SMART INTERNET TECHNOLOGY CRC

SMART INTERNET 2010 – EXECUTIVE SUMMARY

Version: Executive Summary: General Distribution
Date of Publication: August 2005
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Acknowledgment

The editorial team who compiled and wrote sections of this report, and the individual section contributors, wish to collectively thank all of the interviewees who so generously gave of their time, and their thoughts, for this report. The interviewees responded in person, or by email, or in taped telephone conversations. Many were overseas and agreed to be interviewed at difficult times for them. Every endeavour has been made to fully acknowledge the views of those external experts who were consulted and quoted for the compilation of this report.

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Smart Internet 2010

Trevor Barr, Alex Burns and Darren Sharp

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i. Preface

The origins of this Smart Internet Technology CRC project reside within a CRC management discussion in 2003 that involved researchers and sponsors about the need to construct a credible and imaginative research report about Internet futures. The group recalled the fine work conducted by the National Telecommunications Planning Unit in the early 1970s about "planning new services for markets that do not exist, complex technologies that are rapidly changing and a socio-economic environment which widely agreed is becoming unstable and turbulent." After two and a half years of thorough investigation the NTP's seminal report *Telecom 2000* was delivered in December 1975.

A quarter of a century later the original Project Director of *Telecom 2000*, Tony Newstead, in hindsight reviewed their remarkably astute findings. Newstead added: "the main benefits of such wide ranging studies flow not so much from forecasts made as from insights gained along the way." Though there are some important differences between the methodology and approach of this project, **Smart Internet 2010,** and its forerunner, *Telecom 2000*, their overall objectives are comparable.

ii. Smart Internet Technology CRC

Smart Internet 2010 is a major project within the User Environments program. Smart Internet Technology CRC was established in June 2001. Participants include leading International and National corporations across ICT and other industry verticals, select small and medium enterprises, ten Australian Universities, the Government of New South Wales, and the Commonwealth Government. Smart Internet's mission statement is "***To capitalise the outcomes of world class Internet research and development for Australia***" Its focus was originally constructed around five major research and development programs – Natural Adaptive User Interfaces, Smart Personal Assistants, Intelligent Environments, Smart Networks, and User Environments. More recently the CRC has focussed on the utilisation of its developed technologies to deliver solutions to market in Health, Education, Entertainment and Financial Services.

A unique feature of this CRC is that it enables technologists and social scientists to undertake research in collaboration with industry partners, to explore Internet-related prospects and opportunities for Australia.

The prime emphasis of **Smart Internet 2010** is to try to make sense of the likely complex changes related to Internet futures from a user perspective. **Smart Internet 2010** integrates human factors with key technology frameworks for the future.

Industry and Government Partners

Westpac — Australia's First Bank

Telstra

Tenix

Legalco — Business Information

Infosys — POWERED BY INTELLECT DRIVEN BY VALUES

catalystinteractive — The leader in new learning solutions

PACIFICKNOWLEDGESYSTEMS

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Wizard — Computing with a touch of Magic

Agent Oriented — Agent Oriented Software Pty. Ltd.

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SWINBURNE UNIVERSITY OF TECHNOLOGY

THE UNIVERSITY OF NEW SOUTH WALES — SYDNEY 2052 · AUSTRALIA

The University of Sydney

University of Wollongong

ANU — THE AUSTRALIAN NATIONAL UNIVERSITY

GRIFFITH UNIVERSITY

THE UNIVERSITY OF MELBOURNE — POSTERA CRESCAM LAUDE

RMIT UNIVERSITY

AGSM — Australian Graduate School of Management — The AGSM is a School of both The University of Sydney and The University of New South Wales

UNIVERSITY OF TASMANIA

iii. Project Team

The conceptual framework and qualitative research of this report was originated by social science researchers at Swinburne University of Technology in Melbourne on behalf of the User Environments program of the Smart Internet Technology CRC.

Principal authors:

> Professor Trevor Barr, Project Manager
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> Associate Professor Ann Knowles, Swinburne University of Technology
> Professor Susan Moore, Swinburne University of Technology

iv. The Research Investigation

Smart Internet 2010 offers an analysis of the way the Internet might evolve from the perspective of its end-users in the coming years. The prime research questions being addressed are:

- **What might the Internet be like in 2010?**
- **What positions are taken by different people and institutional interests about the future of the Internet?**
- **What are the possible outcomes for end-users towards 2010?**

The report has been compiled by researchers of the User Environments program team based at Swinburne University of Technology of the Smart Internet Technology CRC. Major contributions were also sought from other researchers within the CRC from several other Australian universities, and from some senior members of the corporate sponsors. Expert opinion from other contributors was also sought from external contributors to this project, and expert other opinion was drawn upon in interviews.

