Seven Wonders: End Users and the Internet of the Future

Trevor Barr, Alex Burns and Darren Sharp

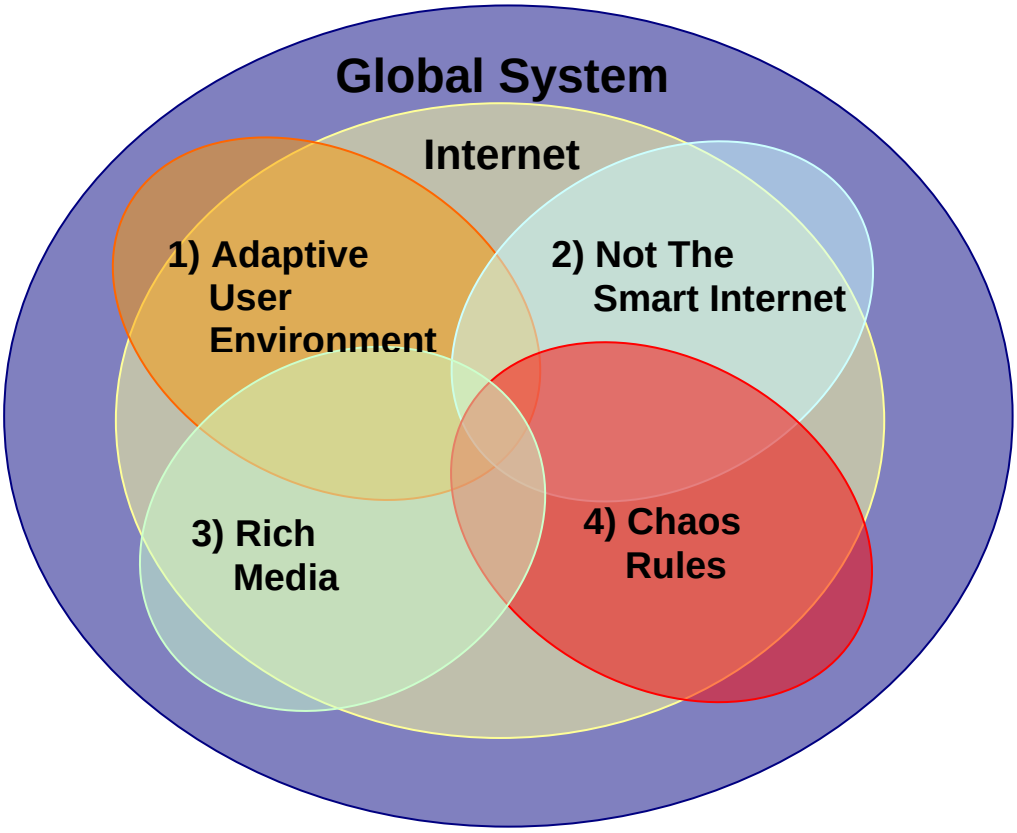
End users of communications services have never before been confronted with such a bewildering range of issues, services and choices related to the way they interact with the new global communications platform, the Internet. And there is little evidence that the pace of change is about to slow. This article presents a summary of some of the key future issues and challenges in the near term future related to end users and the Internet. It is based upon a recently completed major research report titled **Smart Internet 2010** prepared for the Smart Internet Technology CRC, and launched by the Hon Senator Helen Coonan, Minister for Communications, Information Technology and the Arts at the ICT Outlook Conference in September in Sydney.[1] The full report is available at www.smartinternet.com.au.

This Cooperative Research Centre (CRC) was established in 2001 and involves leading communications corporations, notably Telstra, Westpac, select small and medium enterprises, nine Australian universities, the Government of New South Wales, and the Commonwealth Government. This research was based at Melbourne's Swinburne University and drew upon other research work within the CRC. The research team drew upon a plethora of source material and they interviewed over 35 international experts. A Schools of Thought framework was the primary methodological tool chosen to organize this body of expert opinion.

The editorial team for this project constructed four original Schools of Thought:

1. **Adaptive User Environment**
2. **Not The Smart Internet**
3. **Rich Media**
4. **Chaos Rules**

Each of the four schools is a conceptual lens that articulates the driving forces for change, and leading actors within: 1) its own school, 2) the Internet space, and 3) the global system within which these dynamics take place. Schools of Thought are not written as creative original narratives or scenarios of possible futures, but rather as alternative critiques that outline positions held by the adherents suggesting possible future outcomes. A School of Thought ought to be viewed as a *constellation* of individuals with shared mind-sets rather than as a tightly-knit group. Each of the issues listed below fits into these Schools of Thought as outlined in more detail in the full report.



