349	29
Late career	103	8.6
Retired	27	2.2
Skipped question	10	0.9
Total	1203	100*

*Percentage totals have been rounded to the nearest whole number. Percentages have been rounded to the nearest whole number throughout this report.

Table 9. Survey respondents by age and discipline

Age	Arts	Humanities	Social sciences	Engineering	Natural sciences	Technology	Other
20-29	4	16	23	15	82	3	39
30-39	9	28	59	30	185	17	119
40-49	6	29	44	12	91	11	76
50-59	9	39	27	3	35	8	50
60-69	1	20	8	0	2	2	11
70+	1	7	1	0	3	0	0
Totals	30	139	162	60	398	41	295
Skipped question							78
Total							1203

Table 10. Survey respondents by discipline and gender

Discipline	Male	Female	Total
Arts	10	14	14
Humanities	45	54	99
Social sciences	37	84	121
Engineering	31	12	43
Natural sciences	130	170	300
Technology	20	8	28
Other	70	155	225
Totals	344	497	840**
Skipped question			363
Total			1203

**There is a mismatch in the data (an error of 1) collected by Survey Monkey.

Table 11. Survey respondents by place of work

Place of work	Number of respondents
University	803
CSIRO	59
Nationally-funded research institute	43
Other non-teaching research institute	144
Private sector	29
Other ***	119
Total	1197
Skipped question	6

***Other (in order of frequency) includes hospital, university, research institute, government, not working, unemployed/not working.

Appendix D: Examples of 'best practice' programs to support research careers

E.1 Australian programs

Commercialisation Australia Skills and Knowledge program
Queensland Smart Futures Fund Commercialisation Champions
AMSI ICE-EM Winter Graduate School
UQ post-doc fellowships
Discovery Early Career Researcher Award (DECRA)
Australian Post-graduate Awards
ARC grants which make provision to fund a PhD student
Australian Society for Parasitology has an excellent mentoring
ASMR offers career development
Centre for the History of Emotions (by providing post-docs and also short-term funding)
Australian Research Council's Future Fellowship
NHMRC fellowships, post-doctoral fellowship scheme
Informal Italian Renaissance network
IAS block funding at ANU
WEHI program to support women scientists
Graded ARC funding for ECRs, MCRs
Australian Artists Creative Fellowships were the richest fellowships for established and respected independent professional artists engaged in practice led research and research led practice
Myer foundation
Commercialisation Training Scheme
CRC Program
Nuffield Scholarships
Cotton Research and Development Corporation in paying above minimum scholarship rates for PhD's and then providing some level of support for researchers as they move into the industry
Collaborative Research Networks
Industry PhD scholarships
Cancer Institute NSW Early Career Research Fellowship
Australian Professorial Fellowship DORA
UNSW offers some very good Faculty-level mentoring schemes and University-wide research information sessions and workshops
Australian Biological Resources Study grants
Special Studies Project in universities for 6 months that allows full-time research in overseas libraries and research institutes
Meat and Livestock Association supplemented my PhD scholarship funding
Post doctorate fellowship CSIRO
CSIRO's Julius Award
Department of Agriculture Fisheries and Forestry Young Scientist Awards
CSIRO Capability Development Fund
NHMRC Career Development Award
Invasive Animals CRC postgraduate student program
Supportive environment at Archaeology and Natural History, Australian National University
Monash University recently established a number of Early Career Development Fellowship
NEER (Network of Early European Research)
UNSW fund for women returning to work after maternity leave. They are given $10000 (pro rata based on hours before taking leave) to use to further their research.
Early Career Fellowships New Investigator Project Grant
UNSW Faculty of Arts Mentoring Program
ANU Mentoring and career planning programs, Research School of Asia & the Pacific grants scheme at ANU
University of Newcastle - regional university with a broad range of research support schemes encourages and foster real-world, collaborative research for academic staff.
Collaboration between CSIRO and UWA/ANU to foster and encourage early researchers to pursue further PhDs and Pos-Docs.

