

Vision for a Science Nation Consultation

Submission from the Australian Early- and Mid-Career Researcher Forum

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Executive Summary

The Australian Early- and Mid-Career Researcher (EMCR) Forum of the Australian Academy of Science was established in 2011 and acts as the voice of Australia's EMCRs, championing improvement in our national research environment. The Forum is led by an Executive Board comprised of 10 EMCRs from academia and industry. It hosts high-profile *Science Pathways* conferences on issues of priority to Australian EMCRs, and has a membership-base of over 3,500 Australian EMCRs who receive regular newsletters and updates.

In preparing this submission, the EMCR Forum surveyed its membership on key issues of importance. Responses were received from 163 Australian EMCRs who took the time to give their thoughts on how to make Australia a science nation now, and in the future. A move towards a strategic plan for research, with dedicated, stable funding, is a step in the right direction and we fully support this concept.

While researchers support the idea of a strategic plan for research and research funding, our survey revealed that 95% of those surveyed have concerns about whether the proposals outlined in the *Vision for a Science Nation* consultation paper adequately address the Chief Scientist's recommendations.

The main concern for EMCRs resulting from this survey is the lack of a clear, well-funded career pathway. A lack of job security means that many Australian or Australian-trained researchers move overseas for better job opportunities, which is an intellectual and a financial loss for Australia when they have been funded and supported by Australian taxpayers throughout their early career.

Recruiting and retaining a diverse job force is also critical. We lose a number of working parents, especially women, at the critical career stage of transitioning to "research independence," and this issue needs to be addressed urgently. The need now is for stable, dedicated, national support for innovative research – and researchers.

Respondents also acknowledged the importance of achieving a genuine, whole-of-government, approach to shaping and guiding the national strategic priorities for STEM on a long-term basis. We recommend planning science funding in 10-year intervals, decoupled from annual budget cycle allocations, which would help to maintain the integrity of the long-term budget for science and research. Further, we support initiatives to keep funding at a constant percentage of GDP or to remaining above the OCED average for research funding.

The most critical factor to support the STEM workforce would be to support research careers.

Similar numbers of respondents thought accelerating the integration of STEM experts into industry, business and public sectors (Recommendation 3, 30%) and providing support to encourage and enable quality research to respond to problems identified by industry (Recommendation 20, 33%) were important.

To improve educational outcomes, 22% of respondents thought providing all pre-service and in-service STEM teachers with the training and professional development opportunities to deliver contemporary science using contemporary pedagogy (Recommendation 7) and using curricula and assessment criteria, from primary to tertiary levels, to promote the development of long-lasting skills in parallel with disciplinary knowledge (Recommendation 10) were most relevant.

A significant majority of respondents thought adopting a long-term plan for science and research (Recommendation 16, 72%) would be the single issue that would have the greatest impact on policy and planning.

The most important recommendations to enable researchers and their organisations to contribute to Australia's STEM performance, are those which support research careers, including collaboration with industry and business (Recommendation 18, 84%) and adopting a long-term plan for science and research (Recommendation 16, 76%).

Background

The mission of the Australian Early- and Mid-Career Researcher Forum is to serve as the voice of Australia's early- and mid-career researchers (EMCRs), championing improvement in our national research environment. We do this by advocating within the community and to the government for sustainable and transparent career structures, gender equity, stable funding policies, and greater awareness of issues facing the future of science.

From 13–22 July 2015, we surveyed Australian EMCRs to create this submission; we received over 160 responses. The following report details those answers to the consultation questions, and provides additional suggestions from our constituents.

The EMCR Forum notes that these responses reflect the thoughts of our constituents, as persons who are primarily employed as researchers; the priority areas defined in this report represent the professional perspective of people at that career stage. We agree support and training for STEM training and teaching in primary and secondary school, for example, are important, but our concerns are largely centred on training for and sustained careers in research.