2010 Issue One: An Era of 'Unannounced' User-led Innovation

A primary question underpinning the *Smart Internet 2010* report is what might the Internet be like from the users' perspectives by 2010? The accuracy of past predictions and prophecies regarding the possible level of acceptance of new communications technologies by end users shows a decidedly patchy history. Much work about users in the future is still closely tied to notions of supply – "we have these network services for you to use" - or prospective developments are tied to technological utopianism – "these digital services will change your work, home and life".

Yet most of the best recent innovations for users have emerged as 'wild cards' (low-probability high-impact events) from demand in the marketplace and this pattern is likely to continue so. During the past decade we have witnessed the surprisingly widespread acceptance of several new services, notably email, text messaging- which the carriers originally did not want to know about - and Google's PageRank™ search tools - which none of the major players planned for, or forecast. This is partly because few developers investigate why consumers and citizens make the choices they do about communication processes in their lives.

Proponents of the *Adaptive User Environment* School of Thought focus on how social and cultural factors influence the way end users and consumers interact with a wide range of Internet-based technologies and services. An overriding assumption in the context of the Internet for 2010 is that those creators, suppliers, and service providers who invest in understanding the complexity of human factors, and who apply their knowledge about the end-user interaction with the Internet, will be the most likely to succeed. The best new technologies and services will be those that are created, designed, constructed, and marketed in ways that will be highly ***adaptive*** to human needs in the Internet environment of 2010.

A shift in thinking is now underway to conduct social and cultural investigations into the wider contexts of usage in which communications occurs. Critical factors that now drive uptake decisions are whether the prospective services enhance a person's lifestyle, and/or fulfil personal needs, complexities related to identity, their sense of

trust, and whether the service is cost effective and affordable in the long term. So investigations should move 'upstream' and into the conceptualisation stage rather than 'downstream' at the testing stage.

John Fabre, of Telstra Research Laboratories (TRL), when working on an identity management CRC project attempted to marry social and behavioural research investigations, wrote about the 'lessons' that need to be applied to the development of specific product development capabilities at TRL. He discusses key aspects of this relationship:

> When it comes down to deriving technology solutions based around identity, privacy and trust, social science research literature has been empirically lacking, business analyses have been speculative, and solution designers have opinionated around technologies. This is problematic when customers are the epicentre of a business. This assumes that services and delivery of services should be tuned to address business outcomes (revenue) and fit into the way customers 'live'. The latter means fitting in with human behaviours that are inherently adaptive (will work with, despite lousy technology), perceptions of the world (necessary so that the world appears rational and orderly). This research is partly motivated by the belief that knowing how customers navigate their perceptive world informs us as to how they reason about what they do, particularly when they are required to trade off risk and value when using various channels of communication (online, mobile, etc.). ***If this knowledge is captured early enough, it has the ability to inform more high level design decisions when project teams come together to consider how technologies could be assembled to meet a service need***. This research will not stop solution definition, but it will make you think about limitations and features which a product should support in a socially communication-rich world. (J. Fabre, email to CRC Researchers, 1 June, 2004)

This is new thinking offering new prospects – putting users at the centre of the development processes – towards 2010.

'Adaptive User Environment' Champions

Donald Norman, Tom Stewart, Gerry Gaffney, David Sless, Brenda Dervin, Nelly Oudshoorn, Trevor Pinch, Sally Wyatt, Roger Silverstone, Christina Lindsay.

2010 Issue Two: A Shift to Personal Connectedness

The Smart Internet of 2010 is likely to become ***'the platform for personal connectedness'***. Increasingly towards 2010 more users will want to access, and increasingly be prepared to pay for, the connectedness that provides them with their own choices of music, film and video selections, the capacity to exchange specialised peer-to-peer services, use podcasting, and take up the opportunity to express

themselves through digital games. Also likely in terms of connectedness is the emergence of an enhanced range of personal corporate services, especially in finance and banking. In short, the user paradigm will shift away from people merely accessing professionally produced content to using the Internet as a platform for personal connectedness. Hence the process of an 'always-on', co-created Internet experience through social networks, takes on new significance.

Marketplace shifts and new modes of distribution are significantly undermining the established 'top down' broadcasting model. The new era of rich media will radically change the broadcasting landscape and will increasingly disintermediate the traditional distributors of audiovisual media, directly connect producers to consumers, and erase the hard definition between producers and consumers. Peer-to-peer superdistribution, what Mark Pesce refers to as **'hyperdistribution'**, is a likely future pattern of distribution (2005). Optimists trust that this will liberate consumers from the anti-market forces of free-to-air commercial networks and program distributors.

