

Senate Economics References Committee inquiry into the Australia's Innovation System

Submission by the Early- and Mid-Career Researcher Forum (EMCR Forum) of the Australian Academy of Science

July 2014

The Early- and Mid-Career Researcher Forum of the Australian Academy of Science provides this submission to the Senate Economics References Committee to assist with their inquiry into Australia's Innovation System. The Forum would be pleased to provide further assistance by participating in any future public hearings associated with the inquiry.

EXECUTIVE SUMMARY

Australia's Innovation System needs visionary strategy and policies to enable:

- (i) long-term research planning and implementation
- (ii) improved academia–industry engagement
- (iii) better support for start-up companies
- (iv) a streamlined, simplified tax system and incentives for industry investment in research and development in Australia
- (v) mechanisms to attract and retain young, innovative researchers
- (vi) Australian research to engage effectively with international stakeholders and investors.

The Australian Academy of Science's Early- and Mid-Career Researcher Forum has the following recommendations.

Summary of Recommendations

1. Retain and enhance the R&D tax incentive, while simplifying taxation processes for R&D investment
2. Create enablers for strong 'incubators' for start-up companies
3. Encourage diversification of funding for innovation
4. Clarify the leadership and administration of Australia's Innovation System
5. Develop and implement a 10-year research and innovation road map for Australia—*The Australian Innovation Strategy*
6. Educate innovators in the IP process and create streamlined processes for innovators to protect intellectual property
7. Provide support/grants for innovators, start-ups, and small and medium enterprises to protect intellectual property
8. Incentivise researchers to participate in the innovation cycle

9. Recognise and support true and futuristic advanced manufacturing with proven Australian innovation and excellence
 10. Simplify research funding application processes
 11. Operate shorter, more efficient ARC and NHMRC grant cycles
 12. Provide stable and performance-related funding for publicly-funded agencies such as CSIRO
 13. Offer incentives for universities to maintain a large proportion of research active and research-only staff
 14. Incentivise industry to offer research pathways for EMCRs (even as partnerships with universities)
 15. Improve and support communication of Australian research and innovation to the public and the next generation
 16. Develop entrepreneurial training for PhD students to create 'industry-ready' graduates
 17. Increase opportunities for research focus and stability for EMCRs
 18. Create mechanisms for better mentorship and training of postdoctoral researchers
 19. Promote initiatives for gender equity in the research workforce
 20. Reinstate and sustain the International Science Linkages scheme or similar
 21. Ensure research funding for fellowships and scholarships is open to the best, including international researchers and students
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INTRODUCTION

The 2014 Senate Inquiry into *Australia's Innovation System* is very timely as the opportunity is ripe to transition from a resource-driven economy to an innovation-led economy.

The scope of this inquiry intends to understand:

“The challenges to Australian industries and jobs posed by increasing global competition in innovation, science, engineering, research and education.”

As the Early- and Mid-Career Researcher Forum (EMCR Forum) under the stewardship of the Australian Academy of Science, we pride ourselves on being the voice of over 3,000 early- and mid-career researchers across Australia. We represent researchers within 15 years post-PhD (accounting for career interruptions) and those experiencing career transitions. We seek to drive policy which enables transition, such as from academia to industry, ensuring the movement of intellectual capital benefits the Australian economy and the Australian community.

The challenges to the Australian innovation system are numerous. These are also expected to increase due to significant future skills shortages, based on the decline in student numbers in science, technology, engineering, and mathematics (STEM) disciplines.¹

In response to the challenges faced when translating world-leading research into real-world products, the EMCRC Forum organised *Science Pathways 2013: Engaging with Industry and Innovation*. The two-day meeting opened by Professor Ian Chubb, Chief Scientist of Australia, identified a number of potential mechanisms for improved researcher–industry engagement, enabling greater industry investment in research, and transition of qualified researchers into industry.

In the preparation of this submission, the EMCRC Forum ran an open survey consultation with Australian early- and mid-career researchers (EMCRs) inviting their views on the Terms of Reference (ToR). Our detailed submission includes the views of the EMCRC Forum Executive and survey responses.

