

# THE IMMERSIVE INTERNET: NEW MODELS AND LEAD USERS IN AUSTRALIA

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(Refereed)

## Abstract

The move to develop new visualisation tools for online activities is a response to the complex systems of our expanding, informationalised world and the realisation that graphical representation improves our ability to navigate and make sense of it. But when such tools are combined with social networking and gaming principles, the impact is multiplied, the sum becoming bigger than its parts (Battelle and O'Reilly 2009). Real time communication within persistent 3-D environments (worlds), enable users to engage more deeply with one another and with content. With this, new modes of knowledge building, service delivery, interaction and collaboration are being borne.

This paper discusses the notion of 'immersion' and suggests determining factors. It then documents how service delivery in the domains of health, education and business is being re-imagined by new spatial tools and applications. Australian movers and shakers of the immersive web are identified, be they technology innovators or lead users. The proposed National Broadband Network (NBN) is considered in light of the new opportunities it affords: might not the potential of this new technology indeed strengthen the argument to green-light the NBN? With legislators set to argue the case, there is a pressing need to assess the potential of the immersive web, its ability to enhance existing services and create new ones.

## What is an immersive online environment?

The 'immersive Internet', 'multi-user online virtual environments', 'the 3-D Web', 'virtual worlds', 'serious games': whilst the nomenclature may vary or even be disputed, the momentum is clear; the web, increasingly, is a spatial experience. Yet the sense of *immersion* is a more complex response than merely viewing 3-D objects, such as architectural drafting software allows us to do, and extends well beyond the largesse of the Internet itself, for we can be immersed by reading a book, engaging in conversation or gazing at a sleeping newborn.

So what makes online space 'immersive'? Setting a prescription for technical specifications in the online environment is not especially useful as the technology is changing rapidly and with it, users' expectation. To use the cinematic analogy, audiences did not watch silent movies longing all the while for spoken word. Television viewers did not watch black and white programs reluctantly because colour was not on offer. But in both cases, when the technology advanced, the old models were no longer preferable. Similarly, in the online environment, as 'virtual' reality becomes increasingly sophisticated, the old benchmarks fall away. The text-based MUDs and MOOSs of the 1980's were highly effective role-playing games, but their popularity waned as highly produced massively-multiplayer-online-role-playing-games (MMORPGS) entered the market.

Today's virtual worlds might feature densely rendered graphics, increasingly efficient load times, and physics such as wind, light, shadow, weight and velocity. (WOWWIKI) An object that tumbles rather than falls, knocking over other objects along the way, then comes to a standstill when it meets with a denser mass, is more immersive than *Luigi*, of Nintendo's *Mario Brothers* fame who simply falls off the perch.

Tomorrow's virtual worlds, prefigured in the X-box prototype '*Project Natal:Milo*' promises will be controller and keyboard free. Smart sensors will read our body language, voice, and environment, collaborating with search agents that retrieve information about us to determine intention. Environments and narratives will be projected onto surfaces for us to interact with. Farzad Safaei,

Director of the University of Wollongong's ICT Research Institute suggests one way to think about the combined impact of integrated camera/projectors, gesture recognition, motion semantics, and human tracking is 'Let it be' (Safaei 2009).

And yet the online teen hangout, *Habbo* with its cardboard cut-out avatars that barely move or emote, has aggregated 151 million registered users of which 14.5 million unique user logins each month (Sulake, 2009). Clearly the *Habbo* community do not require higher level simulation in order to be immersed. Moreover, although *Habbo*'s creator, the Finnish company Sulake, releases new versions including a format for mobile devices (*Bobba*), they have resisted upgrading the visual properties in any substantial way. Instead, the Company has focussed on facilitating social interaction by establishing personalised and public spaces, community building, purchase of virtual objects, and ease of use.

Clearly, 'immersion' operates on a number of levels, a phenomenon that has occupied philosophical enquiry since Aristotle's time. His musings on the human propensity for creating narratives, which he termed 'mimesis' (Poetics, 350BCE), was the seed from which so much discussion on 'presence' and latterly, 'tele-presence' has evolved. The thread is woven into Descartes' mind/body dialectic from the 17th Century and into theories on consciousness, dreams (Freud S, 1900; Jung C G, 1956) and 'being in the moment' (Heidegger M, 1927). Amongst more recent ponderings are Michael Heim's provocation that technology is a 'mode of human existence' (1991, 61), Richard Dawkin's thesis that cultural environments can be reduced to particles (memes) that constitute who we are (1976) and Jean Baudrillard's treatise that society's pervasive use of simulation diffuses our sense of reality (1985).