'Peercasting' is more efficient on a global scale in terms of distribution than the broadcasting model, and it shifts the balance of power from producers to consumers. Progressively towards 2010 consumers who can afford access to this emerging distribution platform will be able to decide what they see, when they see it, and how they see it.

This will be an important component of 'connectedness' within the new entertainment domain of 2010.

'Rich Media' Champions

Bill Gates, Leonard Kleinrock, Simon Moore, Aaron Quigley, Victor Zue, Steve Jobs, Rob Glaser, Mark Pesce, Cambridge-MIT Institute, IST Advisory Group (ISTAG) of the European Commission.

2010 Issue Three: A Burgeoning Do- it -Yourself Media (DIY) Culture

Online communities have existed since the early days of email, bulletin boards, and IRC (Internet Relay Chat) channels. Sherry Turkle's research (1995) on 'negotiated identities' and Howard Rheingold's (2000) work on the ability for 'virtual communities' to re-enchant the public sphere, display optimism about the empowering potential of life in 'cyberspace'. After more than a decade of widespread uptake, people are being socialised into taking the Internet for granted, leading to higher degrees of new media literacy as users grow accustomed to the changing social environment. The Internet is moving into a more mature phase of development, sometimes described by technology publisher Tim O'Reilly as Web 2.0.

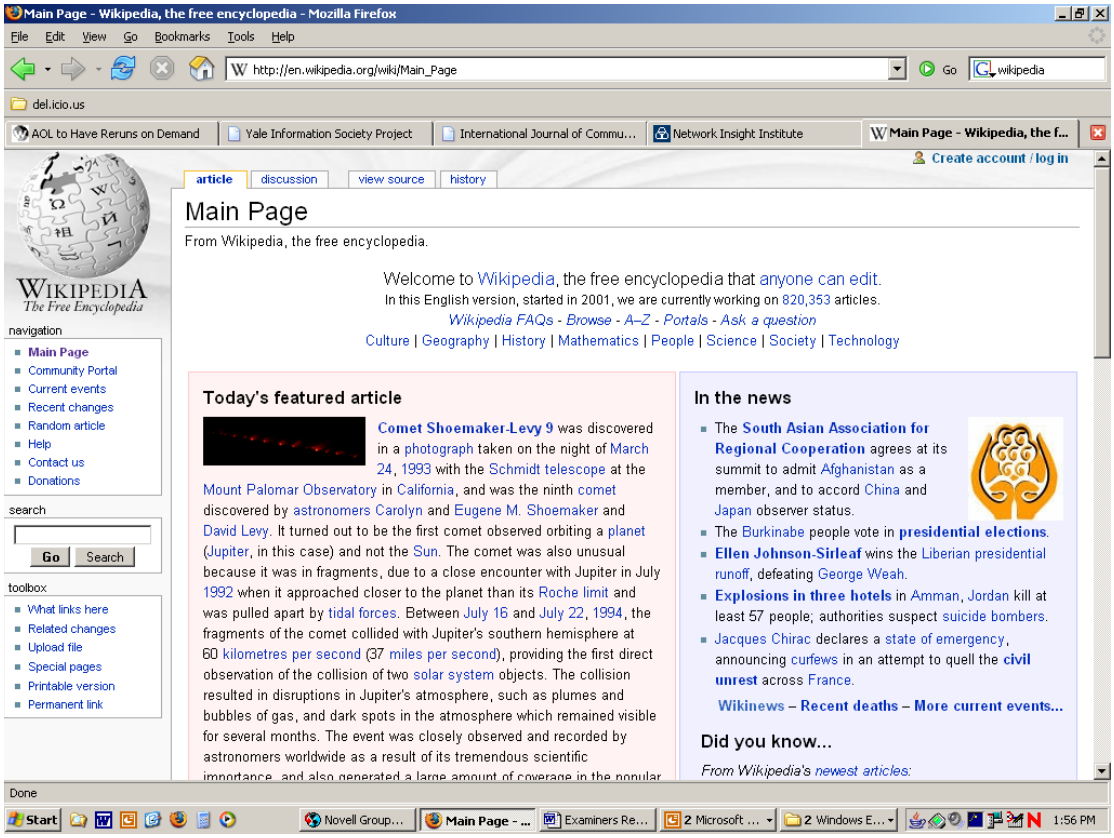
Since 2003 a new wave of primarily American startups have re-ignited enthusiasm in dotcom firms by designing Social Networking applications that enable users to communicate via the Internet in new ways. Social Networking can be defined as any set of activities that enable many-to-many social interactivity to take place via ICTs, whether via the Internet, mobile, PDA or any other device. The first batch of Social Networking Services (SNSs) such as Friendster, LinkedIn, and Orkut became major attractors for a range of early adopters. These included workers in the high-tech industries, political activists, and various interest groups who quickly recognized the potential for Social Networking tools to augment real-time social interactions.

