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**Implications for Virtual Worlds: A Comparative Study of United Kingdom, United States and Australia on Network Readiness, Government Investment and Cyber-security.**

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**Abstract**

*Universities and Colleges are utilizing virtual worlds such as Second Life in increasing numbers worldwide. Virtual Worlds also contribute to access to knowledge and the economic development of countries. The capacity for continued utilization and development of virtual worlds is influenced by government policy and investment. The worldwide performance index of Information and Communication Technology (ICT) is the Network Readiness Index (NRI) of the World Economic Forum. This paper compares and contrasts the performance of the United States (US), the United Kingdom (UK) and Australia since 2006. This paper then provides a comparison of the UK, US and the Australian government ICT policies and expenditure, as well as each government's approach to cyber-security and Virtual Worlds. The US and the UK have embraced virtual world technologies and Australia has ignored the opportunities presented by Virtual Worlds.*

**Keyword:** Virtual Worlds, Government, Policies

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# Implications for Virtual Worlds: A Comparative Study of United Kingdom, United States and Australia on Network Readiness, Government Investment and Cyber-security.

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## Introduction

The capacity to engage with Virtual World activity is underpinned by the ability to access high quality and high speed networks (Huang, Boulos & Dellavalle, 2008, p498). High-speed networks are enhanced by governments ensuring that the technological environment, readiness and usage of digital networks are facilitated (Atkinson 2009 p5.). The worldwide readiness of a country’s digital network is measured by the World Economic Forum (WEF)’s Network Readiness Index (NRI) (Dutta & Mia 2009.).

The development of digital capacity is enhanced by the level of government investment as well as the areas of focus for government policy. This paper contrasts the level of funding across the UK, US and Australia and compares the cyber-security policies and government’s Virtual world activities.

Australia lags behind the US and the UK in the WEF NRI. The level of investment the Australian government plans to make in ICT may improve this ranking. However, Australia’s internet filtering policy and lack of engagement with the possibilities of Virtual Worlds may impact the effectiveness of the government’s investment.

## Network Readiness Index

This section examines the Network Readiness Index (NRI) for the UK, US, and Australia reflects the Environment, Readiness and Usage Sub-Indices contributing to the NRI. These measures indicate particular activities.

The Environment Sub-Index provides a measure of the presence of an ICT-conducive environment and includes the broad business environment, regulatory aspects, and infrastructure for ICT (Dutta & Mia, 2009, p6).

The WEF indicating the relevance of the Environment component is based on “the friendliness of a country’s environment for ICT development” (Dutta & Mia, 2009, p6).

The Readiness Sub-Index provides a measure of the “preparation needed to use ICT; for the three main national stakeholders—individuals, the business sector, and the government” (Dutta & Mia, 2009, p7).

The WEF indicates the importance of the “readiness subindex, including ... appropriate human skills ... and ...affordability ... as well as government readiness” (Dutta & Mia, 2009, p7).

The Usage Sub-Index provides a measure of the “use of ICT by business, government and individuals” (Dutta & Mia, 2009, p7).

The Usage Sub-Index “gauges the actual usage of ICT by a country’s main stakeholders, with a particular focus on the impact of ICT in terms of efficiency and productivity gains” (Dutta & Mia, 2009, p7).

The following sections outline the overall performance of the UK, the US, and Australia in the NRI and the Environment, Readiness and Usages Sub-Indices. The countries’ results in the NRI are provided in Table 1, and the results in the Sub-Indices are provided in Table 2 below.

Country	2006-2007	2007-2008	2008-2009
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<b>United Kingdom</b>	9	12	15
<b>United States</b>	7	4	3
<b>Australia</b>	15	14	14

**Table 1 United Kingdom, United States and Australia World Economic Forum Network Readiness Index Ranks (Dutta & Mia, 2009)**

<b>Country</b>	<b>Environment</b>	<b>Readiness</b>	<b>Usage</b>
<b>United Kingdom</b>	12	24	13
<b>United States</b>	3	6	5
<b>Australia</b>	10	15	17

**Table 2 United Kingdom, United States and Australia World Economic Forum Network Readiness Sub-Indices 2008 -2009 (Dutta & Mia, 2009)**

The next section provides an analysis of the ranks of the UK, the US, and Australia in the WEF NRI Index and Sub-indices.

### **United Kingdom**

The last three years have seen the UK slip further down the NRI from a rank of 9 in 2006-2007 to a rank of 15 in 2008-2009. The UK ranks on the three NRI Sub-Indices; Environment, Readiness and Usage are not rank in the top ten.