In the quest to progress the computer-human symbiosis, scientists have drawn on this rich compendium. According to Mark Weiser, the chief scientist at Xerox PARC for much of the 1980's, concepts around presence, existence and symbolism helped develop the thinking on ubiquitous computing and the organisational metaphors and interaction idioms that became the graphical user interface (Weiser M, 1991) Brenda Laurel, a researcher at Atari, Apple and Interval sourced Aristotle and his work on memesis in her influential book 'Computers as Theatre' (1991) to advance her ideas on telepresence, game theory and virtual reality. Literary works which deal with hyper-reality, notably William Gibson (1984) and Neal Stephenson (1992) are amongst the most cited by technologists of virtual worlds, in particular, Philip Rosedale, creator of *Second Life* (Wagner J A 2008, 16) Raph Koster of designer *Ultima Online* and *Metaplace* (Koster, 2009) and the so-called 'father of virtual worlds', Richard Bartle (2004, 64).

As virtual environments move out of the laboratories and into the services and enterprise sector, the turf once occupied by philosophers and writers is being turned over to the business world.

U.S. based technology consultancy Thinkbalm (2009a), who works with early adopter companies offers a framework of graduated experiences to gauge the level of online immersiveness. They suggest it is 'a continuum that is determined by:

- 1) The degree to which the user's senses are engaged
- 2) The desirability and meaningfulness of the activity in which the user is participating.'

Immersive factors they list are 'visual, tactile, auditory, and collaboration and interactivity', suggesting a virtual environment 'doesn't need to score high in all of these areas to be immersive, but the more 'highs' it gets, the more immersive it is'. Industry consultant Richard Hackathorn suggests 'soft principles such as feelings' should be added factors (Thinkbalm 2009a).

Brian Bauer (2009), a specialist in the educational and enterprise applications of immersive worlds, offers two intriguing analogies: casinos and hypnosis. Casinos, he suggests, are multi-sensory environments in which 'outside world' reminders are eliminated, users' 'needs fulfillment' are attended to, and in which the user is 'elevated into a state of heightened value'. He pairs this with the idea of hypnosis, in which patient awareness shifts through their willingness and the use of an

effective tool (such as a therapist). Bauer then posits that to further optimize immersion, a third facet is required: an overlay of ‘stickyness’, in which user expectations are exceeded and the service outperforms other similar offerings in the market place. A combination of all three elements, he sees as the benchmark of immersion. Nintendo’s *Wii* would appear to satisfy this prescription. Ask a player if they have been on a real court playing tennis. Even though they will be huffing and puffing from the exertion, they will tell you firmly, they have not. The technology has willed them into another mindset, without them losing a sense of themselves.

Indeed studies conducted at Stanford’s Virtual Human Interaction Lab (SVHI) show that immersive experiences can be a powerful influence on behaviour, particularly in the link between digital self-representation online and off-line behaviour. (Yee N, Bailenson J et al 2009; Fox, J, Bailenson, J. et al (2009). Philip Rosedale, the founder of Linden Lab the company that created *Second Life*, noted this himself when he came across a virtual world ‘resident’ who identified so much with his svelte avatar that he lost seventy pounds.

Whether the Stanford studies fall on the side of the utopian or dystopian view of technology is still a matter of conjecture. High profile neuroscientist Baroness Susan Greenfield worries that ‘The messiness and squalor of the real world, and the real time element’, might be offset by the more sanitized virtual reality and that over time, a human’s capacity for empathy could diminish (Greenfield 2009). Not surprisingly, Rosedale holds the contrary view, and is starry-eyed about the potential for virtual worlds’ transformative effects, believing them to be empowering rather than limiting, as they ‘promote the opportunity to explore possibilities for ourselves and our environment’ (PBS 2009).

Indeed there is mounting evidence that people find degrees of liberation in virtual worlds, as they are not constrained by what cognitive scientist Andy Clark calls ‘our biological skin bags’ (Clark, 2005), finding purpose and agency in digitally-generated environments that they may not otherwise have. The experience of cerebral palsy-afflicted residents in a care centre in the US underscores this. They have jointly created an avatar ‘Wild Cunningham’ that socialises, rides waves and climbs mountains in the *Second Life*. Their caregivers report that, free of their wheelchairs and disease, the participants experience a level of social acceptance not possible in the physical world. This has resulted in ‘improved self-confidence’ and ‘a sense of empowerment’: and that participants express their creativity and humour in ways not previously available to them. (CBS, 2008).

### Figure 1: Flying with a disability

**A group with Cerebral Palsy jointly control their avatar, enabling them to ‘experience’ and control activities not feasible possible in the real world.**



Source: <http://www.cbsnews.com/video/watch/?id=3547970n>

In summary, ‘immersion’ would seem to be where one’s reality *is*, constructed though compelling stimuli which engages our thoughts, emotions and senses. When the user gains agency in such a space, via an avatar or viewer, and is then able to manipulate objects, navigate an environment, or be aware of the presence of other users in the space and interact with them, the virtual space takes

on some of the properties that cause us to be, ‘in the moment’ and the word ‘immersion’, in its online context, becomes meaningful.

## Towards a taxonomy of virtual worlds use

Virtual environments are calibrated for different purposes, yet they share a number of features.