What distinguishes Social Networking applications from their two-way predecessors is a combination of factors including a mature web infrastructure, the emergence of Web-native platforms like Blogs (personal Web-diaries), Wikis (Web pages any user can edit), and ubiquitous access among certain groups of users.[2] Taken together with ease of use, these factors enable any user to develop or hook into group-forming networks, whether mobilised strategically or ad-hoc, depending on the nature of the project and the needs of the people in question.

Despite critics' dire forecasts, blogs, wikis and online social networking services have continued to build sizeable user communities. The blog search engine company Technorati is currently tracking over 20 million blogs in the United States market alone. The blogsphere is experiencing phenomenal growth with over 80,000 blogs created daily according to data from July 2005.[3] This sector's importance was

recently validated by News Corporation's decision to purchase the hip social networking site MySpace.com for US$580 million, part of Murdoch's strategy to capture the Internet advertising market.[4] In wiki related developments, the collaborative knowledge site Wikipedia contains over 831,000 English-language articles and maintains a growing base of over 400,000 registered users.[5] These figures illustrate the rapid rate at which many social networking tools are being adopted by millions of users around the world.

What seems highly likely towards 2010 is the emergence of other new forms of alternative media and an even more astonishing growth than now of Do- It -Yourself Media forms. Conventional media proprietors – here they come!



2010 Issue Four: Open Source Builds Momentum

Media scholar Siva Vaidhyanathan in *The Anarchist in the Library* (2004) characterises the battle for the information commons as an age-old struggle between contending forces of anarchy and oligarchy.[6] As our information systems become more complex argues Vaidhyanathan, the dynamic between 'hackers' (anarchists trying to pry open the system), and big business and government (oligarchs that have an interest in making information scarce) is driven to ever increasing extremes of attack and counter-attack.

Into this milieu enters Lawrence Lessig, Professor of Law at Stanford University. Lessig has built a formidable reputation as an Intellectual Property expert, a strong advocate of Open Source development, and the most vocal critic of the current US

copyright regime. Lessig paints a compelling picture of the dystopian future confronting global society if commercial interests are given free reign to enclose the information commons backed by the full power of the law.

Lessig has absorbed the insights from the Free and Open Source Movements and widened the IP parameters beyond software, to encompass music sampling, book publishing, and even scientific research. He mounts strong arguments against the invocation of copyright law and punitive legislation that restrict public access to cultural resources that Lessig believes should remain public domain.

Lessig and his supporters established the 'Creative Commons' initiative (www.creativecomons.org), the focal point of a new licencing framework that broadens creative boundaries for producers, artists, and authors. Creative Commons licences provide protection within the framework of domestic copyright legislation but add new provisions to meet the demands of today's creative industries. Creative Commons has become a global movement in its own right. The most famous cases of creative works using Creative Commons licenses include author Cory Doctorow's science-fiction books and the music of Brazilian Minister of Culture, Gilberto Gil.[7]

Closer to home, Professor Brian Fitzgerald, Head of Law at Queensland University of Technology, leads the small team charged with the task of porting the Creative Commons licence to Australia. This process was completed in January 2005 and adds Australia to a growing list of countries forging a reformed IP agenda. During an interview Fitzgerald outlined how current legal disputes over file-sharing highlight the necessity to balance the need for economic reward with freedom of expression: "The big argument at the moment with file sharing software is that copyright owners are saying: 'We want to protect our copyright material and what you're doing is unlawful.' The user side of the argument is that 'this is innovative technology and what you're doing is using copyright or IP law to stifle innovation.' So on one side you want to stop copyright infringement but the collateral damage here is going to be innovative technology."[8]

Open Commons champions caution against legislation that gives market forces the power to fully enclose the commons, which they argue is neither inevitable nor good

for business. From a libertarian perspective, the ability to legislate Internet architectures that blindly protect Intellectual Property, but forsake the free exchange of ideas, has the effect of restricting legitimate research and critique.

The Open Source movement and the fate of the Information Commons will be one of the major cultural battlegrounds towards 2010.

Issue Five: Digital Games and Next Generation Consoles

Digital Games have now moved from the margins to become vital to the entertainment economy. PricewaterhouseCoopers forecasts that global revenues for the Entertainment Economy "will increase from US$1.2 trillion in 2003 to US$1.7 trillion in 2008."[9] Videogames and hardware sales will contribute US$30 billion in revenues; they surpassed North America's film exhibition revenues in 1999.[10] China, India, and Russia will be high-growth markets between 2005 and 2010.