Smart Internet 2010 is written for several audiences — the general public, researchers, and corporate sponsors of the Smart Internet Technology CRC. *Internet Futures: User Environments* is a set of working notes compiled for the preparation of *Smart Internet 2010* and is only available on request to sponsors and researchers within the Smart Internet Technology CRC.

The project examines how end-users might interact with the many possible Internet innovations during the next few years. It explores the possible benefits that may follow for the users, as well as examining likely major changes for the Internet as a whole by 2010. The approach to the report was designed in part to provide CRC stakeholders with models of future patterns of user needs that could influence new product and service development.

This report was also designed to provide valuable insights for sponsors to enhance their understanding of the business and social environment towards 2010. It was also developed with the intention to act as a vehicle for the integration of research projects within the CRC.

Smart Internet 2010 explores future possibilities for Australia in Open Source and social network technologies, eHealth, digital games, voice applications and mobiles. It identifies possible outcomes that are relevant to innovation strategies and sectoral development. *Smart Internet 2010* also synthesises rich insights from overseas interviewees who are 'thought leaders' in their respective domains, and includes relevant coverage of global and industry trends.

v. Conceptual Framework: Schools of Thought

The project team does not pretend to be able to predict the future. However, it has examined a range of key social, economic, cultural, and technological variables that are most likely to be important forces for change in the next few years in the context of possible changes to the Internet in the future. Although several different approaches were canvassed for this project it was decided on the basis of considered advice that the prime framework would *not* be either quantitative forecasting, or scenario based planning. Instead, a conceptual model about the construction of Schools of Thought was chosen.

Essentially a School of Thought distils the rich insights of expert opinion within a particular field in a way that provides integrated common thinking. In this project each School of Thought offers different visions of possible futures for the Internet. Each reflects a viable 'living strategy' for a group with largely shared norms in the contemporary information and communications environment.

Schools of Thought are not written as creative original narratives or scenarios of possible futures, but 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.

One value of the Schools of Thought is that they ought to challenge conventional 'groupthink' (Irving Janis) and offer multiple mind-sets about the way things might eventuate in communications in 2010. Telstra Research Labs, a CRC Partner, draws upon this process to inform its innovation and planning strategies.

Communications Futures (CF) frameworks provide the Smart Internet Technology CRC with a strategic perspective that enables projects to track international trends, scope Internet futures, examine user needs, and forecast or design new applications and services. Sceptics who reject the value of Communications Futures work are invited to offer their alternative approach as to how the major players in ICT who are making huge new capital investments for networks, sometimes in the order of billions of dollars, might best do their strategic planning and thinking for the long term.

The authors and editorial team of this report have attempted to make sense of the Internet's competing narratives, practices, and technological breakthroughs by grouping these perspectives across four interconnected 'Schools of Thought'. This conceptual framework has been developed as an interpretive tool that acts to reveal the positions, assumptions, biases and insights from a range of leading thinkers.