The UK's decline in terms of digital capacity is marked. The measures the UK government has introduced to arrest these declines are described in Section 4.1 of this paper.

### **United States**

The US has managed to increase its ranking in the WEF NRI in three consecutive editions. The United States has improved its ranking from 7<sup>th</sup> in 2006-07 to 3<sup>rd</sup> in 2008-2009. The US ranks in the top ten for each of the WEF NRI Sub-Indices.

### **Australia**

Australia's performance in the WEF NRI has been consistent over the past three years, with the current ranking of 14 out of the countries involved in the ranking scale. Australia has yet to break into the top 10 ranking in the WEF NRI. Australia ranks 10<sup>th</sup> for the Environment Sub-Index, 15<sup>th</sup> for the Readiness Sub-Index and 17<sup>th</sup> for the Usage Sub-Index.

Comparing the rankings of all three countries, Australia performs below the US and the UK on all Sub-Indices except the Readiness Sub-Index with the UK. In order to rank more highly significant investment in Australia's digital economy is required.

The next section describes the cyber-security measures of the UK, US and Australian governments.

## **Comparative Cyber–Security Measures**

This section of the paper compares the UK, US, and Australian government cyber-security measures policies. While the UK and the US have developed structures to secure their information technology capacity the Australian government has proposed the introduction of an ISP Internet Filtering Scheme, threatening to slow internet speeds and limit access to Virtual Worlds.

### **United Kingdom**

The UK Cabinet Office (UKCO) reported the activities of the UK government to address the UK’s cyber security challenge in the June 2009 Report “Cyber Security Strategy of the United Kingdom”. The report indicates the main aspects of the UK governments’ activities. These are:

- “A cross-government programme, to address the following priority areas in pursuit of the UK’s strategic cyber security” (UKCO, 2009. p 21);
- “An Office of Cyber Security to provide strategic leadership for and coherence across Government” (UKCO, 2009. p 21);
- “A Cyber Security Operations Centre (CSOC) to monitor the health of cyber space and co-ordinate incident response; and; provide better advice and information about the risk to business and the public” (UKCO, 2009. p 21).

The UK House of Lords is currently debating the Digital Economy Bill that proposes that Internet Service Providers (ISP) monitor subscribers and take measures to limit speed, capacity, access, and service to the Internet. These measures are to be taken if subscriber activity is illegal. Illegal activities are to be determined by the government without parliamentary oversight (United Kingdom, Digital Economy Bill 2009-2010).

### **United States**

In 2009, the US created a Cyber-Security Office to “develop a comprehensive strategy to secure America’s information and communications networks” (Obama, B. 2009 p1). The Office will “ensure an organized and unified response to future cyber incidents” and “collaborate with industry to find technology solutions (that) ensure US security and promote prosperity” (Obama, B. 2009 p1). The Office will also “Invest in the cutting-edge research and development necessary for ...innovation and discovery ” (Obama, B. 2009 p1). The US President clarified that the “USA pursuit of cyber-security will not monitor private sector networks or Internet traffic. The USA will preserve and protect the personal privacy and civil liberties” (Obama, B. 2009 p1).

In 2009 the US introduced the Cybersecurity Act to allow the federal government to examine all elements of every citizen’s digital information (United States. Cybersecurity Act 2009). The argument is that the government’s monitoring of citizens will enable it to check the threat of cyber-security attacks.

### **Australia**

The Australian government has developed a comprehensive Cyber-Safety Plan (Department of Broadband, Communications and the Digital Economy [DBCDE] 2009) to combat online risks and help parents and educators protect children from inappropriate material.

The Australian Government’s commitment to cyber-safety include: A Child Protection Operations Team for detecting and investigating online child sex exploitation; funding to the Australian Communications and Media Authority (ACMA) for education activities; an online

helpline; developing and implementing ISP filtering; expanding the Consultative Working Group; forming a Youth Advisory Group; ongoing research into the digital environment to identify issues; and targeting future policy and funding (DBCDE 2009).

The UK cyber-security legislation, if passed in its current form, would place the responsibility of monitoring illegal activity onto ISPs. The US Government plans will monitor activities and the only threat to internet activity in the US is if a cyber-security emergency is declared. Neither of these plans have the potential to limit the activities of citizens on the internet. However, the Australian plan to mandate a filtering scheme will limit access of Australians to the internet and Virtual Worlds.

### **Government Investment**

This section discusses the investments of the UK, the US and Australian governments in ICT. The individual government investments are compared as a percentage of Gross Domestic Policy (GDP) for the respective countries.