The industry's preferred vision is of a broadband-enabled game console integrated into the entertainment area of a smart home.[11] The centre-piece of games growth to 2010 will be next generation consoles—Microsoft's Xbox 360, released in November 2005, and Sony's PlayStation 3, scheduled for Q1 2006. Both consoles have rich multimedia capabilities, clear user interfaces, and integrate 'player-producer' communities into e-commerce revenue streams.

Key drivers for the videogames industry include: inter-firm competition in the console market; design innovations in consumer electronics; new platforms; and marketing channels. Key risks include content piracy; intellectual property debates; outsourced manufacturing delays; 'disruptive' technologies like peer-to-peer networking; regulatory impacts on videogame violence, censorship, and cross media ownership; standards wars; and technological obsolescence. These drivers and risks demand that videogame companies develop 'environmental scanning' capabilities, to anticipate marketplace disruptions and to seize opportunities for future growth.

The Australian industry generated A$100 million in export revenues in 2002 and its global reach will continue to 2010.[12] Most companies work on a 'fee-for-service'

basis with United States and European game publishers. clusters, such as Multimedia Victoria's 'Game On' clusters policy and Queensland's 'Creative Industries' initiative. Evelyn Richardson, the Games Developers Association of Australia's (GDAA) executive director, notes that "we are known internationally for our creative talent and for delivering value for money."[13]

Digital Culture provides a broader context than just technology to understand the world that videogames and players co-evolve within. Its emergence mirrors the Internet's mutative shift from being a technology infrastructure to becoming embedded within society. Digital Culture contexts create new spaces for user-driven innovations and digital lifestyles. Digital Culture draws on the rich legacy of cybernetics scientists, avant-garde artists, and counter-culture movements.[14] It is often equated with Cyberpunk writers like William Gibson (*Neuromancer*) and Neal Stephenson (*Snow Crash*), with 'rave' dance culture and postmodernism, and with Generation X and Y youth subcultures. Savvy 'cool-hunters' tap into these subcultures for rapid prototyping of new products and user led innovation.

Smart Internet 2010 has identified the following as critical areas for high-growth strategies to 2010. These range from technological innovations that are product-centric to consumer-driven innovations that may 'disrupt' current industry strategies.

Massively Multiplayer Online Games (MMOGs) may be the videogame industry's biggest 'wild card' to 2010. Sony's *EverQuest*, LucasArts' *Star Wars Galaxies*, and Linden Labs' *Second Life* are recent successes; Maxis' *The Sims* Online has been a surprise mega-flop. The key to success is giving players true interactivity in an MMOG world, and continued investment in network infrastructure. The fusion of MMOGs and social networks, with an understanding of Games Studies, will empower players, and create novelty via 'emergent' actions, hazards, and randomness. Sony and other firms have lost millions creating 'immersive' game-worlds and infrastructures. Game developers discovered that players had their own goals in MMOGs and that new phenomena unexpectedly emerged. Insights from 'network theory' (small worlds, small-scale networks), artificial life and synthetic ecology ('swarming' and 'cascades') will provide scientific frameworks to design MMOG worlds and interact with game players. These frameworks provide a paradigm that

goes beyond rules-based machine learning, and will be widely utilised in large-scale games development beyond 2010.

Mobile Games will continue to be important revenue drivers in the near-term. Mobile games development revives the 'retro' model of small developer teams rather than the development of larger projects. New developers may gain experience with mobile games and then move into designing games for consoles and other platforms. This employment pathway mirrors the relationship between 'indies' and 'majors' in the film and music industries.

Location Based Games use a mobile phone's functions (including GPS, Bluetooth® and camera) in variations of 'Capture the Flag', 'Treasure Hunt' or problem-solving. This new genre combines elements of Massively Multiplayer games, social networks and wireless mobile networks. Team-based versions of games enable online participants to collaborate with players in the real-world locations. Location Based Games have been a compelling service for 'early adopters' in the United States, Europe, and Australia. When combined with action learning techniques, Location Based Games become a powerful tool for situation-based education.

2010 Issue 6: Chaos is *Not* Inevitable

The *Chaos Rules* School of Thought is primarily concerned with a future Internet that is in a continual state of decay and worsening disorder. Exponents share a sceptical pessimism about the robustness of Internet services that may be ruined by 'spam' junk emails, rogue hackers and viruses. They distrust the utopian visions of high-tech society because an over-reliance on information technology also creates pathologies and vulnerabilities. *Chaos Rules* advocates believe Internet futures will be dominated by a negative utopian vision they describe as Digital Dystopia. Dystopian imagery is pivotal to the Cyberpunk books, films, comics and electronic music that depict Internet futures with dark foreboding. The root cause of this vision is the Internet's chaotic and decentralised nature as a communications infrastructure.

