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**Submission on behalf of Open Universities Australia (OUA) to the Inquiry into  
the role and potential of the National Broadband Network by the House  
Standing Committee on Infrastructure and Communications**

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#### **Inquiry into the Role and Potential of the National Broadband Network**

##### **Background**

Open Universities Australia (OUA)'s story is a prime illustration of the impact of the digital revolution in "improving the educational resources and training available for teachers and students" (to quote the term of reference for this inquiry most relevant to us). We started in 1993 providing open access to distance education primarily delivered through printed materials, tapes and supporting television programs. Nearly all our programs are now delivered online in whole or part, using more and more sophisticated learning techniques which are just beginning to explore the potentiality of online participation.

In 2009 and 2010, OUA enrolled students from across Australia as follows:

	2009	2010
Major cities	78.8%	77.4%
Inner regional	14.9%	15.9%
Outer regional	5.1%	5.5%
Remote	0.8%	0.9%
Very remote	0.3%	0.3%
Total students	32,897	42,954

Although the proportion of students outside the major cities (22.6% in 2010), is below the population at large (31.5%), that proportion is growing.

##### **Broadband Access and Higher Education**

What our future students will be accessing in terms of course materials and interaction will certainly be affected even more profoundly by emerging technologies. The fusion of information technology and knowledge acquisition can shape the learning landscape in Australia.

Due to its unique model of collaboration, more than any other educational organisation OUA understands that the technology that delivers online learning will be constantly changing and that demands on internet capacity will increase exponentially. E-learning is already providing universities and other tertiary education institutions with a means of enhancing and enriching the teaching performance of staff and the learning activities of students, in a cost-effective way. The rapid growth in technologies for education purposes as well as the general uptake across workplaces and households is challenging Australia's communications infrastructure. Failure to provide adequate communications infrastructure

will limit the country's potential to deepen and broaden its skills base and hence limit its economic development.

A national broadband network will be able to deliver, through better connectivity:

- access to learning materials in whatever media are most relevant to effective learning;
- the same learning opportunities for students in their home or workplace, no matter where they live
- real access to virtual classrooms including the capacity to work in real time with classmates and tutors, including through videoconferencing
- the chance to take part in practical classes through simulations and online demonstrations.

For OUA this access is the future of education. Let's take one example of the potential. Recently, Access Economics' review of the benefit of the NBN to the health industry gave insight to its potential for online health education. Access Economics was asked to assess the impact of a high-speed broadband network on telemedicine for remote consultations, remote home-based monitoring of chronic-disease patients and the aged, and remote training of medical professionals, using haptic (touch) technology to communicate with the user.

The benefits of enabling small hospitals and medical centres, individual doctors and other health practitioners to participate in tele-health using such techniques, would be replicated in medical and health education where training should replicate as closely as possible the realities of practice. Even the many urban locations that currently have relatively high-speed broadband, experience upload speeds that are much slower than download speeds, and lack reliability. These are substantial impediments to real-time telehealth, but they equally apply to online education,

We are not impressed by statements that the NBN will mainly provide access to entertainment and other purely private benefits. Recent communications and infrastructure changes have shown that innovations that may have originally focussed on private entertainment are quickly found to have wider social and economic uses. The recent widening use in business and education of Facebook and YouTube on the applications side and the iPad on the hardware side are not going to be the last examples of that phenomenon.

In the previous decade the irresistible rise of the internet in providing business solutions from travel to banking to business-to-business applications shows the spuriousness of the argument that high-speed connectivity may not generate material national economic and social benefit. It is only a question of what will be first – the push of technology inspiring entrepreneurs and innovators in business, health services and education to come up with new ideas, or the pull of innovation in service delivery requiring greater connectivity for optimal take-up.

The characteristics of the planned rollout that mean most to us are:

- **Speed** - Committed download speeds of 100 megabits per second, and peak download speeds of 1 gigabit per second using the optical fibre network.

- **Coverage** - 93% of Australia homes and businesses will gain access to the fibre network, while those not able to access it will be serviced by a combination of wireless and satellite with a minimum speed of 12 megabits per second which at least makes online learning possible with the capacity to download for example an average compressed movie (1 GB of data) in between 11 and 12 minutes.
- **Quality Multimedia Potential** - It will be able to provide high quality voice, data and video services including symmetric services such as high definition video-conferencing, and other services that will emerge to take advantage of its capacity
- **An Implementation Plan and Timeline** - It is scheduled for the Network to be operational progressively over the next eight years. Any slowdown in this rollout would be of concern.
- **Equity of Access** - It will have uniform pricing structure, regardless of location which enables OUA will be able to provide certainty to its students concerning their potential connectivity costs. Transparency and equity are key components of the OUA model.
- **No Degradation or signal deterioration** Consumers located at the furthest distance from a fibre exchange get the same broadband speed as those next door to the exchange. Again this relates to our transparency and equity-based model..