Let us briefly recall what a virtual world is. It is a technology, either installed in situ or delivered as a service, which offers a 3-D environment allowing people to move themselves through representations called avatars, interact with each other through multiple channels (voice, chat, gesticulation and physical contact etc.), and which enables common content to be shared in a synchronous manner. A virtual world is not merely a 3-D interface to the web if it is without interaction, nor is it a merely a social network, which is barely synchronous, and it is not an online game (MMORPG), which retains the intellectual property of all objects created.

An important feature is the combined effect of the spatial element and the close human interaction that a virtual world experience engenders. The 3-D world coupled with audio provides strong cognitive cues that can enhance collaboration. Voice itself has spatial qualities, dimming at a distance and getting louder when collaborators are located closer together. This allows people to intuit who they can talk to at any given time, enabling multiple, conversations to occur simultaneously. Likewise, the arrangement of the objects within the space provides a conversational context. If other avatars are mingling before an event, they are inclined to engage one another in conversation, just as it happens in the physical world. This kind of small talk can often be a more effective relationship builder than the formal content of the event.

Another primary characteristic of virtual worlds is ‘persistence’, the idea that even when an event is over, authorized users can access the virtual space any time. Participants in another time zone may start the day with the results of real-time collaboration that occurred while they were sleeping.

Virtual environments are often configured as 3-D gaming and social spaces. This encourages the development of communities. Such worlds, exemplified by *World of Warcraft* and the teen hangout *Gaia* incorporate systems for trading virtual goods such as high-status wearable objects or furniture for decorating a virtual room. Estimated to be worth around 3 billion USD (Kzero, 2009a) virtual goods are an added revenue stream for the platform creators. However the trend has significance beyond merely making money for its owners. Participants who buy and sell virtual objects clearly enjoy the practice and place real-world value on the objects. Users’ participation in the virtual market place may flag the way for integration of virtual goods into general business, in which virtual goods become incentives for changed behaviour or customer loyalty.

## Expected growth and take-up figures

Projections for the expansion of the immersive Internet are decidedly bullish. According to KZero (2009b), the British-based virtual world analysts, virtual worlds will double in numbers every year, with the children’s market being the pivotal stimulus. By their reckoning, there will be 1200 virtual worlds by the end of 2012.

K-Zero puts registered virtual worlds accounts at 671 million, having grown 92 million in Q3 of 2009. Of these, close to 400 million are in the 10–15 age range, with *Habbo* growing by 13 million in three months. However, the largest percentage growth is in the under 5–10 age range, averaging 40% over Q2 and 3 (2009b). Readers are invited to draw their own conclusions as to the expectations of virtual world ‘natives’ as they become adult and enter the work place.

Not surprisingly, commercially produced environments for the kids, teens and tweens (K,T&T) market spin out of from existing entertainments properties such as *Barbie*, *Webkinz* and *Pirates of the Caribbean*.

In the enterprise sector, virtual environments might be ‘off-the-shelf’; like websites, they are modified by the provider to client specifications. A B2B platform might offer single-themed environment such as a workspace that sits within an organisation’s firewall, or provide a customised fit-out for a conference incorporating a range of audio-visual capabilities hosted on the platform provider’s servers.

Survey results from early adopters in the enterprise sector, collected in Thinkbalm’s Business Value Study, Q2, 2009, (Thinkbalm 2009, 13) suggest that motivating factors to trial virtual worlds for business are:

1. Cut down expensive travel costs and associated down-time
2. Find energy saving and reduced carbon footprint business practice
3. Enable a distributed work force to come together in a unified, branded space
4. Interact with one another using their own voice or text chat,
5. Upload and collectively edit documents,
6. Live-stream audio and video
7. Create or manipulate objects.
8. Record and monitor events

The most well-known platform is the ‘social’ world *Second Life (SL)*. Although the number of active users is relatively small — the platform owner, Linden Lab, measured 750,000 unique repeat logins in the third quarter of 2009 — Second Life is the virtual world which most closely reflects the diversity and happenstance of the physical world. This is due to it being almost entirely user-generated with hundreds of terabytes of content created by users to service their needs. An in-world economy thrives, as people trade virtual objects and experiences. Linden Lab announced in September 2009 this amounted to one to billion USD since the platform went public in 2004. SL is also the world which educators, corporations, government organisations and NGO’s have most explored. According to the Second Life Education Wiki, there are over two hundred higher education institutions that have committed to regions there, and hundreds more rent space within them.