The editorial team for this project has 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; i.) its own school, ii.) the Internet space, and iii.) the global system within which these dynamics take place.
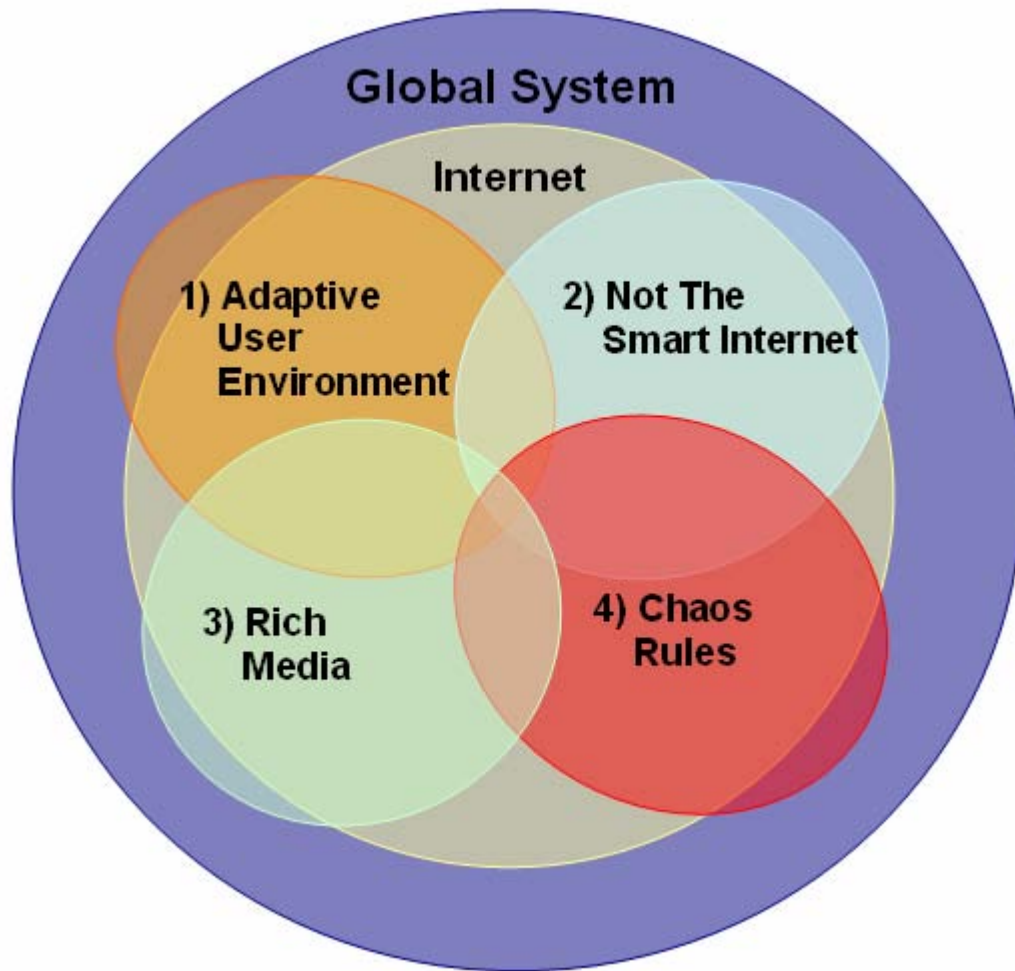
Four Schools of Thought

vi. Research Methodology: Interviews

A significant aspect of the originality of this project is that it drew upon different sets of expert opinion that offered rich insights into the possible future of the Internet towards 2010. The wide range of people consulted included technologists, academics from a wide range of disciplines, select commentators, journalists, entrepreneurs, policy makers, investors, and consumer advocates. Many of the interviews were conducted especially for the project, but in some cases an interview highly relevant to the project was drawn upon from another source. All commissioned interviews, and the select sources of interviews used, are fully acknowledged.

Commissioned Interviews

Paul Boustead (University of Wollongong, Smart Internet Technology CRC)
Danah Boyd (University of California Berkeley, social networks researcher)
Stowe Boyd (Corante Business Intelligence)
Charles Britton (Senior Policy Officer, Australian Consumers Association)
Roy Christopher (FrontwheelDrive.com)
Tom Dawkins (Vibewire.net, and ElectionTracker.net founder)
Rachael Dixon (General Manager, Massive Interactive)
Cory Doctorow (Electronic Frontier Foundation)
Mark Finn (Swinburne University of Technology)
Brian Fitzgerald (Head of Law School, Queensland University of Technology)
Terry Flew (Queensland University of Technology)
Robert Freiden (Pennsylvania State University)
Martin Gibbs (University of Melbourne, Smart Internet Technology CRC)
Cecily Gibson (Senior Action Group Eastern Shore)
Kas Kalba (Kalba International)
James A. Larson (Intel Corporation, W3C Voice Browser Working Group)
Olof Lundberg (Former CEO Inmarsat and ICO)
Richard Metzger (The Disinformation Company)
Kathy Mueller (University of Melbourne, Television Producer)
Ernie Newman (Chairman, International Telecommunications Users Group)
Mark Pesce (AFTRS, VRML co-creator)
Mark Poster (University of California)
Howard Rheingold (Author of *Smart Mobs*, and *The Virtual Community*)
Evelyn Richardson (Executive Director, Game Developers Association of Australia)
David Rooney (University of Queensland, ACRO)
Douglas Rushkoff (New York University)
Katie Salen (Parsons School of Design, GameLab)
Christine Satchell (RMIT, Smart Internet Technology CRC)
Barry Saunders (IndyMedia, NewsLab)
Stewart Smith (Linux Users Group of Australia)
Richard Stallman (Free Software Foundation)
Peter Waters (Partner, Gilbert and Tobin)
Marcus Westbury (This Is Not Art founder, NextWave Festival)
Eric Zimmerman (GameLab, International Game Developers Association)
Con Zymaris (Open Source Industry Australia)