In contrast, the copper network has been exploited beyond its real capacity and indeed its use-by-date. OUA is expecting significant barriers to the expansion of the learning advances of its partnership if the replacement is not planned and implemented soon.

If governments, universities and private companies can act on the assumption that most people can use high definition audio and video, exchange large files, and potentially make use of whatever innovation arrives on our virtual door stop, each can build services that make use of these capacities. Speed measurements can best be considered as threshold points below which particular applications become unfeasible. If most households had access at the 100Mbit/s download speed targeted for 93% of the NBN, new and unanticipated uses of the network infrastructure are likely to emerge. New businesses, and new educational paradigms become possible.

Overall, as a national organisation, which is aiming to deliver the benefits of online education across Australia however remote, Open Universities Australia is looking for an economically and technically feasible solution that delivers to as close as possible to 100% of homes. A mixture of fibre optic connection where there are many users, and fixed wireless in more remote areas where there are fewer users, as envisaged in the current roll-out, would seem to us to be the right model for Australia.

The internationally recognised series of Horizon Reports, part of the New Media Consortium's Horizon Project, a comprehensive research venture established in 2002 which identifies and describes emerging technologies which are likely to have a large impact on education over the coming five years (with predictions about speed of rollout within that time period), highlights the challenges outlined above. The New Media Consortium is an international not-for-profit consortium of learning-focused organizations dedicated to the exploration and use of new media and new technologies. Members include American, European and Australian organizations such as:

- Adobe Systems Inc, Apple Inc and Hewlett Packard
- California Institute of Technology, Harvard, Kaplan University, MIT, Pennsylvania State University, Princeton, Stanford and Yale
- Deakin, Griffith, RMIT and the University of Melbourne
- Universitat Oberta de Catalunya

The Horizon Reports, published in six languages, are regarded worldwide as the most timely and authoritative sources of information on new and emerging technologies available to education anywhere. First launched in 2002, the NMC holds ongoing discussions with hundreds of technology professionals, campus technologists, faculty leaders from colleges and universities, and representatives of leading corporations to generate a list of current technologies, trends, challenges, and issues that are emerging, as well as undertaking ongoing research on dynamic knowledge, emerging technologies, new collaborations, new media and learning initiatives, changes to scholarship and the potential for immersive learning to make the exchange of ideas become more engaging.

As well as global reports, specialised Horizon Reports have documented emerging technology trends and developments in Australia. We have been advised that one of the reasons for a specialised report on Australia is that the timelines appropriate for North America and Europe and not necessarily appropriate for Australia including because of the current lack of wide access to broadband connectivity.

In 2008, the first specific Australia-New Zealand Horizon Report was already noting the many imminent challenges facing tertiary education in the region. Poor quality broadband, limiting options at school and at home, was considered one of the key challenges. "Public policy and reliance on telecom companies for infrastructure and broadband services has failed to ensure sufficient resources to support the level of quality broadband penetration needed to remain competitive. Metering adds to this by discouraging network use: the more useful the network is, the more it is used, and the more expensive it becomes — a cyclical process that ultimately discourages greater utility of the network because it adds unmanageable costs."

*(Johnson, L., Levine, A., & Smith, R. (2008) The Horizon Report: 2008 Australia–New Zealand Edition. Austin, Texas: The New Media Consortium)*

The 2010 Australia-New Zealand Horizon Report continues to highlight how important adequate broadband access to the future of education in Australia. It indicated that the following trends, all dependent for full realisation in Australia on adequate broadband access, were gaining rapid purchase:

- As the availability and use of electronic books continue to grow, the traditional publishing (and textbook) market is undergoing a profound and lasting change with consumers looking for interactive electronic content that is divorced from hardware, offered cheaply and conveniently, and provided in flexible and shareable formats.
- Social and open forms of peer review and scholarship are gradually gaining acceptance.
- The availability of educational content for mobile devices is increasing as more providers develop for these platforms

- Our notions of space and what constitutes learning environments continues to evolve.