Helsinki University of Technology Professor Hannu H. Kari illustrates the challenges that Chaos Rules presents to strategic analysts. Kari warned that the Internet would

collapse in 2006 because its network infrastructure was never designed to be a mass communications platform.[15] Global newswire services transformed Kari's analysis into a pithy sound-bite on viruses, spam, identity theft, and trans-national crime networks:

> "There are many bad people who want to create chaos on purpose," said Kari, who has in the past voiced doubts about the Internet's future. . . . Kari said spam and viruses are the main culprits. The next stage is that the loosely organised global network will function less and less smoothly, and become progressively more prone to manipulation.[16]

Rich insights emerged from 'disruptive' proponents, who understood the complexities of large networks and the historical forces that had shaped the Internet's design. Chaos and systems theorists realised that Internet uptake was a 'critical threshold' for waves of users, and that technological innovations had dramatically altered the underlying infrastructure. For Henry Ergas:

> That decentralisation has been a source of the Internet's enormous strength is undoubtedly the case. But it has also created severe weaknesses. The most obvious is that as so much network control resides at the user terminal, or close to it, there is enormous scope for users to act destructively. In some cases, such as viruses, purely malicious conduct is involved. In others, such as spam, commercial motives are at work. The Internet's lack of hierarchy makes preventing this kind of behaviour nearly impossible.[17]

Proponents of *Chaos Rules* view this uncontrollable ecosystem with considerable concern. University of Notre Dame's Albert-Laszlo Barabási notes that 'scale-free' networks such as the Internet make it virtually impossible to eradicate Love Bug, Nimbda and other viruses.[18] Spam, Internet porn and identity theft have become endemic. For 'irregular' proponents this has become a reason either to create virus detection solutions or stay with traditional media outlets, and not venture beyond major sites and trusted Web portals. On the other hand, 'disruptive' exponents believe these problems can be managed, if the major culprits—malicious users, poorly designed software, and renegade service providers—are identified and targeted. Experts on non-traditional threats, like Richard Clarke, warn that critical infrastructure may face a 'catastrophic' cyber-terrorist attack.[19] Cryptography pioneer and security expert Bruce Schneier warns that tightly-coupled technological systems are often designed without end users in mind, and therefore lead to hacker cascades.[20]

The value of the *Chaos Rules* School of Thought is that it brings together a range of dystopian views towards 2010 and can provide the basis for working towards constructive measures to solve serious problems for end users. It's more than likely that our collective capacity to solve Internet related problems towards 2010 will outweigh the rate at which further problems emerge.

'Chaos Rules' Champions

John Arquilla, Damien Broderick, Mark Dery, William Gibson, Andrew S. Grove, Bill Joy, Hannu H. Kari, David Ronfeldt, Clifford Stoll, Siva Vaidhyanathan.

2010 Issue 7: Tackling the Digital Divide

An accessible and affordable Internet for everyone is surely a highly desirable policy priority towards 2010, rather than merely a smart Internet that works for some but excludes the participation of others, if not most, in a user pays society. Debates about 'technology futures' generally underplay the complex issues related to those who have access to new technologies, and on whose terms this access is granted. After years of steady uptake within regions of affluence, global access to the Internet remains a privilege for only 880 million of the world's 6 billion people.[21] Kofi Annan, United Nations Secretary-General has superbly summarized the extent of the global digital divide:

> The digital divide is real. It is actually several gaps in one: a technological divide in infrastructure, with 70% of the world's users living in the 24 richest countries, which contain just 16% of the world's people; a content divide, with nearly 70% of the world's web sites in English and a frequent lack of locally meaningful material; and a gender divide, with women and girls in many countries, rich and poor alike, enjoying less access to information technology than men and boys.[22]

The proponents of *Not the Smart Internet* School of Thought advocate that a simple, user-friendly, and culturally appropriate Internet is the best option for the year 2010. *Not The Smart Internet* sets out to challenge designers who wish to build a new array of technologically driven Internet applications - what Apple's Donald Norman has described as 'featuritis'. Rather, what is more important is a functional, low-cost

Internet that hides operational complexity and meets the users' social and communication needs. Donald Norman's plea was for the eventual design and realization of the *Invisible Computer* (1999); the 2010 counterpart is a call for an *Invisible Internet* for end users.

'Not The Smart Internet' Champions
Lawrence Lessig, Brian Fitzgerald, David Rooney, Siva Vaidhyanathan, Howard Rheingold, Mark Pesce, Cory Doctorow, Richard Stallman, Douglas Rushkoff, Danah Boyd.