Research Fellowship with a government department mid career this was an excellent opportunity and experience adding to my reach and expertise. I was also able to move between university and policy environments easily.
Postgraduate Certificate in Education at USQ. It is a community of practice approach that supports the research journey for post graduate and early career researchers. Through collaboration and mentoring members engage in regular meetings where a range of issues, conceptual and theoretical perspectives, career options, etc. are explored. Collaborative endeavors around publications are also a strong feature.
ARC Laureate fellowship scheme
Postdoctoral Fellowship Programmes like the McKenzie Fellowships at Melbourne University
In my own university (Melbourne), programs focussing on early and mid-career researchers are excellent, as are other on developing mentoring skills among senior researchers.
Australian Mathematics Society fellowships for post-submission of PhD (called `Lift-off' fellowships)
QUT Vice Chancellors Fellowship Scheme
Primary Health Care Research & Information Service
Cancer Institute NSW Early Career Development Fellowship
Queensland Children's Medical Research Institute Early Career Researcher Fellowship (and associated project grant).
Australian Rotary Health scholarships and fellowships
University of Sydney internal early career research mentoring program.
ANZ trustees Clinical scholarships
QUT Early Career Recruitment and Development program
Group of Eight Future Research Leaders Program
CJ Martin Fellowship
Walter and Eliza Hall Institute have a system whereby early career researchers are given the opportunity to 'prove themselves' and establish their careers without having to obtain initial funding for this themselves - that is, they are funded by WEHI initially, with the view to them then obtaining independent funding.
Monash Science "Populate and publish" $15k post maternity re-entry grant
Margaret Clayton Fellowships at Monash (women only)
University of Tasmania internal Institute mentoring program which provides structured input and our University has a Leadership Development Program for Women which is also very helpful (also with a mentoring angle)
Osteoporosis Australia
ARC Linkage Grants encourage collaboration with industry

E.2 Best international examples of programs or initiatives which encourage researchers in their career development, as identified by participants in this study

This is a comprehensive list of all specific programs or institutions identified by respondents. A selective description of the features of the listed programs is below in E.3.

Humboldt Foundation	Germany
European Research Council Starting Grants	Europe
Gulbenkian Science Institute	Portugal
UNESCO-L'OREAL International Fellowships Programme for Young Women in Life Sciences (2012)	Paris/International
Fulbright Fellowships	USA
Folger Library Fellowships	USA
College residencies (such as at Cambridge or Oxford)	UK
National Institutes of Health	USA
Howard Hughes' Medical Institute (HHMI) fellowships	USA
Max Planck institutes	Germany
Alexander von Humboldt Foundation fellowships	Germany
Deutsche Forchungs Gemeinschaft	Germany
German Academic Exchange Service (DAAD)	Germany
International Council on Monuments and Sites (ICOMOS)	Based in France
The American Foundation for AIDS Research (AMFAR)	USA
Erasmus and Erasmus Mundus programs	Europe
Fox Chase Cancer Centre postdoctoral training program	USA
European framework FP7	Europe

Marie Curie Fellowships	Europe
Swiss National Science Foundation post-doctoral position	Switzerland
US Department of Defense Congressionally Directed Research Fellowships	USA
NSF Advance Program	USA
European Molecular Biology Laboratory (EMBL)	Europe
Institut national de la santé et de la recherché medicale (INSERM)	France
Janelia Farm	USA
US Harkness Fellowship	USA
Engineering and Physical Sciences Research Council (EPSRC) grants for early career researchers	UK
Bridging Awards (NIH, USA)	USA
Mentored Awards (NIH, USA)	USA
US Science Policy Fellowships	USA
UC Davis Laboratory Management Institute Program for Postdoctoral Scholars	USA
National Institutes of Health K99 program	USA
European Research Council (ERC) excellence grants, starting grants	Europe
Killam Trust Postdocs	Canada
European Molecular Biology Organisation (EMBO)	Europe
Wellcome Foundation and Trust Fellowships	UK
Institute for Sustainability and Peace (JSPS) fellowships	Japan
Research Councils UK (RCUK) fellowship scheme	UK
Arts and Humanities Research Council (AHRC)	UK
Young Scientists Summer Program at the International Institute for Applied Systems Analysis, Austria	Austria
Russell Group unis in UK, Post doc research training schemes	UK
Human Frontiers Science Program (HFSP) European Molecular Biology Organisation	Europe
Centre for Continuing Professional Development (Health Programmes), Oxford University	UK
MentorNet (www.mentornet.net/)	USA
NSERC grants	Canada
Natural Environment Research Council (NERC) fellowships	UK
Universities of California President's Postdoc Fellowship	USA
Mellon foundation	USA
Build IT mentoring scheme in New Zealand	NZ
MSI Tech Expert supporting researcher time in industry	USA
AAAS Science & Technology Policy Fellowships	USA
Smithsonian (www.si.edu/ofg/fell.htm)	USA
Worldwide Universities Network Researcher Mobility Scheme	UK, international
Canadian Research Programs	Canada
ISF investigator program	Ireland
ICRF	UK
Centre National de la Recherche Scientifique (CNRS)	France
Pew Fund	USA
New York State Academic Research Program (NYSTAR) Centers for Advanced Technology	USA
American School of Classical Studies Athens	USA
Burrough-Wellcome Fund	USA
Group of 8 (Go8)-Germany Joint Research Grant Scheme	Germany
German Research Foundation (DFG) fellowship	Germany
Endangered Languages Documentation Project (ELDP) grants	UK
Warwick University Arts and Humanities Research Fund	UK
National Postdoctoral Association (NPA): www.nationalpostdoc.org/about-the-npa/recent-accomplishments In	USA
Kauffman Foundation Entrepreneur Postdoctoral Fellows Program. http://sites.kauffman.org/postdocs/	USA
German Heisenberg program (administrated by the DFG)	Germany
Churchill Fellowship	UK
UK Royal Society	UK