Our detailed submission below highlights some of the challenges, but more importantly, recommends policies and schemes to support and enable Australia's innovation system.

ACRONYMS

3D	Three-dimensional
APD	Australian Post-Doctoral Fellowship
ARC	Australian Research Council
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DECRA	Discovery Early-Career Researcher Award
EMCR	Early- and mid-career researcher (PhD candidates to ~15 years post-PhD)
EoI(s)	Expression(s) of interest
ERA	Excellence in Research for Australia
GDP	Gross domestic product
IP	Intellectual property
MRFF	Medical Research Future Fund
NCRIS	National Collaborative Research Infrastructure Strategy
NHMRC	National Health and Medical Research Council
OECD	Organisation for Economic Co-operation and Development
R&D	Research and development
STEM	Science, technology, engineering, and mathematics
ToR	Terms of Reference of this Senate Inquiry

THE EMCR FORUM'S DETAILED SUBMISSION AGAINST TERMS OF REFERENCE

Terms of Reference – Item (a)

The need to attract new investment in innovation to secure high skill, high wage jobs and industries in Australia, as well as the role of public policy in nurturing a culture of innovation and a healthy innovation ecosystem

The EMCR Forum's Response against Item (a)

From an era of significant research and development (R&D) across all industries encompassing automotive, telecommunications, electronics, power engineering and manufacturing in Australia during the 1980's to early 2000's, there has been a steady and rapid decline in industry investment in R&D. The share of direct government funding of business R&D in Australia has fallen from 4.9% in 2001 to 1.8% in 2010. These figures are in contrast to with the increasing OECD average of 6.8% in 2001 and 8.6% in 2011 (OECD 2013).

This has resulted in an erosion of the culture of innovation and entrepreneurship.

Existing R&D in Australia in the health and medical space and in academia are hampered by effective mechanisms to enable research translation. World-leading research is often quarantined in the laboratory due to barriers in effective protection of ideas, start-up capital in establishing prototype production, and lack of support from the wider Australian business and taxation framework. There also tends to be an aversion to risk associated with innovation and a 'tall poppy syndrome' targeting entrepreneurs.

In Australia, organisations with major capital resources tend to focus their investment on high yield, low risk projects. A primary example is superannuation companies' significant focus in shares, cash and property investment. Education of significance of research and innovation, and the need to support moderate risk investments, is required and can potentially be kick-started with taxation incentives (which can be likened to the Silicon Valley model).

Recommendations

1. **Retain and enhance the R&D tax incentive, while simplifying taxation processes for R&D investment.** A drain on industry resources which could be better expended on R&D is on book-keeping. A singular mechanism which enables R&D tax breaks would create efficiency and clarity—one such is the recently affected R&D tax incentive (which, while offset by reduction in company tax, selectively penalises companies engaged in R&D). Reducing the complexity of the paperwork would make it attractive for industries to consider investing in innovation in Australia by, allowing them to redirect tens of thousands of dollars spent on accounting. A simplified tax system would also attract new industries such as big data, cloud computing and retail services to Australia, and encourage them to establish R&D divisions here.
2. **Create enablers for strong 'incubators' for start-up companies.** Government support and incentives for private enterprises to fund and support start-up incubators should be considered due to significant multiplier benefits. A few private enterprises (especially telecommunication companies) have established incubator facilities for small scale start-ups to access basic capital, office space, and most critically a mentorship network to grow their concepts. This recent advent (within the last three years) has been long overdue, but still only supports very few companies. Government support and incentives for private enterprises to fund and support start-up incubators should be considered, with the potential benefits having a significant multiplier effect: incentives would create more incubators, support more start-ups, and draw out entrepreneurs wanting to test their new ideas.

3. **Encourage diversification of funding for innovation.** Encourage investment in research by creating tax incentives and education for sectors with significant capital resources such as superannuation funds. Australians have the highest average per capita investment in managed funds in the world and the Australian-managed funds industry is the fourth largest in the world. There is a clear opportunity to remove the barriers to investment in science and research and ensure Australian ideas support Australian industries. Currently activities are limited to small philanthropic trusts. Mechanisms to educate and incentivise such organisations to invest in innovation should be implemented.