Australia Needs an Infrastructure Vision

The *Smart Internet 2010* report authors want to acknowledge the need for a new network. Australia has managed for over a hundred years with what is essentially an old decaying network that primarily offered voice communications. We need to re-invigorate the national debate about how we put in place a new user-centred network that offers the prospect of a multiplicity of new services which become significant to Australia's necessary economic re-structuring towards- and well beyond- 2010. There is growing potential for the Internet of 2010 to cater to a wide variety of social practices as the cost of hardware falls and the ubiquity of mobile phones increase, along with the growth in WiFi and broadband connectivity which collectively provide more access points.

This should be part of an 'Internet for all' strategy which is clearly affordable when taking into account the state of the Australian economy and its low levels of national public debt. Australia urgently needs infrastructure vision to put in place a communications network to secure its future.

The Internet has emerged relatively recently to become the premier communications platform, offering diverse services and extraordinary communications capabilities. Its richest potential is that eventually global 'any to any connectivity' may be realised for the benefit of most humanity.

References

Annan, Kofi (2003). 'Break the Technology Barrier - The World Information Summit.' *International Herald Tribune* (9 December). <http://www.un.org/News/ossg/sg/stories/articleFull.asp?TID=11&Type=Article>

Barabási, Albert-László (2002). *Linked: the new science of networks*. Perseus, Cambridge MA.

Ergas, Henry (2003). 'Free-riding Internet can impose high cost', *The Australian Financial Review*, 28 October.

Internet World Stats. (2005). 'Internet Usage Statistics: The Big Picture'. <http://www.internetworldstats.com/stats.htm>

Norman, Donald A. (1999). *The Invisible Computer.* MIT Press, London.

Pesce, Mark (2005). 'Piracy Is Good?: How Battlestar Galactica Killed Broadcast TV'. *Mindjack.* <http://www.mindjack.com/feature/piracy051305.html>

Rheingold, Howard (2000). *The Virtual Community: homesteading on the electronic frontier* (rev. ed.). The MIT Press, MA.

Sapa-DPA (2004). 'The Internet Will Collapse In 2006.' Helsinki, Finland (18 October). <http://www.mg.co.za/Content/l3.asp?cg=BreakingNews-Business&ao=123911>

Turkle, Sherry (1995). *Life on the screen: identity in the age of the Internet*. Simon & Schuster, New York.

Vaidhyanathan, Siva (2004). *The Anarchist in the Library: How the Clash Between Freedom and Control is Hacking the Real World and Crashing the System.* Basic Books, New York.

About the Authors

Trevor Barr is Professor of Media and Communications at Swinburne University of Technology, and Program Manager, Smart Internet Technology CRC. His four major books have each been standard references in university media and telecommunications courses for many years and influential in policy formulation. He has been employed as a senior adviser or consultant by a number of government and industry bodies, including the Commission for the Future, Telstra, and Ericsson Australia. Trevor was invited to deliver one of the prestigious Alfred Deakin Lecture Series as part of The Federation Festival in Melbourne where 53 leaders in their field were invited to discuss critical issues regarding Australia's future. Trevor is also currently Co-Chair of the Telstra Consumer Consultative Council (TCCC), a national consumer advisory body to Telstra.

The Sydney Morning Herald has chosen him as one of the 20 influential thinkers about major future issues facing Australia.

Email: tbarr@swin.edu.au

Alex Burns is a Senior Researcher with the Smart Internet Technology CRC. He has an MS in Strategic Foresight (SUT) and a BA in Cinema Studies (LTU). His CRC research interests include communications futures, counterterrorism, entertainment services, innovation, rapid development, and risk societies. Burns is editor of the subculture site Disinformation (www.disinfo.com), and was contributing editor to the award-winning digital culture magazine 21C (1996-1998).

Burns has been a panellist, facilitator, and adviser to the festivals This Is Not Art (www.thisisnotart.org), Straight Out Of Brisbane (www.straightoutofbrisbane.com), Next Wave (www.nextwave.org.au), and the National Student Media Conference (www.studentmedia.org.au). He has written about the Internet for Playboy.com, Artbyte, internet.au, Information Week, Marketing, Desktop, and REVelation magazines.

Email: aburns@swin.edu.au

Darren Sharp is a Senior Researcher in the User Environments program of the Smart Internet Technology CRC, based at Swinburne University of Technology in Melbourne. Sharp was principal researcher on a project commissioned by Multimedia Victoria in 2004 which examined community use of the Internet. His research interests include the co-evolution of technology, culture and social praxis, user-led innovation, and opportunities for collective intelligence through an emerging information commons. He was an associate editor of the website Australian Policy Online (www.apo.org.au), and produced multimedia for SBS New Media and Eclipse Group. He was an invited panellist to the Next Wave (www.nextwave.org.au), and This Is Not Art (www.thisisnotart.org) festivals, providing commentary on media related issues.

