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Senate Standing Committees on Economics
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Submission to the Inquiry into Australia's Innovation System

Dear Secretariat,

I am writing to contribute to the inquiry into the Australian Innovation System in my capacity as Director, Victorian Life Sciences Computation Initiative (VLSCI) which is a specialised life sciences facility funded by the Victorian Government and contributing institutions, hosted by the University of Melbourne and including the first IBM Research Collaboratory for Life Sciences. Although originally funded for Victorian life science researchers and their collaborators, 15% of the facility is also made available to the Australian research community through the National Computational Merit Allocation Scheme. As of July 2014 VLSCI remains the most powerful supercomputer facility devoted to life sciences in the world.

Working at the convergence of biology and ICT, we live and breathe research innovation in the life sciences. We are witnessing the substantial changes these new techniques and technologies are bringing to health, agricultural, environmental, engineering, computational and medical research and development. Key to maximising the potential of the equipment and instrumentation now available to life sciences researchers is the creation of a pipeline of trained specialists with overview knowledge of mathematics, computer science, and specific disciplines within the life sciences. These are not people with one degree. They usually have at minimum a Masters or PhD and several years of post-graduate training, with further education gained through travel to overseas conferences and experience gained in several laboratories through exchange programs. Their education and, even more importantly, the retention of these experts in Australia, is essential to ensure we can create and maintain biotechnology and biomedical investments as a premier value-added high-technology industry locally.

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It is critical that the education of students with both application-specific (in this case the life sciences) and mathematical/computational backgrounds be expanded and thereby used to build on Australia's recognised capabilities ("Australia moves from 7th to 4th in Scientific American Worldview's Biotechnology Innovation Scorecard" ) in a major industry/innovation sector that offers very high return on the initial investment. A sustained program to maintain the technology base that operations such as VLSCI provide must accompany this.

In the area of personalised medicine, where we are currently witnessing an explosion of projects which are already having clinical applications, such innovations will contribute to Australia having a healthier and more productive workforce, as well as deliver savings in health care costs as we find more appropriate and targeted treatments for disease as well as offer better advice for tailored preventative health strategies. Personalised medicine relies on mountains of data, hence the need for specialist programmers and mathematicians. But it also relies on access to personal health data.

We cannot simply sit back and contract other countries to do our number crunching. We may use some of the tools developed overseas, we may contract to share some of our de-identified data with collaborators, if it brings us some benefits, but it is unlikely that we will be willing to hand over to other countries or companies most of our own health data for them to "mine".

No, we will need to own these computers and operate their associated facilities. But more importantly, what we will need is people to run them. Other countries are already targeting those people – currently in early high school – to develop the expertise to run, program, decipher, maintain and develop the information going into and coming out of these supercomputers. The UK has identified that it will need 830,000 new science, engineering and technology professionals and 450,000 technicians between now and 2020. In the new world of the super-supercomputer, life scientists, mathematicians and engineers are all working together to deliver better health outcomes.

In the biotechnology sector, Australia is competing with the USA, Denmark, Singapore and others. The practice in each of these countries is for government support for fundamental and early stage research as the high-risk, high-return nature of the industry makes players reluctant to invest early. The people we see having early success in life sciences computation innovations are those who are looking at what data collections they have that are unique, they find a talented team to put together and access all the available skills development opportunities that exist to support their goals.

Then they work hard at the problem, knowing competitors overseas also have access to similar support structures. Once they have built their reputation as having particular data interrogation tools and skills and/or access to particular data collections, this then attracts overseas collaborators and the funding and investment follows.

There are other lifestyle factors which combine to excite Australian students and attract qualified people to Australia and which need to be maintained: leading-edge facilities competitive with what is available overseas, an exciting, family-friendly and safe place to live and work, programs to assist with professional development and competitive and realistic options for work in both academia and industry.

Innovation requires all parts to work together. Australia is well placed to get it right.

Australia's Prime Minister encourages us to see this period of time in Australia's history as one of infrastructure growth. I would argue that this should be half of the plan: the other half should be to promote students into mathematics, bioinformatics and computer science from a young age. Encourage them to see these fields as potentially making a very valuable contribution to future health outcomes in our community, arguably a very socially rewarding career.

Yours sincerely

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Director