## Immersive web: Taxonomy of use

**Table 1**

Type	Example
Command and control	A facility management system in which real-time data from different facilities can be bought into a 3-D environment to visualize hot spots, data flow, server utilization.
Service delivery	In the health sector, diagnostics and patient support, such as using virtual environments to improve cognitive function after brain injury, or providing a clinical or therapeutic environment for people isolated through illness or disability.
Prototyping and design	Show case next-generation operations centres such as BP’s oil rigs ( <i>Teleplace</i> ) Palomar West hospital ( <i>Cisco/SecondLife</i> ). Mock-ups of objects, living spaces or urban design. Users traverse, interact, or customise in order to get a sense of space and function. Companies launch virtual products to gauge market response.
Social, entertainment and retail	Recreational spaces for meeting, a place for self expression (content creation, machinima) Streaming of live events from concerts to political broadcasts, purchase and trading of virtual goods with click through to the web for real world purchase. Includes Kids, T’weens and Teens (KTT) worlds and branded worlds ( <i>BarbieWorld, Neo Pets etc</i> )

Type	Example
Education and training	Establishing workflow practices and scenario building such as emergency response. Remote learning. Learning through 'doing' and 'experiencing' via spatial and visual metaphors, game play, cultural exchange, group work.
Enterprise	Meetings and forums, project and document collaboration, customer/client role-play, trade shows, market research, brand extension, recruitment.

## A snapshot of the Australian scene

Australians are demonstrably quick in their uptake of new technology. The nation's mobile subscriptions, for example, outstrip South Korea's, widely recognized as the most wired nation in the world. (MSBC 2009). Similarly, Australian participation in virtual worlds punches above its weight. Both the Telco giant Telstra, and the national broadcaster, the ABC, were early experimenters and have regions in *Second Life* which they use for product extension, content creation and user's recreational use. In August 2009, more than 21,000 Australian Residents logged in (about 2% of the monthly total), spending more than 800,000 hours (again, about 2% of the monthly total) and accounting for more than USD1.3 million in user-to-user transactions (Linden Labs, 2009).

### 1. The educators

Amongst the education sector, there is vigorous activity. 'Second Life remains by far the virtual world of choice', surmises John Kirriemuir in his 'Q1 2009 Report on Virtual World Activity in the Higher and Further Education Sectors in the UK' (Kirriemuir, 2009) and Australian educators mirror this trend. Virtual Worlds education consultant Lindy McKeown counts 23 Australian education regions (dedicated server space). Pursuing her doctoral research into action learning, McKeown instigated Southern Queensland University's foray, *Terra Incognita*, in 2007, making it, along with the Australian Film and Television School, one of the first. Since then, she has become a key resource in running mixed-reality (simultaneous real and virtual) events.

Many more edu-projects are conducted in rented space from managed virtual world facilities. *Jokaydia*, with its mission to 'assist teachers and students to gain competency and confidence whilst having fun' is a professional learning facility run by Wollongong educator Jo Kay. The region is a venue for conferences and events, and hosts space to a range of tenants including the University of Adelaide History and Politics Department, Macquarie University's Learning and Teaching and Environmental Design Faculties, Hobart Polytechnic, Sydney Institute of TAFE and Charles Sturt School of Information Studies. (Salomon, 2009).

The University of Western Australia (UWA) is the latest local institution to join the higher education ranks, having launched its virtual campus in a mixed reality event in October 2009. The University has embarked on an ambitious program, the result of two years of research led by senior researchers in the physics department. Virtual UWA is a facsimile, rendering real-world features such the gardens and duck pond as a gathering point for prospective students and alumni. Current students can attend classes and participate in a competition to design the University's Second Life cultural precinct. The university's supercomputing program, WASP uses the site to extend its Collaborative Visualisation research and both the School of Business and the Graduate School of Education will use the platform as a teaching tool (UWA, 2009).

Second Life's profile, longevity and international cohort work in its favour as a platform of choice for educators, however access restrictions, the complexity of setting up an island, user verifications and security protocols, especially on the Teen Grid, is a challenge for schools with scant resources, causing a drift to other 3-D offerings. Second Classroom, a Sydney-based network for teachers

using 3-D interactive spaces is keen on *Reaction Grid*, based on the stand-alone server platform *Open Sim*, for its cost effectiveness, flexibility and ease of use. ‘We want to support innovators, on the ground, wherever they may be — big school, small school, whatever the setting’ writes Dean Groom in the group’s blog (Second Classroom, 2009). Still in alpha, this PG world designed for educators can be part of a grid, or sit behind a firewall. As it is compatible with *Second Life*, it shares the SL viewer meaning, in theory at least, that content can be transported from the old platform to the new (but not the other way around).

Another *Reaction Grid* advocate is Steve Collis, from the Northern Beaches Christian School (NBCS), Sydney, and plans are afoot to make the transition from Second Life to the new world. The School has made a major commitment to 3-D learning environments and NBCS students are highly competent in their use of 3-D interactive tools. The students have created clothing designs and started a business for selling them with an inworld currency. There is bookstore for student writing, a welcome centre, an auditorium, an art gallery showing monthly exhibitions of student work, and an in-world radio station streaming student-made programs. There is a virtual land council and a content regulatory body for programmers. Directed learning might take place at the Maths Maze. In group work, students can be beamed up into pods that hover above the terrain. Text chat is part of the assessment and is emailed directly to the teacher. A dance club enables students to socialise with their French counterparts, developing language skills and cultural insights at the same time.