Human Frontier Science Program (HFSP)	France/Europe
Medical Research Council (MRC) career development award	UK
Canada Research Chairs	Canada
Colombo plan	Sri Lanka/Asia
Greenwalls Bioethics Fellowship	USA
National Institutes of Health (NIH) Office of Intramural Training and Education	USA
Canadian Institutes of Health (CIHR) Research Training Programme	Canada
Max Planck Junior Independent Group Leader appointments	Germany
Wenner Gren Foundation	USA
Robert Wood Johnson Foundation programs	USA
Macarthur Foundation committees addressing specific scientific issues or questions (www.macfound.org/)	USA
National Institute of Allergy and Infectious Diseases (NIAID)	USA
Gulbenkian Science Institute	Portugal

E.3 The key features of these programs mentioned by respondents were:

Below is a selection of the features of the programs recommended above.

Specific feature	Program	Country
Funding: for biomedical research and practice, multi-disciplinary approaches encouraged	Wellcome Trust fellowships	UK
International collaboration	Humboldt Foundation	Germany
Commercialisation: encouraged activity	NSF Innovation Corps (I-Corps)	USA
Post-doctoral program: enhance the quality of the experience	National Postdoctoral Association	USA
Supports emerging research leaders: helps the creation of excellent new research teams and strengthens those already created	European Research Council Starting Grants	Europe
Post-doctoral program: enables early career fellows to develop their projects and form their groups in complete financial and intellectual autonomy	Gulbenkian Science Institute	Portugal
Commercialisation and entrepreneurship: encouraged activity	Kauffman Foundation Entrepreneur Postdoctoral Fellows Program	USA
Post-doc funding: for excellence in research of international importance	British Academy postdoctoral scheme	UK
Teams creation: bringing together researchers to focus on a specific issue	Robert Wood Johnson Foundation programs	USA
Team creation: assembles teams to address specific scientific issues or questions	Macarthur Foundation	USA, international
Longer funding (6 years) for post-doctoral fellows deemed to have a strong future in Science	Swiss Government	Switzerland
International experience: funds early stage researchers to gain experience overseas and return home to establish careers	Marie-Curie Fellowships	Europe
International experience: funds junior researchers to gain experience overseas and return home to establish careers	DFG Fellowships	Germany
Funding across career: three tiers for researchers at different stage of their career	Netherlands Organisation for Scientific Research	Netherlands
Short term funding: fellowships for completing research (fares and salary) without teaching or supervision expectations.	Rachel Carson Centre, Munich	Germany
Fellowships: exemplary support for fellowship holders and their families	Alexander von Humboldt Foundation	Germany
International linkages: American fellowship programs which allows me to research at my home institution in Australia while being connected to researchers across the globe.	Mellon Foundation	USA
Industry linkages: exposes veterinary students to a range of career options outside clinical practice	Cornell University Leadership Program	USA