Significant Secondary Sources

Albert-László Barabási (University of Notre Dame)
Yochai Benkler (Yale Law School)
Manuel Castells (University of California, Berkeley)
Edward Castronova (Indiana University, Bloomington)
Clayton M. Christensen (Harvard Business School)
Roger Clarke (Xamax Consulting)
Peter Drahos (Professor of Law, Australian National University)
Jeffrey L. Funk (Hitotsubashi University, Japan)
Sohail Inayatullah (University of the Sunshine Coast)
Leonard Kleinrock (University of California, Los Angeles)
Robert Laubacher (MIT Sloan School of Management)
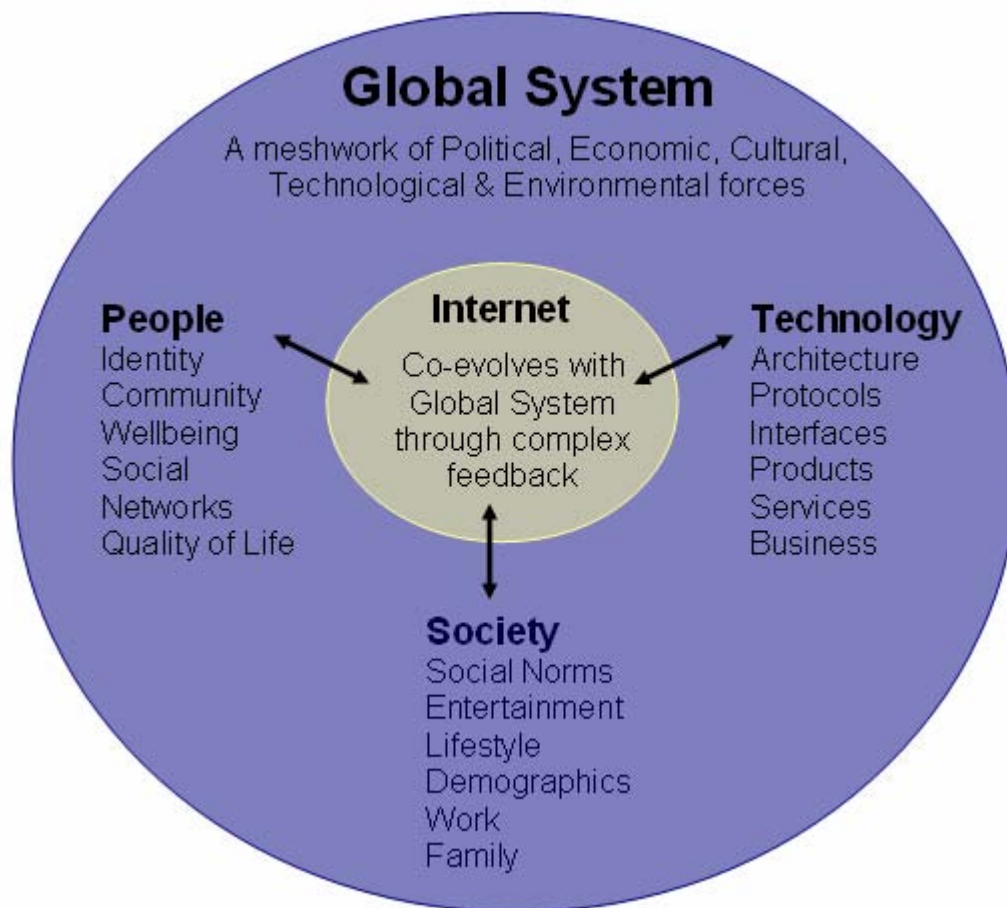Charles Leadbeater (Writer)