Collis, who has a language teaching background — as well as a supportive Head of School — has overseen NBCS’ many in-world projects, and believes that the students are learning ‘high order skills’ that ‘would impress any employer’ (Collis 2009).

An employer would jump at the chance of hiring these students who have creativity, drive, project management skills, independent enquiry and the ability to collaborate as part of a team in decision making, at the age of only 13,14 and 15. (Steve Collis, Head of Innovation Northern Beaches Christian School)

Westley Field from Sydney’s Methodist Ladies College has achieved a remarkable response to *Skoolaborate*, a region he developed on SL’s *Teen Grid*. Participant schools span the globe from Kyoto to Washington, China to Chile, Taiwan to Porto, in Portugal.

**Figure 2: Visitors to [www.skoolaborate.com](http://www.skoolaborate.com)**





**Figure 3: Multipurpose sites on the SL Teen Grid, May 2009**

Just as champions within an organization drive innovation in business, highly motivated teachers with a strong belief and the ability to win the support are the ones driving the use of virtual environments in schools. Collis and Field have both benefited from supportive and well-funded administrations, suggesting that independent schools have a head start over schools in the public sector. However a virtual worlds study devised by Victoria University (VU) is aimed squarely at some of Melbourne's more marginalised students and has found its home at Debney Park Secondary College in Melbourne's Footscray. Researching the positive social and skill-based outcomes SL has been found to have on young people with autism, hearing impairment and depression, Stefan Schutt devised the 'Avatar Project', a three-year program to see how virtual worlds might assist regionally or financially disadvantaged students (Avatar Project, 2009).

With Vic Health funding, Shutt's team began working with Debney Park's immigrant community, some of whom were refugees, from the Middle East, Asia and the Horn of Africa. The study found students became more engaged with school and socially confident as a result of their Second Life activities (VU 2009). And the Avatar Project's success was recognised by being awarded the Community Technology Innovator of the Year, National Community ICT Awards, 2009.

With well-honed programming skills, Debney Park SC students were then enlisted to mentor 'newbies' from other schools, including Melbourne Grammar students during that school's three day Global Leadership Conference, 2008.

The Melbourne Grammar project (Salomon, 2008) was ambitious, particularly in light of the time frame. Led by Director of eLearning, Alberto Rizzo, students decided to build on the theme 'Make Poverty History' by creating awareness with objects and posters in an exhibition space in Skoolaborate, culminating in a mixed reality concert. The actual concert, held in the school hall, was broadcast into the virtual world, whilst the inworld version, complete with avatar band members and instruments, was broadcast into the school hall on large screens. Students from around the world logged in to the Skoolaborate region to attend the event. Those for whom conflicting time zones were a problem were able to visit the exhibits after the event and watch the real-world concert as streaming media.

The Second Life component alone was a considerable financial cost to the School, who as first timers, brought in a technical support team, equipment and extra bandwidth amounting to over \$6,000. Still, Rizzo believes it was money well spent given the steep learning curve for the School, and importantly, the legacy of active MGS staff and students who continue to collaborate with Debney Park SC and many others around the globe, scripting objects and creating narratives in Skoolaborate (Salomon, 2008).



