Deputy Vice-Chancellor (Research)

25 November 2011

Digital Economy Taskforce
C/o NSW Trade & Investment
NSW Government
Sydney 2000

Dear Taskforce Members,

The University of Sydney welcomes the opportunity to make this submission on The Digital Economy. The University commends the NSW Government for developing Industry Action Plans as strategic roadmaps in key industry sectors in NSW and in particular, for the focus on developing a dynamic and strong digital economy.

The University, and other higher education providers, are key participants in developing a digital economy, both from a research and a teaching perspective. The Digital Economy Issues Paper suggests areas of focus to include skills development, research and innovation. These focus areas are essential building blocks for the development of a digital economy. New scientific knowledge that can be efficiently translated by a skilled workforce to meet the needs of business, governments and the community is the basis for developing leadership in the digital age. The work of our researchers has potential to transform the society in which we live with long term and sustainable benefits for the community. In regard to teaching, the University plays a significant role in educating the future workforce that will be responsible for maximising the potential of a digital economy. We are fully cognisant of the emerging Asian economies’ interest in developing a highly skilled, technology savvy workforce and commend the NSW Government’s timeliness in developing a strategic Action Plan for the Digital Economy for NSW.

The States of Victoria and Queensland are generally regarded as more successful than NSW in maximising the potential of research. However, the reality is that NSW has significant research capability to rival either of these States. The University has been heartened by the NSW Government’s interest in developing research and its recognition of the potential of emerging technologies.

We are encouraged that the Industry Action Plan will develop a “shared vision” for NSW to focus the efforts of universities, governments and businesses to strive to maximise the potential of innovative research. In particular, we would encourage a “shared vision” to focus on:

- Leveraging established research strengths
- Fostering and nurturing interdisciplinary research clusters based on existing research strengths
• Recognition of the work being done, and that which needs to be done to address the future skills shortages

This shared vision for NSW will significantly aid and improve the marketing and exploitation of research and developments in emerging technologies to potential investors, both nationally and overseas.

To provide some substance around this discussion, we have identified several specific areas where there is significant promise for transformation. The University would be keen to elaborate on the potential for NSW leadership in these identified areas.

**Smart grids**

The University of Sydney and EnergyAustralia signed an agreement in 2009 to lead intelligent electricity networks, or smart grid development, in Australia and train the next generation of power engineers. The new technologies will have the capability to integrate energy storage, distributed generation, intelligent information processing systems and communications, high-bandwidth sensors, weather and geographical information, control systems and IT with the capacity to predict problems through artificial intelligence and provide fully-automated solutions.

**Nanoscience**

The Australian Institute for Nanoscience is in development with a purpose-built building in the final planning phase. The Institute will develop nano-devices with prospective capacity to transform Australian society ranging from innovations in broadband and low energy, secure communications technology, advanced medical diagnostics and therapies, and new astronomy instruments. The Institute will host a range of nationally accessible research infrastructure including Centres of Excellence in photonics, and astronomy.

• **Large-scale plans for small-scale technology** – 15.6.2010 – University to build world-leading facility for specialist research into nanoscience

**Robotics**

The past decade has seen substantial technical development and commercial investment in robotics, especially in civilian applications such as cargo handling, mining, agriculture and marine environments; applications which are of central importance to the Australian economy. Research continues in multi-sensor perception, cooperative navigation, large-scale terrain modelling, multi-robot planning and human-robot interaction. New technology is enabling old problems to be tackled in new ways, for example, advances in robotics, engineering, mathematics and biology are assisting researchers in developing a computer model to control locust outbreaks and therefore protect our vital food crops from decimation.
Biomedical Technologies, E-health and Simulated Learning

Further advancement in biomedical and life sciences research and healthcare services are significantly dependent on the innovative utilisation of novel technologies, particularly in light of the expected roll out of the National Broadband Network. The social impact and importance of Biomedical Engineering, E-health and simulated learning technologies are significant. In regard to the economic impact, the 2010 report, *Optimising E-Health Value*, released by the management consultancy, Booz & Company, revealed Government investment in a comprehensive e-health system may generate more than $7.6 billion in annual healthcare savings by 2020.

The University, and NSW generally, has strengths in:

- Biomechanics, Biomaterials and Tissue Engineering
- Biotechnology and Biomolecular Engineering
- Biomedical Devices and Instrumentation
- Data management and data sharing
- Imaging, Visualization and Information Technologies

On 6 December 2011, ANSTO and the University of Sydney will commission a new cyclotron, providing a key imaging instrument for the development of nuclear radioisotopes to support molecular imaging research into cancer, cardiovascular, and immune diseases, as well as brain and mind diseases. This is a significant node of the Australian National Imaging Facility and as well as having enormous potential for diagnostic research provides a vital development opportunity for the increasing challenge of managing, sharing and using large complex datasets.

The potential impact of e-health and simulated learning can be seen from the stories attached. The significant challenge in e-health is the issue of data sharing and maintenance of confidentiality, an issue currently being examined by our researchers.

- **Improving early detection of breast cancer** – 5.10.11 – New web-based program to monitor the performance of radiologists in detecting and diagnosing abnormalities in breast x-rays being rolled out nationally
- **All a Twitter to improve regional health** – 6.9.11 – Facebook, Twitter and YouTube are being used by a group of Indigenous health care professionals to promote healthier outcomes in rural and regional Australia
- **Helping health professionals with difficult questions** – 26.9.11 – new website, the Clinical Ethics Resource, launched to help health professionals deal with the wide range of challenging ethical and legal issues they encounter at work.

Cyber security

A major risk factor in developing a digital economy is cyber security. While there are no reliable figures on the cost of espionage and electronic pilfering to the Australian economy, the figure is almost certainly growing rapidly. The industries most heavily targeted are ICT, military technologies, health care, pharmaceuticals, agricultural and clean technologies, energy, natural resources, advanced materials and manufacturing techniques.
The Federal Government is sufficiently concerned in regard to a potential threat that they have explicitly warned that a cyber attack on either the US or Australia may now be considered a trigger for invoking ANZUS. A more local approach involves educating and building community and business awareness of the cyber security risk through a major public information campaign, combined with a commitment to build a public/private partnership around cyber defence. Good computer housekeeping practices based on up to date firewalls and computer anti-virus programs, could reduce the risk to business and individuals by 80 percent.

It may be necessary for owners of critical infrastructure, such as water and power companies, to invest in certifiably higher levels of cyber protection in order to retain their operating licences. Specialised government agencies would provide another, deeper layer of active defence against sophisticated, state based attacks.

It is suggested that the Government could consider positioning NSW as a repository of cyber security expertise and benefit from the commercial opportunities for the cyber defence sector. The UK is already touting itself as a cyber security centre. There is a regional opportunity.

- **A new spider for the web** – 22.8.11 – A revolutionary new chip that uses little energy and operates at ultrafast speeds for telecommunications and computing is set to replace the power-hungry, expensive and bulky equipment that currently resides at the core of the internet

- **Australia’s biggest security risks in the cyber world** – 2.6.11 – About one in five home computers and one in 10 work computers have been taken over and used to conduct illegal activity

We look forward to engaging with the Taskforce about these and other issues as the review proceeds. We know our academics would welcome the opportunity to interest the Taskforce in future possibilities for the Digital Economy emerging from their research. Please do not hesitate to contact the University through my office.

Yours sincerely,

[Signature removed for electronic distribution]

Professor Jill Trewhella
Deputy Vice Chancellor (Research)