### **United Kingdom Policies**

The government of the UK is providing significant support for and investment in the Digital Economy, as the NRI rank indicates is a requirement. The United Kingdom Digital Britain Report (Department for Business Innovation and Skills [DBIS]. 2009) outlines the investments and direction of digital policies for the coming years.

The Digital Britain report outlines the UK government investment plan including:

- 120 million pounds (approximately AUD219million) for a coordinated digital economy program (DBIS, 2009. p 166);
- 300 million pounds (approximately AUD548million) to provide home access scheme for low-income families (including lower cost devices, new recycling schemes and pre-pay mobile broadband) (DBIS, 2009. p 166);
- Universal Access to Broadband Scheme; 200m pounds (approximately AUD365 million) direct public funding to deliver the universal service broadband commitment (DBIS, 2009. p 11-12).

### **United Kingdom Investment as a Percentage of Gross Domestic Product at Current Prices**

The International Monetary Fund (IMF) in 2008 indicated the United Kingdom had a Gross Domestic Product (GDP) of USD 2,198 billion (approximately AUD 2,500 billion) (International Monetary Fund, World Economic Outlook Database. ([IMF], 2009). The investment in the policies described earlier in this paper is equivalent to approximately 0.0004% of GDP in the UK.

### **United States**

In the US the Obama Administration is pursuing an aggressive investment and infrastructure program for the support and development of the digital economy. The president places the Digital Economy at the centre of the investment strategy under his direction (Obama, 2009).

Key aspects of the vision provided by President Obama include:

- “Making Internet access available to everyone and everywhere;
- “Promoting Internet-based innovation, competition and user choice”, and ;

- “Creating an environment to encourage infrastructure investment, higher levels of connectivity and innovative services and applications” (Obama, 2009. p1).

The Recovery Act provides USD 7.2 billion (approximately AUD 8.2 billion) for broadband internet access nationwide. The Federal Communications Commission (2009) has also been commissioned to develop a comprehensive plan for national broadband.

### **US Investment as a Percentage of Gross Domestic Product at Current Prices**

The IMF calculated the United States had a GDP at current prices in 2008 of USD 14,077 billion (approximately AUD 16,020 billion) (IMF. 2009). The Recovery Act spending is approximately 0.0005% of GDP for the United States.

### **Australia**

The Australian Government’s current ICT funding includes:

- The establishment of a company to invest up to AUD 43 billion over eight years for an enhanced National Broadband Network; to provide broadband for all homes and businesses;
- AUD 61.1 million to develop and implement targeted initiatives for regional telecommunications, and;
- AUD 2.2 billion over six years for: new ICT equipment for secondary schools; high speed broadband connections to schools; teacher access to training; online curriculum tools and resources in national curriculum and specialist subjects; parent online learning; support mechanisms for schools to deploy ICT (Department of Education, Employment and Workplace Relations. *Digital Education Revolution*. 2009).

### **Australian Investment as a Percentage of Gross Domestic Product at Current Prices**

Australian Gross Domestic Product (Current prices), according to the International Monetary Fund in 2008, was USD 1,013 billion (approximately AUD 1,152 billion) (IMF 2009). The amount of government investment in ICT AUD 6.41 billion as a percentage of Australia’s GDP is approximately 0.005%.

### **Virtual World Activities**

The number of Universities and Colleges with virtual land in *Second Life* is in the hundreds (Second Life Virtual Environments Enable New Models of Learning. 2009). Specific opportunities available in Virtual Worlds include training, rehearsing and role-playing, re-enactments, scientific theories and natural processes (De Freitas, 2008). Virtual Worlds present tangible educational benefits for universities.

Virtual Worlds also include their own economies. In 2008 Second Life economy traded USD 35 million (AUD 43 million) a month. Also in 2008 more than USD 100 million (AUD 124 million) worth of *Linden Dollars* were bought and sold on the LindeX, the official virtual currency exchange of Second Life (Second Life. The Marketplace. 2009).

The number of Virtual Worlds is collated by the KZERO Worldwide Company in the UK. KZERO provides a graph of the number of Virtual Worlds. The graph illustrates currently active Virtual Worlds; by target age group, years of development and number of subscribers. The graph developed by KZERO is available through <http://www.kzero.co.uk/universe.php>.



## **United Kingdom**

This section examines the UK, US and Australian Governments' response to Virtual World development.

The Digital Britain Report (DBIS, 2009) recognizes “the potential reach and scale of virtual worlds. For example, Habbo, the virtual world for 8-14 year olds has had 130 million registered users and receives 2.7 billion visits per month from young people” (DBIS, 2009. p113).