Consultation Questions: Recommendations

Do these proposals adequately respond to the Chief Scientist's recommendations – both now, and over the longer term?

Although the proposed measures represent an appreciated step towards responding to the Chief Scientist's recommendations, there are concerns it does not adequately address them. In particular, the recommendations to support research careers (Recommendation 18) and the development of a long-term science and research plan (Recommendation 16). About equal proportions of the EMCR forum who responded to the questions believed the proposals somewhat or do not address the Chief Scientist's recommendations (47 and 48%, respectively). Only 5% of our respondents think the proposals do address the recommendations.

Which of these proposals will have the greatest impact on Australia's STEM performance?

The question was broken down into the following areas (with majority support for the recommendation in parentheses):

- the STEM workforce (Recommendation 18);
- industry and innovation (Recommendations 3 and 20);
- education (Recommendations 7, 10, and 5); and,
- policy and planning (Recommendation 16).

For these questions in the survey, we asked respondents to select only one option.

STEM Workforce

The majority of respondents said the most critical factor would be to support research careers, including collaboration with industry and business (Recommendation 18, 68%). Increasing the uptake of STEM across the workforce (Recommendation 13, 19%) was also important.

Industry and Innovation

Approximately equal numbers of respondents thought accelerating the integration of STEM experts into industry, business and public sectors (Recommendation 3, 30%) and providing support to encourage and enable quality research to respond to problems identified by industry (Recommendation 20, 33%) were important. Supporting the translation and commercialisation of STEM discoveries was also identified as important (Recommendation 2, 19%).

Education

To improve education outcomes, 22% of respondents thought providing all pre-service and in-service STEM teachers with the training and professional development opportunities to deliver contemporary science using contemporary pedagogy (Recommendation 7) and using curricula and assessment criteria, from primary to tertiary levels, to promote the development of long-lasting skills in parallel with disciplinary knowledge (Recommendation 10) were most relevant. Supporting the national interest in maintaining the pipeline of STEM graduates, and increasing the recognition of STEM education and careers as a public good was also seen as important (Recommendation 5, 20%).

Policy and Planning

A significant majority of respondents thought adopting a long-term plan for science and research (Recommendation 16, 72%) would have the greatest impact on policy and planning; increasing communication between STEM practitioners and the community was also seen as useful (Recommendation 15, 10%).

Which of these proposals will enable you and your organisation to contribute to Australia's STEM performance?

For this question, we gave respondents a selection of 15 recommendations and asked them to choose any that would be relevant for them and their organisation. These recommendations were focused on policy and research initiatives, and omitted those focused on primary and secondary education. The most important recommendations are to support research careers, including collaboration with industry and business (Recommendation 18, 84%) and adopting a long-term plan for science and research (Recommendation 16, 76%).

#	Recommendation	Percent
18	Support research careers, including collaboration with industry and business.	84
16	Adopt a long-term plan for science and research.	76
20	Provide support to encourage and enable quality research to respond to problems identified by industry.	58
2	Support the translation and commercialisation of STEM discoveries.	45
8	Ensure active scientists, technologists, engineers and mathematicians are involved in the delivery of content in pre-service STEM teacher education courses at university.	44
3	Accelerate the integration of STEM experts into industry, business and public sectors.	43
15	Increase communication between STEM practitioners and the community.	43
14	Facilitate community engagement with STEM.	42
13	Increase the uptake of STEM across the workforce.	41
11	Ensure that changes to the Australian Curriculum do not diminish the place of STEM.	40
17	Develop and implement strategic research priorities.	39
12	Ensure that the skills of STEM graduates are aligned with workforce need.	34
19	Enhance dissemination of Australian STEM research by expanding open access policies and improving the supporting infrastructure.	33
4	Promote an entrepreneurial culture.	31
1	Establish an Australian Innovation Board.	20

Do you consider there are any areas that require more urgent action?

This question was left open-ended, and received fewer than 60 responses. The suggestions have been categorised as follows.

