

Digital White Paper Submission

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The Government is to be commended for broadening the scope of the Cyber White Paper to a Digital White Paper. In my discussions on the topic, including participation in the Cyber Research and Development Taskforce, it was clear that a broader, more inclusive view would be helpful.

I appreciate the opportunity to provide further views on the focus of the white paper - "how the Australian government, industry and community can best work together to make Australia a leading digital economy."

This submission primarily addresses item b. from the Digital White Paper: Key Themes, namely ***The information and communications technology (ICT) skills and training required to sustain the digital economy now and into the future;*** and also item c. - ***The development of collaborative partnerships between governments, industry and community.***

It is widely agreed that there is a shortage of ICT Skills. Pleasingly, there has been a significant amount of activity in response to the shortage in the past several months, with more activity planned. To mention just three events, Senator Evans hosted an ICT Skills in the Workplace Forum at Parliament House in November, the Victorian Government had a meeting of its ICT Skills working group in December and there will be a plenary discussion on ICT Skills at the Australian Computer Science Week Conference in January in Adelaide. While the conversations are constructive, no quick fix has emerged to the growing problem of an ICT Skills shortage. However we need to build on what has been discussed.

Four points of agreement are:

- ICT is part of STEM (Science, Technology, Engineering and Mathematics), and so discussions of ICT skills should be included in Government considerations on how to improve STEM skills in order to boost national productivity and innovation;
- the content and teaching of ICT in schools needs to be improved;
- there needs to be improved public understanding of the range of careers to which ICT studies can lead; and
- there needs to be more emphasis on the high end of ICT skills, not just ICT literacy, where knowledge of informatics/computer science is needed.

To start with the last point, there was a recent relevant op-ed piece from Google's Alan Noble in the Sydney Morning Herald (December 26:

<http://www.smh.com.au/opinion/politics/science-the-key-to-seize-control-of-the-future-20121225-2bv55.html>). More must be done to associate that strong maths and science skills are needed to drive innovation in ICT. As an example of such an association, Australia is hosting the International Olympiad in Informatics in Brisbane in July, 2013. The Olympiad is a

worldwide competition that effectively is identifying, developing and supporting computer science skills in high school students. There will be associated workshops on promoting teaching of informatics in schools, concentrating on the high end of ICT rather than how to write Web pages or use Office applications. The Government is currently considering supporting the Olympiad and it would be a great opportunity to make a statement on ICT Skills relevant to the Digital White Paper.

Incidentally, at the ICT Skills in the Workplace Forum hosted by Senator Evans, there were several competitions mentioned which the various industry attendees supported. It would be good if these were coordinated. Note that encouraging and developing such ICT skills would grow and innovate the digital economy, rather than just sustain it.

What of the role of universities? As President of the Australian Council of Deans of ICT, it is my opinion that university ICT courses are performing adequately in providing graduates from ICT courses with employable skills; however there is always room for improvement across the sector. Graduates from ICT programs largely find jobs. The primary cause of the skills shortage is that there are insufficient numbers of students taking the courses. Who should be responsible for increasing the attractiveness of ICT courses to students is a difficult issue.

Regarding relevant employability skills and work-ready ICT graduates, a most useful national exercise would be to identify best practices in the sector where industry and universities have successful partnerships in producing graduates with optimal ICT skills. Swinburne University, together with the Australian Council of Deans of ICT, is ideally placed to undertake such a task the outcome of which would inform local practices and thereby grow national expertise.

One observation is that the ICT Skills needed are changing, and at a rapid pace, more so than in other fields. It is difficult for universities to introduce new courses due to the nature of the workforce, the need for long lead times in introducing new courses in the curriculum, to prepare student guides, to meet accreditation requirements, and prepare the academic teaching staff. It would be most useful to the sector to know what, where and how these constraints are being efficiently addressed.

There is also a need for flexibility, agility and innovation in the VET sector. For example, it would be good to introduce a new training course in managing large data that will be needed in science, business and government. In the past two years the necessity for more people to handle data has only increased. I am unaware of such a course having been developed. Where the responsibility lies for developing such courses between industry, government and the tertiary sector is unclear. The Digital White Paper should give consideration on what policy drivers might facilitate introducing training courses on topics of benefit to society rather than rely on vendor-specific training courses.

Note that the last couple of points require collaboration between government, industry and universities to achieve successful outcomes. This is directly in line with item c. from the Digital White Paper: Key Themes - *The development of **collaborative partnerships** between governments, industry and community.*

Another observation about ICT Skills is that one size does not fit all and ICT skills are not only an issue of concern for economic productivity and workforce shortages. A key group that needs to be considered if Australia is to fully appreciate the benefits of the National Broadband Network is the elderly, particularly in our ageing population. Technology has an

important role to play in supporting the elderly in their homes thus reducing the cost of health service delivery. It plays directly into the provision of tele-health. Research at Swinburne¹ is showing that technology needs to fit into people's lives in order to be most effective. Designing a technical solution with insufficient consideration of the context in which it will be used has led to the technology not being used. Our current project concerning emergency alarm systems for the elderly in their homes has demonstrated that they are often not adopted because the elderly person does not feel included in the decision or the technology does not meet the purposes for which it is designed.

Training in ICT skills for the elderly needs to be different from other parts of the population; contextual training is essential. Support needs to be given to community groups and consumer groups to help train in the use of technology, often in preference to technology vendor groups. The Government should be highlighting uses of technology that improve people's lives. Perhaps there should be a highly visible award for the best App or technology development that improves the support of people in their homes. Support could be given to universities to work with communities to support the use of ICT in homes and communities. Note that Swinburne University of Technology is building capability in the area of Technology for Aged Care and would be pleased to work with the Government on the issue. One idea to help support the initiative is to use school children to help in the explanation of technology to the elderly.

To conclude this submission, I would like to remind those developing the Digital White Paper not to conflate various strands of ICT that are sometimes lumped together. Digital literacy is not the same as understanding the concepts that underlie the technology. Separate investment in informatics and computer science education is needed in addition to more basic skills. Support of one does not necessarily support the other. Similarly, investment in ICT infrastructure does not equate to investment in ICT skills. Indeed investment in infrastructure should automatically lead to investment in training to use the infrastructure. Having the infrastructure without the skills to operate it effectively is counterproductive. A key part of the infrastructure is the skill sets of the teachers of ICT in high schools which is the place where students are not engaging with deep ICT skills that are so necessary in all disciplines.

I look forward to the development of the Digital White paper. I will continue to work constructively with the Australian Government discussing how the Australian government, industry and community can best work together to make Australia a leading digital economy. The engagement will be both through my role as Dean of the Faculty of ICT at Swinburne University of Technology and as President of the Australian Council of Deans of ICT.

A handwritten signature in black ink, reading "L Sterling".

Professor Leon Sterling

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¹ I would like to acknowledge and thank the Australian Research Council in supporting my research through a Discovery Project on designing technology for the aged.