Furthermore the Digital Britain Report argues “Virtual worlds may offer business benefits and opportunities in relation to enhanced interaction with customers, efficiencies, environmental gains, international collaboration and knowledge transfer” (DBIS, 2009. p113).

The UK has a lead role in arranging the Organisation for Economic Co-operation and Development (OECD) workshop on Virtual Worlds. The OECD workshop discussed trends and development in Virtual Worlds. The result of these workshops was a proposal presented by the UK to the OECD for a major study on Virtual Worlds (DBIS, 2009).

By ensuring that the UK is at the forefront of Virtual World discussions, it will be able to make the most of the opportunities presented by Virtual Worlds.

## **United States**

The Federal Trade Commission (FTC) (2009) conducted a study examining the content available and the methods virtual world operators use to restrict minors' access to explicit content. As a result the Commission suggested virtual world operators make certain enhancements to reduce youth exposure to explicit content. The measures included:

- “Ensuring age-screening mechanisms for virtual world operators employ do not encourage underage registration”;
- “Implementing or strengthening age-segregation techniques to ensure minors and adults interact only with their peers and view only age-appropriate material”;
- “Re-examining the strength of language filters to ensure detection and elimination of communications violating online virtual worlds' conduct standards”;
- “Providing greater guidance to community enforcers in online virtual worlds to ...: self-police virtual worlds by reviewing and rating online content; report the presence of potential underage users; and comment on users who otherwise appear to be violating a world's terms of behavior; and”;
- “Employing a staff of specially trained moderators whose presence is well known in-world and who are equipped to take swift action against conduct violations” (FTC, 2009. p iii).

The Commission recommended parents and children become educated about the benefits and risks of online virtual worlds. The focus was on ensuring that parents have the information they need to decide which online virtual worlds may be appropriate for their children (FTC, 2009. p iii).

The US Government has actively engaged in virtual worlds. A Congress Telecommunications and Internet Subcommittee hearing was streamed live in Second Life. The Subcommittee was able to hear evidence through “a three-dimensional (3-D) model of the House hearing room and the subcommittee chairman presided over the meetings in person in Washington and as an avatar in Second Life” (Pellerin, C. U.S. Department of State's Bureau of International Information Programs. [USDoSBIIP] Congressional Hearing on Virtual Worlds

Simulcast in Second Life. 2008 p1). The Second Life rendering of Capitol Hill is provided in Figure 2 below.



**Figure 2. An avatar looks over Second Life's Capitol Hill, (Pellerin, C. [USDoSBIIP] - avatar Mercy Paine, 2008. p1)**

### **Australia**

The Australian Government has proposed a mandatory ISP -level filtering scheme. This scheme will mean slower internet speeds and does not guarantee material cannot be accessed. Schemes like these could mean that Australia may not be able to utilise the possibilities of Virtual World technology. Australia has not produced a policy or reference to Virtual Worlds. While classification of Virtual Worlds, such as Second Life, is expected after the implementation of the Internet Filtering Scheme. Classification of Second Life as a game, combined with the Internet Filtering Scheme would put access to Virtual Worlds and their possibilities in Australia in serious doubt.

### **Conclusion**

From 2006 to 2009 Australia lagged behind the US and the UK, in terms of the worldwide indicator for ICT capability, the WEF NRI. Australia's commitment to investment in ICT over the coming years is roughly equivalent to ten times more, as a percentage of GDP, than the funding currently set aside by the UK and the US. This level of investment may improve Australia's rank in the NRI. However, in contrast to the US and the UK who have adopted structural measures to address cyber-security, Australia has chosen to address cyber-security through an internet filtering scheme. Obstruction through an internet filtering scheme will not enable Australia to gain an advantage in virtual worlds. Indeed such obstruction will threaten Australia's virtual world development.

### **Notes;**

The International Monetary Fund Gross Domestic Product at Current Prices Data has been used for consistency across the country comparison. This data is accessible through *International Monetary Fund. World Economic Outlook Database*, <http://www.imf.org/external/pubs/ft/weo/2009/02/weodata/weorept.aspx?sy=2007&ey=2014&scsm=1&ssd=1&sort=country&ds=.&br=1&c=193%2C112%2C111&s=NGDPD&grp=0&a=&pr1.x=69&pr1.y=16>

The foreign exchange conversions used in this paper are based on conversions by the Foreign

Currency Exchange website (<http://www.xe.com/>) on 22 December 2009.

The author has an account and 10,000Lindens (approximately USD250) in *Second Life*.

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