*(Johnson, L., Smith, R., Levine, A., & Haywood, K. (2010). The 2010 Horizon Report: Australia–New Zealand Edition. Austin, Texas: The New Media Consortium).*

Both the 2010 Australia-New Zealand Report and the 2011 global Horizon Report which focuses on more world-wide trends, provide specific examples of sorts of learning interactions which broadband will enhance. For example, it suggests that within the next two to three years augmented reality (AR), a 3D technology that encourages student interaction and game based learning will be a major element in learning provided accessibility issues are addressed.

AR allows the blending of information with the real world in an experiential environment. AR's two great advantages are, first, that it can be used for visual and highly interactive forms of learning, allowing the overlay of data onto the real world while easily simulating dynamic processes. Its second key characteristic is its ability to respond to the user. The result is significant potential for learning and assessment as students can use it to construct new understanding based on interactions with virtual objects that bring underlying data to life. Dynamic processes, extensive datasets, including which in real life are too large, too small or too dangerous to be manipulated in reality can be brought into a student's world in an understandable and manipulable form. The Massachusetts Institute of Technology (MIT) Teacher Education Program is already working on creating AR simulations to engage students in complex simulation games such as an activity try to uncover the source of a toxic spill by interviewing virtual characters and conducting large scale simulated environmental measurements and analyzing data. Radford University in the USA has created ROAR, which uses AR to help teach K-12 students more about Native American history and teamwork through a game called Buffalo Hunt.

**Game-based learning** has grown in recent years as research continues to demonstrate its effectiveness for learning for students of all ages. Games for education span the range from single-player or small-group card and board games all the way to massively multiplayer online games and alternate reality game. Game-based learning can be founded on the creative use of commercial games or be specifically developed for educational purposes

At the University of Oregon a commercial game, Madden NFL, is used one of its modes for developing football franchises to help teach students about marketing and business decisions. [See <http://it.uoregon.edu/itconnections/playing-for-a-good-grade>] At the University of Wisconsin-Madison an engineering game called "Cool It": An Interactive Learning Game for Cryogenics was developed to teach students about cryogenics by providing detailed information and feedback based on the engineering decisions they make when designing objects for this discipline area.

*(Johnson, L., Smith, R., Willis, H., Levine, A., and Haywood, K., (2011). The 2011 Horizon Report. Austin, Texas: The New Media Consortium)*

The 2011 Report also highlights the contribution that enhanced broadband access can make to relieving economic pressures from the current challenges for tertiary institutions in providing high-quality services while controlling costs. Broadband allows creative solutions

such as streaming survey courses over the network so students can attend flexibly freeing up teaching space and providing student choice of study mode

These trends in use of technology to support delivery of education can be clearly seen in the changing requirements of units offered by the provider Universities through OUA. OUA has a strong commitment to the quality of its academic products and supports continuous improvement of units through programs such as professional development and funding grants in partnership with providers. One measurable outcome of this continuous improvement is the changes to delivery mode for undergraduate and postgraduate units over time, as shown in the tables below. The delivery modes are defined in section 3.2.1 of the 2002 DEEWR report "Universities Online: A survey of online education and services in Australia".

( [http://www.dest.gov.au/NR/rdonlyres/69BC95EB-CAE4-4A4B-80DE-C74BB5F33E10/896/02\\_a.pdf](http://www.dest.gov.au/NR/rdonlyres/69BC95EB-CAE4-4A4B-80DE-C74BB5F33E10/896/02_a.pdf) )

Delivery Mode	2010		Delivery Mode	2011	
	Number of Units	Percentage		Number of Units	Percentage
Print Only	15	2%	Print Only	7	1%
Web Supplemented	146	16%	Web Supplemented	112	12%
Web Dependent	377	42%	Web Dependent	268	30%
Fully Online	362	40%	Fully Online	652	72%
Total	900		Total	1039	

Of the units which are offered in one of the three delivery modes which rely on the web, the percentage which indicate a specific requirement for broadband access has also increased substantially over this time.

2010			2011		
Units with requirement of "Broadband access"	92	10%	Units with requirement of "Broadband access"	587	56%

Descriptions of the instructional methods used in such units reveal that a range of technologies are in use, including recorded lectures/podcasts, embedded multimedia and interactive games, and online submission of assignments.

As the Horizon Reports clearly predict and the evidence supports, demand for technology will increase. Capacity must. The copper network will not be able to meet our future demands because our current demand is already at the maximum physical capability. The future must include the widest possible access to fibre optic delivered broadband, with fixed point wireless where that is most cost-effective.

In summary, OUA sees the NBN as a vital step forward in taking advantage of the potential of technology and innovation for Australia's future.