Table 2

<b>Roll call of Australian institutions (Edu's and Government) using virtual worlds</b>
<b>Adelaide University:</b> Interdisciplinary project with global affiliates. 'Georgian London' a virtual 18th century London to test the pedagogical & practical value of virtual worlds as an innovative learning and teaching space for the Humanities in Higher Education.
<b>Australian Academic Research Network (AARnet):</b> investigating networking capability for academic research. Contributing to the NBN testbed. Looking to trial intranet virtual world for its distributed workforce (SL, iSEE, Exit Reality)
<b>Australia Council:</b> 2008–09 Allocated 50,000 over two years to artist projects (SL).
<b>Australian Film and Television School (AFTRS):</b> first Australian island in Second Life. Students learn machinima, immersive storytelling, create mixed reality games across platforms including mobile (SL).
<b>National Portrait Gallery, Canberra:</b> 'Doppelganger', a mixed reality event explores digital identity October 2009–March 2010 (SL)
<b>Canberra Institute of Technology (CIT):</b> <i>Eduversal</i> : using (Project Croquet and Mycosm)
<b>Curtin University of Technology WA:</b> Faculty of Health Sciences, Curtin University Perth Western Australia) are collaborating with Kings College London for inter-professional education using a virtual clinic (SL): <a href="http://flc.curtin.edu.au/casestudies/virtual_environment.cfm#virtualworld">http://flc.curtin.edu.au/casestudies/virtual_environment.cfm#virtualworld</a>
<b>Deakin University:</b> studying governance and regulatory frameworks for students in VW's ds, Criminology Department. Art and performance space for students (Arts and Education Faculty)
<b>Denby Park Secondary College (Vic):</b> 'Avatar Project' Pilot project with Victoria University using virtual worlds to increase confidence and skill set amongst disadvantaged students. (SL/Open Sim)
<b>Gippsland TAFE:</b> VET training
<b>Griffith University:</b> use their island to experiment with learning techniques and efficacy of learning space such as virtual tutorials.
<b>Hobart College:</b>
<b>Kangan Batman TAFE (Broadmeadows):</b> site for staff exploration in Jokaydia, 2008 (SL)
<b>LaTrobe University:</b> Conducting study on how Second Life can be used as an instructional tool for pre-service teachers (Campbell, C. & Jones, S., 2008)
<b>Macquarie University:</b> Learning and Teaching Centre
<b>Melbourne Grammar School:</b> inter-school project culminating in mixed reality concert on the 'Make Poverty History' Theme, 2008 (SL)
<b>Methodist Ladies College:</b> hosts <i>Skoolaborate</i> , facility designed for schools on Teen Grid, international focus with around 40 schools, 10 Australia (SL)
<b>Monash University:</b> Topics being researched by Monash academics include: identity and self in virtual worlds; legal constructs for virtual worlds; cross-cultural communication; governance; privacy; ethics; communities of practice; cognition and motivation in learning; learning theory; social organization; and language immersion. A number of virtual worlds and online platforms are being utilised, such as Second Life, Croquet, Active Worlds, EVE-Online, Lively by Google, and 'hybrids' such as SLoodle (interfaces Moodle to Second Life). <i>Pharmatopia</i> , an island for pharmacy students with international participants.
<b>Murdoch University:</b> March 2007, Set up Island to explore 'new learning tool' <a href="http://www.youtube.com/watch?v=hySW5QC4JLw">http://www.youtube.com/watch?v=hySW5QC4JLw</a>
<b>Northern Beaches Christian School</b> <a href="http://www.happysteve.com/2009/04/practical-examples-of-3d-virtual-environments-for-learning-in-high-school.html">http://www.happysteve.com/2009/04/practical-examples-of-3d-virtual-environments-for-learning-in-high-school.html</a>
<b>Queensland University of Technology:</b> YAWL: a business work-flow system (OpenSim/ (SL) Other projects in the area of Physics, environmental design, aerospace design, games teaching, legal education and training.

<b>Roll call of Australian institutions (Edu's and Government) using virtual worlds</b>
<b>RMIT:</b> various departments Design and Built Environment students create prototypes, Media creative projects include 'Dark Luminance, a mixed-reality art show and constructing narratives within virtualworlds'. <a href="http://www.rmit.edu.au/browse/News%20and%20Events%2FNews%2FArts%2Fby%20date%2FID=s8x04sg1wnzz;STATUS=A">http://www.rmit.edu.au/browse/News%20and%20Events%2FNews%2FArts%2Fby%20date%2FID=s8x04sg1wnzz;STATUS=A</a>
<b>Swinburne University of Technology:</b> Business Systems students explore branding& business concepts (Lilydale Campus). Media and Communications students explore virtual worlds as part of coursework (SL)
<b>University of Melbourne:</b> NICTA researchers have created <i>Badumna</i> , a P2p network for transmission of virtual worlds. Active Researcher cohort use Second Life Research List (slrl@list.academ-x.com) to update and collaborate with global research community
<b>University of South Australia:</b> developing virtual world assistive technologies for people with disabilities research projects include <a href="http://www.virtualblinddog.com">www.virtualblinddog.com</a> . Recipient of 2 ATLC grants (SL). Collaboration with University of Coventry.
<b>University of Southern Queensland (USQ):</b> Established action learning programs for new users, mixed-reality specialists hire their facility 'Terra Incognita' Island in SL.
<b>University of Sydney:</b> English Department, digital story telling (Dr Angela Thomas); ARC Research Grant 2009; 350,000 \$ over three years. to understand how innovative multi-user virtual environments (MUVEs) can be designed and used in Australian schools to enhance the learning of important scientific knowledge and inquiry skills. In addition, this project will develop science inquiry-based curriculum modules employing MUVEs that run on computers being distributed as part of the national Digital Education Revolution initiative.
<b>Queensland University:</b> Dr Farley and Dr Rick Strelan, from the School of History, Philosophy, Religion and Classics, were last year awarded a \$30,000 UQ Strategic Teaching and Learning Grant to construct a Studies in Religion Island in Second Life.
<b>University of Western Australia:</b> October 2009 Opened virtual campus: remote access to classes. Contact point for future and past students.
<b>University of Wollongong:</b> ICT Research Centre developing <i>iSee</i> , and multi-camera immersive environments. Pedagogical research.
<b>Victoria University:</b> The Avatar Project, explores how VW's assist disadvantaged young people with new skills and social connectedness
<b>Victorian Department of Justice:</b> experimenting with moderated juvenile courts (VastPark)
<b>VET Sector,</b> incl Canberra and Sydney Institutes of Technology, Tafe SA, Gippsland Tafe

## 2. The service providers

Although the list of virtual world providers in Australia is not lengthy, the impact of this cohort is significant.