Terms of Reference – Item (b)

The Australian Government's approach to innovation, especially with respect to the funding of education and research, the allocation of investment in industries, and the maintenance of capabilities across the economy

The EMCR Forum's Response against Item (b)

The Australian Government has a fragmented and disconnected approach to the research and innovation framework. R&D spending is spread over more than 12 government portfolios with more than 70 individual budget lines. Although occasional special initiatives of research funding have been organised, these are often terminating programs. As Chief Scientist Professor Ian Chubb says, "We have spread all the jigsaw pieces on the table—but we seem to have thrown away the top of the box". This has led to an increasing disconnect between academic research, intellectual property management and industry-driven/based research. While capabilities exist across the economy, there is a lack of cohesion and collaboration in solving grand research challenges, diluting the impact of research outcomes.

The potential disconnect of research and innovation from industry is highlighted by the absence of a dedicated Minister for Innovation (or for Science and Research). While one could argue that the current titles and departments are for simplicity, they have created a situation where there is no clarity on whether research and innovation is led by the Minister of Industry or Education and their respective department, which translates to a lack of leadership in this area. Moreover, it does not give stakeholders a point of contact to convey current limitations and highlight opportunities and policies for better innovation practices.

Recommendations

4. **Clarify the leadership and administration of Australia's Innovation System.** Currently innovation activities are spread between departments, particularly Industry, Education, and Health. This creates lack of cohesion in policies, duplication of processes, and a burden on the Chief Executives of respective organisations (such as the ARC and the NHMRC) to create a balanced system. There is a need to establish connectivity and alignment between departments with innovation-related portfolios, such as Industry, Education, and Health. Clearer Ministerial responsibility for innovation should be established.
5. **Develop and implement a 10-year research and innovation road map for Australia—*The Australian Innovation Strategy*.** The allocation of funding to areas, industries, and schemes has been ad hoc purely due to the lack of a non-partisan Australian innovation strategy. We strongly urge the Senate and the Government to develop a strategy through strong stakeholder engagement. The primary goal of the strategy should focus on outcomes and impacts on Australia and the world, and direct necessary budgetary resources accordingly (combined with strategies to attract co-investment, described below). The major scientific bodies and the national committees of the Australian Academy of Science develop decadal plans for research strategies in specific disciplines which

provide a good starting point. The development of a long-term strategy will create confidence in the sector, as policy stability is critical in attracting investment and attracting young researchers and innovators to relevant professions to ensure the workforce pipeline. An example of such a strategy is the United Kingdom's Innovation and Research Strategy.³

Terms of Reference – Item (c)

The importance of translating research output into social and economic benefits for Australians, and mechanisms by which it can be promoted

The EMCR Forum's Response against Item (c)

Translating research output and outcomes into social and economic benefits for Australians is critically important, and recognised as such by researchers and research-driven organisations. Success examples range from vaccines to pesticides to bionic technology and flexible electronics. Another oft-cited example is wireless technology (WiFi) developed by CSIRO. Nevertheless such achievements are the exception and not the rule.

A culture for protection of intellectual property (IP) and translation of such IP into economic benefit to Australia is absent. The aversion to risk of Australian capital, along with risk aversion by young Australian researchers coupled with the tall poppy syndrome, is a part of the problem.

In addition to these, IP processes are relatively complex and in general Australian researchers are poorly educated in the complexity of these processes, providing a significant deterrent. Furthermore, costs associated with these processes deter innovators, potentially meaning that even if an idea is first conceived and/or demonstrated in Australia, the IP protection and related financial benefits might be secured elsewhere.