Email: dasharp@swin.edu.au
Photograph set separately

Caption

Launching the **Smart Internet 2010** Report at the ICT Outlook Conference 1 September, 2005 in Sydney (from left), Darren Sharp, Professor Trevor Barr, Senator Helen Coonan, and Alex Burns.

[1] Barr, Trevor; Burns, Alex; and Sharp, Darren (2005a). *Smart Internet 2010* Report. Smart Internet Technology CRC, Sydney. http://www.smartinternet.com.au/SITWEB/publication/files/274_$$$_14049/Smart_Internet_2010.pdf. Barr, Trevor; Burns, Alex; and Sharp, Darren (2005b). *Smart Internet 2010* Report Executive Summary. Smart Internet Technology CRC, Sydney. http://www.smartinternet.com.au/SITWEB/publication/files/275_$$$_9476/Smart_Internet_2010_Summary.pdf.

[2] Schofield, Jack (2003). 'Social Climbers'. *The Guardian*. May 8, 2003. http://www.guardian.co.uk/online/story/0,3605,950918,00.html.

[3] Sifry, Dave (2005). 'State of the Blogsphere, August 2005, Part 1: Blog Growth.' *Technorati* (2 August). http://www.technorati.com/weblog/2005/08/34.html.

[4] Anonymous (2005a). 'News Corp in $580m internet buy.' *BBC* News (19 July). http://news.bbc.co.uk/1/hi/business/4695495.stm.

[5] Anonymous (2005b). 'Statistics.' Wikipedia. http://en.wikipedia.org/wiki/Special:Statistics.

[6] Vaidhyanathan, Siva (2004). 'FAQ about The Anarchist in the Library.' (26 May). http://www.nyu.edu/classes/siva/2004/05/faq-about-anarchist-in-library.html.

[7] Dibbell, Julian (2004). 'We Pledge Allegiance to the Penguin'. *Wired Magazine* (November). http://www.wired.com/wired/archive/12.11/linux.html?pg=1&topic=linux&topic_set.

[8] Sharp, Darren (2004j). Interview with Brian Fitzgerald. (14 December 2004).

[9] Jackson, R. Wayne (2004). 'What's Ahead For The Entertainment Industry?', PowerPoint for NARM: InSights and Sounds .04, PricewaterhouseCoopers.

[10] Wolff, Michael J.P. (2001). *The Medium of the Video Game*. University of Texas Press, Austin TX, p. 5.

[11] Anderson, Chris (2004). 'Welcome to the Broadband Home of the Future.' *Wired* Magazine, January. http://www.wired.com/wired/archive/12.01/wiredhome_1.html.

[12] Burns, Alex (2004e). Interview with Evelyn Richardson. (9 September 2004).

[13] Burns, Alex (2004e). Interview with Evelyn Richardson. (9 September 2004).

[14] Gere, Charlie (2002). *Digital Culture*, Reaktion Books, London, p. 14

[15] Kari, Hannu H. (2004). 'Internet Is Deteriorating And Close To Collapse: What Can We Do To Survive?' University of Helsinki presentation (22 October). http://www.tcs.hut.fi/~hhk/pdf/20041022_Internet_Collapses_How_to_survive.pdf.

[16] Sapa-DPA (2004). 'The Internet Will Collapse In 2006.' Helsinki, Finland (18 October). http://www.mg.co.za/Content/l3.asp?cg=BreakingNews-Business&ao=123911.

[17] Ergas, Henry (2003). 'Free-riding Internet can impose high cost', *The Australian Financial Review*, 28 October.

[18] Barabási, Albert-László (2002). *Linked: The New Science of Networks*. Perseus, Cambridge MA, p. 135.

[19] Clarke, Richard A. (2004). *Against All Enemies: Inside America's War on Terror*. The Free Press, New York. PBS Frontline (2003). 'Cyber War!' WGBH Productions, Boston MA. http://www.pbs.org/wgbh/pages/frontline/shows/cyberwar/.

[20] Schneier, Bruce (2002). *Beyond Fear: Thinking About Security In An Uncertain World*. Copernicus Books, New York. Schneier, Bruce (2000). *Secrets and Lies: Digital Security in a Networked World*. John Wiley and Sons, New York.

[21] Internet World Stats. (2005). 'Internet Usage Statistics: The Big Picture'. http://www.internetworldstats.com/stats.htm.

[22] Annan, Kofi (2003). 'Break the Technology Barrier - The World Information Summit.' *Herald Tribune* (9 December). http://www.un.org/News/ossg/sg/stories/articleFull.asp?TID=11&Type=Article