Beginning with those in the National Capital, Big World (2009) and Simmersion (2009) have many enterprise and gaming products covered. In Big World's case, they are developers of an MMO game engine from which companies create their own proprietary worlds. Big World's middleware is the basis of 19 international titles including Korean and Chinese products. To date, its main venture into virtual worlds is *Twinity*, created by German/Ukraine company, Metavesum. Still in private beta, *Twinity* is a mirror world, that is, it is a one-to-one digital representation of actual cities. Berlin and Singapore have been mapped so far, but *Twinity* also has a social network dimension with avatars and content creation, making it more of a mashup than a strict digital facsimile. Big World began its commercial venture in 2002, and was in research phase for three years before that. With an established market, and offices in China, the US and Europe, Big World is well positioned to take advantage of the predicted rise in branded virtual worlds. (Big World 2009)

Simmersion's portfolio of 3-D worlds includes a real time visualisation product *Simurban*, a set of tools which enables users to import and place height data, aerial photography, 3-D models, scenery, water, sounds into a spatial area that is licensed to them. A second set of tools, a simulation engine creates real time viewing of the data into a virtual world environment. The geometrically accurate fly-throughs are in demand in government organisations and with property developers and urban planners. Given their skill set, Simmersion have launched *Mycosm*, a social world with photorealistic avatars and many of the activities that recreational users might expect including games, media sharing, chat, and the opportunity to share in a virtual economy. *Mycosm* is currently in private beta (Simmersion,2009)

Within two kilometres of one another in Melbourne's inner east, are two start-ups *VastPark* (VP) (2009) and *Exit Reality* (ER) (2009). Each are striving to make an impact in the international market place, and with youthful entrepreneurial technologists at their respective helms, they are making inroads.

Both ER's Danny Stefanic and VP's Bruce Joy acknowledge that it is a delicate time in their company's life cycle. From a service point of view however, they are polar opposites: *Exit Reality* is a plug in which 'turns the web into 3-D'. A light weight, free download, the program reads the metadata of a given website such as *Facebook*, searches the Web for 3-D content deemed relevant and then pulls it to the site. A list of favourite videos might become a video library with avatars that can browse the shelves; a business selling secondhand cars would find its web content converted into car show room.

*VastPark* is an open-source product made of four components: the server, the publisher, the creator, and the client. Elements to the immersive experience are plug-ins, including voice control and avatar generation, opening the VastPark environment up to the developer world. Vast Park has connectors to Twitter, Flickr, eBay and Skype and the flexibility of the architecture is being noticed by major US organisations including the military. Vast Park has partners in France and services education and government sectors, including the Victorian Department of Justice who are exploring virtual peer-run courts for young offenders.

In terms of second-tier services, two other Melbourne companies stand out. OOM Creative (2009) is consultancy of architectural designers creating new spatial metaphors for physical world concepts and phenomena. OOM Creative designed the Australian National Gallery's exhibit of immersive artists 'Doppelganger' which opened in October 2009.

*Treet TV* (formerly SLCN) is globally recognised as the leader in capturing virtual world content. *Treet* package the content like television. Their expanding list of credits includes mixed reality conferences and fora as well as entertainment and sports-style programming which they cast live onto screens in virtual locations as well as on the web where it is also archived (Treet TV 2009).

**Figure 4: Treet TV's coverage of the *Metamonics* forum at *Engage Expo*, San Jose, September 2009**



### 3. Beyond the Beyond: where to Virtual Worlds in light of the proposed National Broadband Network (NBN)?

Whilst some pundits are hopeful that future immersive services will become so technologically lightweight that they will not require high broadband speeds, the more likely scenario is that in having the bandwidth and speeds promised by the NBN, more deeply immersive services will evolve. Bruce Joy from Vast Park and Farzad Safaei envisage holographic scenes at call, powered by multi-camera sensors and they are of the view that a high end broadband service, whether wireless or fibre to the home, will be required (Salomon, 2009).

The Health Informatics Society CEO Brendan Lovelock is of the view that virtual delivery of health services could be the proposed NBN's 'killer app', uniting real-time diagnostics with high-end visualisation (HISA, 2009). This view is supported by The Centre for Health Innovation director, Cathie Steele. Steele oversees a training facility within the Alfred Hospital that is in high demand and expensive to run. She sees value in establishing a virtual platform where real-world exercises such as monitoring dummy patients and practising critical care protocols could be replicated (Salomon 2008). Promising experiments in virtual health care (Arinthio 2009; Virtual Ability, 2009), along with the demand for innovation in the e-health sector (Dept. Health and Ageing, 2008) suggest there is value in establishing a nationally-funded program to consider the immersive Internet's potential for services such chronic-care programs, the establishment of virtual clinics and using virtual environments to assist the disabled and the elderly.