Recommendations

6. **Educate innovators in the IP process and create streamlined processes for innovators to protect intellectual property.** Strengthening Australia's innovation system will also mean enabling innovators to protect, develop, and translate concepts into products. Researchers who have filed a patent have a dramatically increased chance of filing additional patents when compared to their contemporaries. Educational resources to assist researchers to understand IP law can assist in bringing larger segments of the Australian research community into the innovation cycle.
7. **Provide support/grants for innovators, start-ups, and small and medium enterprises to protect intellectual property.** This will remove the financial deterrent in IP protection for small organisations and young innovators, who typically have the freshest ideas. This will ensure most, if not all, Australian innovations will be protected to ensure the social and economic benefit to Australia.
8. **Incentivise researchers to participate in the innovation cycle.** Policy settings at the ARC, NHMRC and research infrastructure block grant (RIBG) funding distribution are the key drivers of behaviour of Australian researchers. As part of an *Australian Innovation Strategy (Recommendation 5)* increased weighting could be given to social and economic benefits of research. For example, increased weightings on track record of economic impact of research in prestigious and highly sought after fellowships would dramatically alter the patterns of behaviour of both researchers and their employers.

Terms of Reference – Item (d)

The relationship between advanced manufacturing and a dynamic innovation culture

The EMCR Forum’s Response against Item (d)

The first question to be answered is “What is advanced manufacturing?” While Australia has a strong history of manufacturing excellence, in recent decades it purely related to mass manufacture and assembly. There are very limited examples of *advanced* manufacturing.

Advanced manufacturing in an innovative sense encompasses manufacturing technologies for nanomaterials and devices, photonic technology, microelectronic and microsystems, flexible electronics, microfluidic devices for biomedicine, pharmaceuticals and drug discovery as examples. These high-end research-driven innovative techniques would go along with technologies such as additive manufacturing and three-dimensional (3D) printing.

Australia competes at the top of these research fields, and in many cases leads advancements in these areas of advanced manufacturing. This research is primarily undertaken at Australian universities and the CSIRO.

Creating schemes that recognise existing strengths in advanced manufacturing and supporting the directed growth towards innovative outcomes of economic benefit to Australia is the major challenge. This requires effective utilisation of existing metrics and measures, such as in the Excellence in Research for Australia (ERA) exercise, to identify where our strengths lies, and also utilisation of infrastructure, such as that developed through ARC Centres of Excellence.

Recommendations

9. **Recognise and support true and futuristic advanced manufacturing with proven Australian innovation and excellence.** Australia currently performs well above world standard (ERA scores of 5) in certain areas of innovative manufacturing. An example is nanotechnology-enabled devices and photonic devices. Recognising such areas of excellence and existing infrastructure (six relevant ARC Centres of Excellence, five-six well-equipped research facilities, etc.) and directing investment strategically will enable a dynamic innovation culture. One such mechanism is to further focus the expenditure through the *National Collaborative Research Infrastructure Strategy* (NCRIS). Sustained support and promotion of selected areas will create a culture where students aspire to pursue professions in advanced manufacturing, minimising impact of impending skills shortage.

Terms of Reference – Item (e)

Current policies, funding and procedures of Australia’s publicly-funded research agencies, universities, and other actors in the innovation system

The EMCR Forum’s Response against Item (e)

Australia has a strong and established system of funding for agencies and universities to enable research. With increasing schemes and variants in policies the funding has often been fragmented and unpredictable. In relation to this aspect, we would reinforce our

Recommendations 4 and 5 above to streamline and enhance Australia's research funding with long-term vision.

Currently about \$1.7 billion a year is administered as research funding through the ARC and NMHRC. The processes that allow access to the funding in form of grant applications have become a significant administrative burden for researchers. A *Nature* editorial estimated that in 2012 Australian researchers spent the equivalent of 550 years of research time in applying for grants just to the NHMRC (one of multiple agencies),² with applications typically 80-120 pages long.