Lawrence Lessig (Stanford Law School)
Thomas Malone (MIT Sloan School of Management)
Geoffrey Moore (The Chasm Group)
Bonnie Nardi (University of California, Irvine)
Donald Norman (Nielsen Norman Group & Northwestern University)
Vicki O'Day (Xerox Palo Alto Research Center)
Tim O'Reilly (Founder and CEO, O'Reilly Media)
Eric S. Raymond (Author, Open Source Initiative)
David P. Reed (MIT Media Laboratory & HP Laboratories)
Everett M. Rogers (Author, *Diffusion of Innovations*)
Clay Shirky (New York University, Interactive Telecommunications Program)
Richard Slaughter (Foresight International)
Siva Vaidhyanathan (New York University)
David Weinberger (Author, Fellow at Berkman Institute for Internet & Society)
Barry Wellman (Netlab, University of Toronto)

vii. The Internet and Social Change

Janet Abbate's seminal work, *Inventing the Internet* (1999), argued that the Internet's history as a communications medium was "not inherent in the technology; it was constructed through a series of social choices" (p. 6). Originally intended to allow scientists to overcome the difficulties of running programs on remote computers, the Internet became something different. For Abbate, the "current commercially run, communication oriented Internet emerged only after a long process of technical, organizational, and political re-structuring" (p. 2). She points out that the very notion of what the Internet is – its structure, its uses, and its value – has changed radically over the course of its existence. The primary constant is that the Internet is, has been, and will remain, a product of its social environment.

The *Smart Internet 2010* research team employed a systems metaphor to capture the complexity of forces and actors shaping the development of the Internet space. Systems theory reveals that complex social systems undergo change that is dynamic, non-linear and self-organising, making it difficult to pinpoint causal relationships, and impossible to predict future trajectories.

The Internet space is a complex adaptive system in a state of continuous formation. It is constituted by the people that co-create it, the technology that defines it and the society within which it is situated. This project sets out to track how the users of the Internet are engaged now, and will remain so in the near future, on the next stage of re-inventing the Internet. From this vantage point the Internet is progressively emerging as a platform with the capacity to enable people to 'get on' with their lives.

Global System

A meshwork of Political, Economic, Cultural,
Technological & Environmental forces

People
Identity
Community
Wellbeing
Social
Networks
Quality of Life

Internet
Co-evolves with
Global System
through complex
feedback

Technology
Architecture
Protocols
Interfaces
Products
Services
Business

Society
Social Norms
Entertainment
Lifestyle
Demographics
Work
Family

The domains selected for this project were seen as important sites of social, economic and technological transformation towards 2010. Understandably, decisions about commission and omission were difficult.

In line with the broader aims of speculating on the contours and patterns of the Internet 2010, the 'exemplar chapters' have been thematically grouped into three subject areas; *People, Technology and Society.*

The first section *People* explores the domains of 'Understanding Users Towards 2010', 'Social Networks' and 'Patient-centred eHealth'.

The second *Technology* looks at 'Open Source' and 'Voice'.

The third and final section investigates *Society* through developments taking place in 'Digital Games' and 'Mobility'.

Each of these domains stands alone as a detailed research study that can be read separately.

The Schools of Thought framework adds new layers of meaning to each chapter by revealing the relationships between the multitude of actors, institutions and discourses shaping the future of the Internet towards 2010.

viii.) Executive Summary

The *Smart Internet 2010* team developed a qualitative conceptual framework based around four Schools of Thought. The overriding theme across these Schools of Thought is the range of possible futures of the Internet from the users' perspective. They are designed to scope the multiplicity of views about the way the Internet might be by the year 2010, and to highlight strong differences of opinion. Schools of Thought differ from econometric forecasting and scenario planning by drawing upon the richest insights from experts, specialists and participants working in the Internet space. These Schools of Thought are written for decision-makers, product developers, strategic analysts, and members of the CRC research community.

Smart Internet 2010 is not pitched towards conventional strategic planning, but rather, offers a set of rich insights for the future as a vehicle for strategic thinking about the future of the Internet.

The editorial group came to a collective position on many issues and opportunities related to the future of the Internet. Where a particular position is drawn upon from a contacted source during the conduct of the research a clear acknowledgement is made. The more generic comments are offered on behalf of the editorial group.

1.) Schools of Thought

Smart Internet 2010 has constructed four Schools of Thought: Adaptive User Environment, Not The Smart Internet, Rich Media, and Chaos Rules. Each has champions and exemplars who articulate and promote its unique perspective. Each School of Thought is written in an accessible and engaging way to enable widespread participation in these key debates about the future of the Internet.