Job Security for EMCRs

Almost all respondents mentioned the need for increased job security for early- and mid-career researchers, and the need for a defined career pathway if one is to have a sustained career in research (inside or outside the academic sphere). The emphasis was on long-term appointments (of several years), since most early-stage researchers are on contracts of 3- or 6-months to a year. It is difficult or impossible to make a optimal contribution to a major research topic on rolling, short-term contracts.

Researchers are in a global job market. A number of respondents also outlined their plans to move overseas, due to the lack of secure support for mid-career researchers. We experience a considerable lack of stability with respect to techniques and disciplines – many feel they are trying “to hit a moving target” when determining what will be de rigueur in the next funding cycle.

Funding (Type)

Respondents called for a stable level of funding for basic research and infrastructure (including the National Collaborative Research Infrastructure Strategy, NCRIS; Australia’s Information and Communications Technology Research Centre of Excellence, NICTA; and, the Commonwealth Scientific and Industrial Research Organisation, CSIRO).

The proposed Medical Research Future Fund will be dedicated to health and medical research, so care must be taken to dedicate funds to basic and non-biomedical research as well, including innovative projects not within the safe zone of previously funded work. An emphasis on “future proofing” research was noted, where research priorities would be aligned not with industry or other short-term goals, but with a holistic, collaborative view towards how science in Australia will be funded and how all the funded pieces fit together.

While funding should not be exclusively focused on research that is of potential interest to industry, it is important to dedicate funds to more blue-sky research as well as to translation and commercialisation. Translation is often an expensive process particularly at the early-stage where it is difficult to attract investment and where effective translation of research is often beyond the remit of academic or smaller or non-commercial research-focused institutes.

With this conversation about who is funded and for what projects is a tandem problem of metrics: how do we determine which research(ers) are to be funded? This should be examined from a career-stage basis and also a discipline-specific perspective, as there are a variety of differences within different research communities. This issue also links in with work being done by the Science in Australia Gender Equity (SAGE) Pilot Program being run by the Australian Academy of Science. By ensuring we measure the outputs of our research community accurately and fairly, we will increase the proportion of traditionally underrepresented groups with careers in research.

Government Support for Science and Research Priorities

The majority of respondents mentioned the need for long-term research priorities, both for the purposes of funding and for shaping a vibrant research community with clear goals and objectives in mind. The emphasis on collaboration with industry and industry-led project funding is perceived to devalue the basic research that forms the basis for many commercially viable projects.

This includes research that ultimately contributes to innovative, commercially relevant products like WiFi. An emphasis on industry-driven projects also encourages researchers to apply for funding in “safe zones” that have already been funded previously and discourages more innovative research “outside the box” which may be riskier and have a higher failure rate.

Public Support for Science and Research Priorities

The Government’s public support for research, and researchers, was something many respondents mentioned they were glad to see. Although the majority didn’t think the recommendations addressed the needs of Australia’s research community, they were glad to see the consultation take place.

A number of respondents also supported increased funding and training for primary and secondary STEM teaching, as that early spark of interest carried many of us into careers in research.

Industry Engagement with Research

Respondents were puzzled by the report’s emphasis on industry (both for funding, and for an origin point of research priorities) since the research and development (R&D) community in Australia is so small. Perhaps due to the small size of the Australian investment in R&D many researchers feel they are not connected with industry, and vice-versa, which further confounds the problem of transitioning to a position in industry or finding a role for their research within a business plan.

Teaching (Tertiary)

The challenge with not having a well-defined career pathway for research has an impact on tertiary STEM teaching and research as well: researchers pointed out the lack of continuity in planned funding from the tertiary level (where many PhD students are supported and subsidised), to a job market where there are a shrinking number of fellowships and job opportunities available. This links back to the first point about the strong need to improve job security for EMCRs.

Acknowledgements

The EMCR Forum Executive Board

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