Grant cycles are long, typically taking up an entire calendar year in reality, with applications submitted in March and outcomes announced in October/November. For EMCRs, who are the front-line of the research workforce, this results in a year in limbo. This hampers productivity and also creates a brain drain from Australia where excellent researchers leave seeking stability and security. The length of grant cycles and unpredictability on announcements based on political aspects is a major drawback, even drawing the ire of Australia's recent Nobel Prize recipient, Professor Brian Schmidt.⁴

Recommendations

10. **Simplify research funding application processes.** With grant success rates ranging from 15-20% for applications to the ARC and the NHMRC (with funding returns averaging 60% of requested budget), it is apparent that at least half the applications would not have been competitive. Such a judgement could purely be made on the basis of the quality of the investigators and the core of the research idea/problem. Introducing short-form expressions of interests (EoIs) limited to 3-5 pages into most funding schemes should be considered. The EoIs should be considered with priority for schemes related to EMCRs, to allow them to be more productive at a crucial stage in their career.
11. **Operate shorter, more efficient ARC and NHMRC grant cycles.** While a number of grant schemes can cope with the current grant cycles, there are two aspects that suffer—careers of EMCRs and research partnerships with industry. Schemes to support EMCRs with salaries via fellowships should have much faster turnarounds (preferably less than 6 months). As a current example, applicants for the ARC's premier early-stage fellowship—the Discovery Early Career Researcher Award (DECRA)—need to have a PhD conferred and then wait a year to know the outcome. This means they need to secure employment for the year in between. A shorter EoI process with a 3-month turnaround could give such EMCRs clarity and allow them to seek more stable opportunities and undertake productive research.
12. **Provide stable and performance-related funding for publicly-funded agencies such as CSIRO.** Creating uncertainty in the quest for productivity and efficiency can potentially have the opposite effect. Funding cuts to agencies such as CSIRO should be re-considered, as CSIRO and its Flagship Programs have a strong track-record of research, innovation, and translation of research outcomes for the benefit of Australians. CSIRO's public impact is apparent as we carry its outcomes on our person in the form of secure polymer currency and connect our devices routinely to WiFi networks. Budgets for publicly-funded agencies should align to our recommended *Australian Innovation Strategy* (**Recommendation 5**) and be quarantined from dramatic changes during every strategic cycle.

Terms of Reference – Item (f)

Potential governance and funding models for Australia's research infrastructure and agencies, and policy options to diversify science and research financing

The EMCR Forum's Response against Item (f)

The existing governance and funding models are predominantly suitable and continue to deliver excellence. The significant requirements are the need for stability and long-term funding models. As a related aspect, this would imply simplifying governance, policy, and bureaucracy to increase research and innovation productivity.

The initiative to create a stable fund for long-term research investment in the form of the Medical Research Future Fund (MRFF) is commendable and positive (although the significance was overshadowed by links to other policy areas). This model should cover all forms of sciences, as all research activities are complementary. A portion of this fund's expenditure could be targeted at commercialisation in the form of an innovation commercialisation fund.

Effective governance to align activities of the agencies with a major long-term strategic plan (**Recommendation 1**) can potentially make a significant difference.

Recommendations 1, 4, 5, 6, 10 and 12 relate to these aspects.

Terms of Reference – Item (g)

The effectiveness of mechanisms within Australian universities and industry for developing research pathways, particularly in regards to early and mid-career researchers

The EMCR Forum's Response against Item (g)

Australian universities offer reasonable (but inconsistent/unpredictable) pathways for EMCRs. The primary mechanism is through tenure, but given the primary emphasis in most Australian universities is on teaching, this pathway is often detrimental to an independent research career. Teaching is a significant time commitment, and more so for EMCRs as they need to prepare material afresh. This manifests itself as poor national and international competitiveness in research performance benchmarks of EMCRs, and in a significant number of cases gradual decline in research activities and output. The secondary mechanism for EMCR support in universities is providing a research environment and offering facilities to host fellowships, often funded by the ARC or the NHMRC. With the extremely competitive nature of fellowships, EMCRs are left with a challenging choice—sacrifice research excellence for stability or pursue the high risk fellowship pathway and its inherent insecurity. This increasingly affects research performance and culture with despondence, negativity and lack of focus.

Industry pathways for EMCRs are extremely limited and almost non-existent. Australia has just over three researchers in business per 1000 workers, whereas Canada has seven, and Norway almost 14. There is a lack of mobility between industry and academia; it is often seen as a one-way exit, which hinders the exchange of knowledge and human capital. This contributes to the stigma associated with research and PhD graduates in an industry workforce, which undermines the culture of entrepreneurship. Recognising the value and different perspective researchers can bring to industry, and the mutually beneficial relationship can produce valuable returns.

