National Committee for Physics

A committee of the Australian Academy of Science

Office of the Chief Scientist
Via email: SRP@industry.gov.au

23 March 2015

To whom it may concern

Re: Draft Science and Research Priorities for Australia

Thank you for the opportunity to provide input into the Draft Science and Research Priorities for Australia. The National Committee for Physics (NCP) of the Australian Academy of Science is pleased to respond on this matter. Please see below a) comments specific to three matters in the draft and b) a general statement on the priorities as a whole.

Please do not hesitate to be in contact with the National Committee Officer, Meaghan Dzundza (Meaghan.Dzundza@science.org.au), should you require further comments.

a) Specific comments on the draft priorities

Regarding the studies of EU and US models on page 2, it is important to also study how priorities are established in those parts of the world. These processes are an important part of the strategy setting. We understand that Horizon 2020 in the EU runs a series of stakeholder workshops prior to a major call so that the priorities are authoritative. The Australian community may be too small to emulate this process, but it would certainly be worth learning more about it.

Under Priority 3: Transport – It would be worth pointing out that transport in Australia consumes about 40 GW from the almost exclusively (91%) imported fossil fuels, and this is a significant contribution to our emissions. With the advent of electric cars, we will also need to re-engineer our fixed energy generation systems in the near-term to cope with the demand. This cannot be untangled from the transport questions. The statement “Lower dependence on imported fuels “could be extended to say “….including enhanced electrification of the transport sector.”

Under Priority 7: Environmental Change – The meaning of “regional impacts” is not very clear. This section should have an outward looking component. At present it is largely inward looking. We saw last week (Cyclone Pam) that the impact on vulnerable countries in our region can be significant and is likely to be even more significant in the future. Australia has obligations and responsibilities to assist with preparation and recovery from climate events affecting those countries. A better description might be “impacts on the Australian region of the world”.

b) General comments on the draft priorities

The proposed research priorities cover the most urgent needs of Australia and thus seem to be a logical choice. The detail of each of the 9 priorities cover the specific research needs of our country, determined by our special needs and our research capabilities. These priorities can be met by R&D in both commercial and scientific institutions, covering targeted research, which is close to profit and immediate practical and strategic impact which provides medium term profit and impact. There is guidance required to implement these priorities effectively.

One issue that is only lightly discussed is the balance between pushing researchers to work on these topics and industry pulling researchers into their domain to work on their challenges. For many years there was little of either in Australia. Scientists pushing their research is now fairly common. In contrast, pull by industry is almost non-existent in Australia, in comparison to countries in the EU, the US or Japan.

Industry pull can be very effective, since it is linked to the actual demand in each priority area and can highlight possible careers for the people we urgently need; that is scientifically trained professionals working directly on these research priorities. They are needed to create the ideas for solutions, analyse the demand for new technology, wisely and effectively select, purchase, adapt and optimise and maintain the required strategies, hardware and software. Doing all this within Australia will be effective and economical. How will the policy support industry pull?

The second balance that should be created is between large abstract research challenges and targets set in minute detail. Some of the most successful and effective examples of successfully addressing these grand challenges is through the strategic priorities of science managers, not the individual scientists or projects. We want our researchers to focus on science, not compliance. In science they are creative and effective, when the matching to the priorities is done at the macroscopic level and by setting the themes for institutions and large teams.

Finally, there is the balance between targeted, strategic and fundamental research. The latter is necessary to find in the long term completely new solutions, develop unforeseen technologies, and explore new avenues ignored by mainstream research or other countries with different economic or strategic priorities.

Some of the areas of the world with the biggest economic impact and societal benefit carefully maintain such a balance - and address this independent of the exact priorities. Two of the many examples are the EU and Germany.

In the EU targeted and strategic research is addressed by the Horizon 2020 program and national R&D initiatives. Fundamental research is specifically addressed by the European Reseach Council - and the national funding agencies.

An impressive example is Germany. Here targeted research is covered by industry, with specific government support, and the Fraunhofer Gesellschaft. The Helmholtz Association is largely guided by strategic priorities and maintains much of the big infrastructure. The Deutsche Forschungsgesellschaft and the Max Planck Gesellschaft are focused on fundamental research. The Universities collaborate with all of them depending on their specific strengths, and train the future scientists and professionals. The ratio between these three components is set as a clear statement of intent that all three types and

timescales have to be constantly covered. The strategic research priorities are updated on a five year timeframe.

Government statistics show that in Australia about 80% of government spending is for targeted and strategic research, including R&D tax concessions and CSIRO, with about 12% for NHMRC and 8% for ARC, leaving these two agencies to cover almost all fundamental research. Industry contributes little R&D and almost no fundamental research. This leaves fundamental research, driven by the latest questions and opportunities in science, in a very precarious position. This category includes project grants, fellowships, infrastructure, Centres of Excellence and international collaboration, which outside the health sector relies almost completely on the Federal government.

We hope that this proposal becomes a model for an Australian policy, which creates a long term balance between research push and pull, a balance between targeted, strategic and fundamental research and which supports scientists and professionals to focus on their creative work, while guided by managers implementing the priorities set by our society.

Yours sincerely

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Chair, National Committee for Physics