The NBN test bed initiative, under the auspices of the Institute for a Broadband Enabled Society (IBES) (2009) may provide the means to take this idea further.

On the business side, the immersive Internet industry is spawning a second tier on which sits designers, event specialists, technicians, event capture (machinima), analysts, consultants, market researchers and advisors in regulation, governance and the law. Currently a self-directed community, this tier will drive curricular changes within related disciplines in the higher education sector, as demand for professional practice becomes established.

Bearing in mind that Gartner forecasts in its *2009 Hype Cycle Special* report that mainstream adoption of virtual worlds will occur within the next five years (Virtual World News 2009), where will support come from to develop our indigenous immersive Internet services?

#### Funding and future strategies

Though not an exhaustive list, a look at government funding indicates that whilst some individual projects are being recognised, the collective immersive services and allied industries are not recognised. Funding is adhoc, and virtual world developers such as Keren Flavell of Treet TV and Bob Quodling of Simmersion, point out that projects tend to fall between funding camps (Salomon 2009). It follows that there may be a case for recognising the immersive Internet as an enterprise entity of its own if Australia's home grown innovators are to flourish.

Plans of this nature are already afoot in the education sector with a proposal, 'PLanet', spearheaded by NIDAAG to gauge the impact and steer the future of virtual environments use in schools and higher education. At the time of writing this proposal is still in development, but according to its advocate, Jenny Millea, program manager at Education.au, the aim is to create an 'infrastructure and interoperability framework, supported by policy framework' (Millea; Salomon, 2009).

Similar moves are being made in the health sector with Stuart Smith, a senior researcher at the Prince of Wales Medical Research Institute initiating institutional support for Serious Games. Smith is hoping to establish an Australian/New Zealand consortium to promote 'Games For Health' (G4H) and is in discussion with the Federal Government's IT Innovation Council to enlist support (Salomon, 2009).

Health Victoria has recognised the importance of the Victoria University's Avatar Project, having funded it for two 3-year projects targeting school's focussed youth groups (Avatar Project 2009). Other funding bodies supporting immersive service development include ARC, the Australian Teachers Learning Council, Centre for Creative Industries (CCI) and NICTA. The Smart Services Cooperative Research Centre has a dedicated Immersive Services stream.

Austrade offers networking and exhibitor assistance for overseas trade shows, and a number of developers mentioned in this paper have been recipients although this amounts to 'small change'. More substantial development came from AusIndustry's Commercial Ready grant, with Simmersion Holdings receiving \$836,440 (Simmersion 2008). However, at the time of writing, the Fund is suspended and industry is awaiting the announcement of a replacement industry support fund.

Platform developers are going off-shore to raise capital, with Vast Park securing French and US investment and Simmersion receiving an injection of \$2m in venture capital from undisclosed sources in the US (Salomon, 2009).

On the creative side, the Australia Council has funded two Second Life projects to the value of \$20k and \$30k respectively (Australia Council 2009). Screen Australia, along with state film agencies jointly funds the Laboratory for Advanced Media Production (LAMP) convened by AFTRS whose alumnus includes Treet TV's Keren Flavell. Screen Australia and Film Victoria have shown some leadership with their joint 'Serious Games Initiative' in recognition of the emerging market, but the sum of \$375,00 for 2009–2010 needs to be compared with the French Ministry for the Digital Economy program in which EU20m has been earmarked for developing 'serious games' (Telecom.gouv.fr 2009)

## Closing comments

Considering its global uptake and rapid technological development, growth in the immersive Internet is set to continue. Digital natives growing up with virtual worlds will expect to use them in their work, education, health and lifestyle pursuits.

Indeed, there is no reason why, in the near future, *all* institutions should not consider how virtual environments can add value to their current and future digital activities.

With wider adoption, use cases will become clearer, such as the way a company with a distributed workforce can better collaborate or make more of fewer resources. Education, training and health services, delivered in simulated environments with multi-modal real-time interaction will be a boost to remote and developing territories. Open platform virtual worlds will enable users to co-create environments to fit their needs — as we are seeing with other technology tools such as social networking applications, sms and Twitter. This will likely deliver innovative and disruptive practices as yet merely speculative.

If there is a final point to be made, it is that innovation in this field is predicated on having a digital delivery infrastructure equipped to handle its development. The Rudd Government's 'Digital Education Revolution' allocation of high quality laptops to all Year Nine students attests to the importance it places on a technologically equipped nation. However, the digital divide is now less about having access to the Internet, and more about having a fast and efficient delivery mechanism. Only with this foundation in place, will innovation in terms of immersive environments flourish, for its future is more about users and what they may do with it, than it is about the tools and architecture.

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