Recommendations

13. **Offer incentives for universities to maintain a large proportion of research active and research-only staff.** All international university rankings and metric systems rely on research performance. This relates to international recognition, citations to research outputs, translational outcomes, etc. Teaching related metrics only contribute in a very limited manner to rankings, although rankings have a significant impact on undergraduate

enrolments. This highlights that the trademarks of a strong university system is research. Excellent research with outcomes and impact communicated well to society will make the next generation interested in pursuing education in related areas, potentially sustaining university enrolments. While Australian higher education funding supports research activity, there should be increased incentives for maintaining a greater proportion of research active and research-only staff. This will also potentially decrease the extreme competition for fellowships from tenured academics, creating a greater pool of excellent researchers in Australia.

14. **Incentivise industry to offer research pathways for EMCRs (even as partnerships with universities).** Extending *Recommendation 1* further, create incentives, which make it attractive for industries to employ researchers. Australia produces 6,000+ PhD graduates every year with limited opportunities for continuing employment in Australia (only three researchers in 1000 workers as noted above). This means significant investment in research training is lost, either overseas or through under-employment of graduates. Encouraging and enabling industries to create secondments or internships for EMCRs would inject innovation and innovators into Australian industry. Potential for university–industry partnerships to offer EMCR opportunities could also be explored, with a co-investment matched by grant support (this has been loosely enabled by the ARC Linkage Projects scheme).

Terms of Reference – Item (h)

Policy actions to attract, train and retain a healthy research and innovation workforce

The EMCR Forum’s Response against Item (h)

This term of reference has three specific aspects to “attract, train and retain” a strong research and innovative workforce in Australia, and there are tailored policies that need to be considered. In order to attract people and the next generation of potential researchers, the public need to be excited about research. Australia excels in many research areas. This needs to be communicated in a simple and accessible manner to market the outcomes.

Training the research and innovation workforce should focus on enhancing PhD training. Currently the focus for a PhD candidate is often on a tightly confined research problem, as a result of which many graduates are not adequately equipped with skills for the workforce.

Retaining the skilled workforce, on the basis of both research excellence and investment in research training will rely on opportunities for research performance and stability for EMCRs.

Overall, the major policy action required is vision and long-term strategy and stability for research and innovation in Australia (*Recommendation 5*).

Recommendations

15. **Improve and support communication of Australian research and innovation to the public and the next generation.** Research funding agencies could drive change in this area by having a section on communication of research as part of grant application, a condition of funding. For example, the National Science Foundation in the United States has a section on the “broader impacts” of the research proposal, which includes education and outreach. Also providing additional metrics to defining excellence that give recognition to those researchers who are making contributions to science communication. Encouraging and supporting science-related media agencies will help convey outcomes to the broader society. Currently most of these agencies are limited in funding, with most major newspapers having made specialist science journalists redundant. Secondly, to

make the messages reach children early, the government-funded Scientists in Schools program⁵ should be expanded and actively promoted.

16. **Develop entrepreneurial training for PhD students to create ‘industry-ready’ graduates.** The skills acquired during PhD training should be broadened to include areas such as business development, commercialisation and intellectual property management, and science communication elements (commonly referred to as ‘soft skills’), as essential components of PhD training. This will create graduates who are ready to participate in the research and innovation workforce, prepared to be entrepreneurial and good at communicating their ideas to attract people to research.
17. **Increase opportunities for research focus and stability for EMCRs.** This closely relates to *Recommendations 5 and 10-14*. While those recommendations will benefit Australian research and innovation, they will also significantly benefit young researchers. It will allow more time for research, and therefore, better outcomes.
18. **Create mechanisms for better mentorship and training of postdoctoral researchers.** The postdoctoral stage can be the most daunting transition from being a PhD student to an independent researcher. This period, which can vary from one to eight years, is currently a leaky pipeline where many excellent young researchers become disillusioned by lack of mentorship, funding support and stability. Our detailed policy document on ‘Best practices for postdoctoral progress’ can be accessed here:⁶
<http://www.science.org.au/sites/default/files/user-content/postdoctrainingbestpractice.pdf>
19. **Promote initiatives for gender equity in the research workforce.** Mechanisms to support young female researchers are critical in retaining a well-trained workforce. If female EMCRs choose to start a family, lack of a supporting environment and challenges where career breaks are not effectively recognised by peers act as deterrents to stay in research. Our platform of initiatives on ‘Gender equity: current issues, best practice and new ideas’ is available via the link below, and we acknowledge the NHMRC for taking a leadership role in exploring the implementation of this:⁷
<http://www.science.org.au/sites/default/files/user-content/genderequityemcrforum.pdf>