Industry linkages: encourages relationship between practitioners and academics.	English Heritage [heritage regulator in UK]	UK
Early career support: very promising new researchers are provided 'no strings attached' funding and a laboratory for five years.	European Molecular Biology Laboratory (EMBL)	Europe
International research: living allowances and outstanding access to the best libraries and archival records in the world.	College residencies or institutions like Folger Library Fellowships	UK USA
International full scholarships and fellowships	Fulbright	USA
Tenure: for both early career and for established researchers.	Howard Hughes Medical Institute	USA
PhD system with its heavy course load as well as dissertation plus teaching experience.	US universities	USA
International training: funding selected early-career researchers to undertake jointly-badged PhDs at suitable overseas universities	Norwegian government	Norway
Career pathway: from undergraduate to PhD student to post-doc to lecturer and Habilitation and permanent appointment is clearly structured, better funded and possible.	Germany	Germany
Funding: adequate support for early, mid- and late career	NIH	USA
Maternity: grants for female re-entering academia after maternity leave.	Swiss National Fund Fellowships	Switzerland
International fellowship: stipend (living cost) and project costs for a researcher to go overseas for a post-doctoral position	Swiss National Science Foundation	Switzerland
ECR support: grants to allow good mentoring support and automatic provision of an allowance to attend scientific conferences.	Wellcome Career Development	USA
Bloc funding: a position comes with a laboratory, fixed budget (running costs) and technical assistance (dedicated lab personnel)	France	
Funding: provide salaries and consumables for at least 5 years.	Wellcome and HHMI fellowships	
Gender and diversity: funded grants to institutions to improve gender equity as well as diversity.	NSF Advance Program	USA
International research: a salary, money to relocate partners/ children, travel expenses, health insurance, visas etc.	The US Harkness Fellowship	USA
ECR support: a 5 year fellowship coupled to the host institution agreeing to convert the fellowship into a permanent professorship (after successful evaluation)	The German Heisenberg program (administrated by the DFG)	Germany
ECR grants: based not only publication record but also on referee reports of supervisors - much easier for early career researchers to get early grant success.	UK EPSRC grants	UK
ECR grants: mentored Awards recognises the early career researcher as the PI, with senior investigator 'sponsoring' them.	NIH	USA
Postdoc support: funding to 5 Canadian universities to offer competitive postdocs that include an expectation for development of networking, teaching, science-communication skills.	Killam Trust Postdocs.	Canada
Postdoc training: fabulous training opportunities with courses on grant writing, career development, career options, job applications, mentoring programs etc. This was provided for free to all postdocs.	NIH Office of Intramural Training and Education.	USA
Collaboration: supports/enables cooperation among scientists and researchers across Europe	COST (European Cooperation in Science and Technology)	Europe
Funding: gives top researchers (laureate fellow equiv standard) a large stable grant to free them up to achieve outcomes	Max Planck system in Germany	Germany

Postdoc support: 5 year fellowships provide time to develop an independent research program, and transition grants to completing postdocs to enable you to set up a lab group in an academic institution.	NIH	USA
Mentoring support	MentorNet www.mentornet.net	USA
Funding: for training and mobility grants from early career to experienced researchers.	Marie Curie fellowships	France
Postdoc Fellowships: with adequate research funding in addition to salary, e.g. to employ an research assistant	Wellcome Trust	UK
Postdoc Fellowships: President's Postdoc Fellowship scheme offers a salary and mentoring and networking opportunities.	University of California	USA
Female ECR support: grants of up to USD 25000 to support ECRs for travel, accommodation, research costs or other	UNESCO-L'OREAL International Fellowships Programme for Young Women in Life Sciences	International
Female ECR support: grants of up to USD 25,000 to support ECRs for travel, accommodation, research costs or other	Fulbright Fellowships	USA
ECR funding: career development award supports a 5 year period to transition from postdoc to independent appointment, with flexibility in location, loading and no residency requirements.	Medical Research Council	UK
Competitive grants: 2 rounds/year, and NIH works with researchers to perfect the grant over rounds and provides funding for 5 years - an adequate time for establishment of a project and productivity outcomes to be realised.	NIH	USA
Undergrad funds: to work in an international research laboratory for a 3-month period.	AAD Rise Program	Germany
Postdoc fellowships: 3-6 month fellowships in Japan to learn techniques off well-established researchers, exchange ideas.	JSP Fellowships	Japan
Long-term funding: provide ALL research facilities and funding without the need to constantly chase around for small grants, acquit them, try to establish facilities	Max-Planck-Institutes	Germany

Appendix E: Biographical notes on the consultant

Mr Toss Gascoigne is a consultant specialising in science communication, and with broad experience working across all disciplines.

He served as Executive Director for three national organisations over the last 15 years: the Federation of Australian Scientific and Technological Societies (FASTS); the Council for the Humanities, Arts and Social Sciences (CHASS); and Australian Science Innovations (ASI).

While at FASTS he wrote a number of reports including *Incentives and impediments to scientists communicating through the media; Scientists commercialising their Research*; and *Commercialisation of research activities in the humanities, arts and social sciences in Australia*. He also edited two DEST-funded reports: *Measures of quality and impact of publicly funded research in the humanities, arts and social sciences*, and *Collaborating across the sectors: the relationship between HASS and STEM*.

These reports made extensive use of surveys and focus group discussions to elicit the views of researchers in all disciplines.

He is a former President and life member of Australian Science Communicators and the inaugural President of an international group, the Network for the Public Communication of Science and Technology (PCST).

Since 1994 he has regularly published articles, book chapters, policy documents and commentaries on matters relating to science communication and science and research policy.

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Dr Christina Parolin

DESIGN BY LYREBIRD

ACOLA Secretariat Ltd

ABN 40 143 536 805

www.acola.org.au

Contact: +61 3 9864 0923
or mail@acolasectariat.org.au

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