Terms of Reference – Item (i)

Policy actions to ensure strategic international engagement in science, research and innovation

The EMCR Forum’s Response against Item (i)

Australian researchers and stakeholders are often proud, and rightly so, that we punch above our weight in performance—given both our small population and relatively meagre research investment as a percentage of GDP when compared to other developed nations in the OECD (it is below the OECD average).⁸

However, true value comes from international recognition and participation in international networks to solve grand challenges. International engagement also comes with benefits of access to expertise, industry partners, and specialised facilities.

Over the last five to seven years, mechanisms for international engagement have been drastically reduced. The very relevant International Science Linkages scheme was gradually wound down, with related schemes with specific focus on partnerships with China and India. While engagement with emerging economies and their excellent talent base is important, it should not be at the exclusion of relevant international partners. For example, at present Australia has no major scheme which allows undertaking of a major project in Australia in

partnership with the European Union, the United Kingdom or the United States (while there exists some support for participation in these major external programs).

Recommendations

20. **Reinstate and sustain the International Science Linkages scheme or similar.** The European Framework program is a very renowned and successful program that enables researchers from across the world to come together to solve major research challenges and enable innovative products and technologies. The International Science Linkages scheme enabled the same for Australia albeit at a much smaller scale. This scheme should be reinstated and administered to support the best project and partnership.
21. **Ensure research funding for fellowships and scholarships is open to the best, including international researchers and students.** Australia can tackle brain drain by embracing the best talent available irrespective of nationality. Australia needs to attract excellence in research and innovation from all over the world. There is a current disparity between the number of scholarships available to international and local PhD applicants. While the majority should support local students, a greater proportion should be on offer to international applicants. Most of these students are highly motivated, contribute significantly to Australian research outcomes, and on graduation stay in Australia or maintain research collaborations. This also means that research fellowships, such as the Future Fellowships scheme, should continue to be accessible to researchers who have chosen to build their research careers in Australia. Like Professor Brian Schmidt, our most recent Nobel Prize winner, who was attracted to Australia, we want to retain international research stars, and continue the brain-gain. This will serve to create true international engagement with the next generation of young researchers, and strong international networks.

Terms of Reference – Item (j)

Policy options to create a seamless innovation pipeline, including support for emerging industries, with a view to identifying key areas of future competitive advantage

The EMCR Forum’s Response against Item (j)

A seamless innovation pipeline will need to naturally appear as an indirect outcome of multiple policies that enable greater interaction between academia and industry, supported by simplified processes to protect ideas and mechanisms to transform ideas into products.

For areas of research excellence and leadership to transform into **Australian** emerging industries, such support and mechanisms are again critical.

Recommendations 1, 2, 6-9, and 14 are all potential enablers for such a seamless innovation system.

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DECLARATION

Members of the Forum Executive have received, or receive, funding from the Australian Government, state governments, the Australian Research Council, the National Health and Medical Research Council, and Australian and international industry.

ACKNOWLEDGEMENTS

We acknowledge the contributions of attendees at the *EMCR Forum's Science Pathway 2013* meeting. This meeting with the theme of engaging with industry and enabling innovation put forward many ideas from EMCRs and experts across Australia very relevant to this Senate inquiry, with some of these messages presented as recommendations in this document. We also acknowledge those who responded in detail to our survey against the terms of reference of this inquiry, with some of their responses paraphrased in this submission.