In summary these are the positions taken regarding the Internet towards 2010 within each of the four Schools of Thought:

a.) Adaptive User Environment

An overriding assumption here 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, are generally 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, 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. This paradigm puts the users at the centre of the development thinking.

b.) Not The Smart Internet

The proponents of this School of Thought advocate that a simple, user-friendly, and culturally appropriate Internet is the best option by the year 2010. The title, 'Not The Smart Internet', sets out to challenge advocates who wish to build a new array of technologically driven Internet applications, some of which may be based merely upon their 'smartness' or the 'quick fix'. Rather, what is more important is a functional, low-cost Internet that hides operational complexity and meets the social and communication needs of its users. Proponents of this School view most technologically advanced devices to access the Internet as little more than expensive systems that lock users in to walled gardens of proprietary standards and preferred partner agreements. They advocate open standards for audiovisual content and devices for the future and are critical of products that tether users to narrow service offerings. It may be better in the future to concentrate on addressing the shortcomings and problems related to the operation of the present Internet rather than investing in, and building, a new Internet for the elites. We need an Internet that offers basic services for all.

c.) Rich Media

This School of Thought is primarily driven by technological innovation in a world where there are a plethora of devices, applications and services feeding off the Internet by 2010. Its members are not inherently deterministic in their approach to 2010, but are increasingly aware that 'smart' also means that technology innovation has to be developed within a context of relevance and usefulness to a diversity of markets, people, contexts, and places. Increasingly personal communications have shifted away from a paradigm of a single person using a single device, to a multi person/multi device scene where people use an array of devices - i.e., a desktop pc, a laptop pc, a personal digital assistant, a mobile phone, and an MP3 player. And in a rich media environment, more and more people are able, and also can afford, to access the Internet, via a workstation, mobile phone, a PDA, or some other appliance. Therefore, as we approach 2010, more and more people will access a wide array of Internet based services irrespective of their dependence on a particular technology or a certain mode of connectivity. It's the 'any content, any device, any format, anytime' paradigm for the Internet by 2010.

d.) Chaos Rules

This School of Thought is primarily concerned with an Internet in the future that may be in a continual state of decay and worsening disorder. Chaos is defined here in a variety of ways. 'Chaos' is a contested concept. Microsoft's Bill Gates contends the Open Source (OS) software movement is 'chaotic' and threatens the free market. OS advocates Richard Stallman and Cory Doctorow counter-argue that Microsoft's oligopoly and software design processes are the key underlying problems. Exponents of this School of Thought widely 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 a '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. The root cause of this vision is the Internet's chaotic and decentralised nature as a communications infrastructure. The extremists argue that some of the problems can never be solved and that the Internet may collapse by 2006.

In summary those insights and possible outcomes for the Internet towards 2010 appear below.

2.) The Internet *In* Society 2010

• In the year 2000 the Internet was seen to be ushering in major business and social changes as the *'father of all disruptions'* during the dotcom boom (i.e., shopping malls would close to be replaced by the coming ubiquity of online shopping and e-commerce). Some commentators then postulated the notion of re–labelling our society as 'the Internet society'. Subsequently much of the thinking has shifted from such all encompassing macro predictions of change i.e., the Internet will change everything, to more realistic and micro senses of change for the Internet of 2010.

• Rather than discussing 'the Internet society', we need to work towards understanding the role of the Internet *in* society. Canadian social network analyst Barry Wellman has charted this evolution of the Internet as a social phenomenon, showing how it plugs into existing social structures and maps onto everyday life.
The Internet by 2010 is likely to emerge as a more **user friendly, more accessible, indispensable lifestyle communications tool.**

• The Smart Internet of 2010 is likely to become *'the platform for personal connectedness'*. Increasingly towards 2010 more and 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, and 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.

3.) Nomadicity, Embeddedness and Ubiquity

• Leonard Kleinrock, a distinguished long time Internet pioneer, has offered his special vision for the rich media of the new Internet. He talked of **nomadicity** where 'Internet nomads' can access services by moving from place to place in a way that will be "transparent, integrated, convenient and adaptive." He talked of **embeddedness** where small intelligent devices embedded in the physical world are connected to the Internet. The web of the future, for Kleinrock, will present links and information via natural language speech, video, images, eyeglasses, displays, holograms, and other human centred interface technologies.

• Leonard Kleinrock's overly optimistic prediction about **ubiquity** – i.e., that Internet services will be available wherever the nomad travels globally – is highly desirable but unrealistic for the near term. Examination of United Nations (UN) and International Telecommunications Union (ITU) data would lead to a more realistic conclusion that on a global scale the vision of 'any-to-any connectivity' is most unlikely to be realised by 2010. The notion of the digital divide, based on projections from the World Summit on the Information Society (WSIS) & World Bank data, however, is likely to narrow faster globally towards 2010 for mobile communications than for the fixed line telephone and for access to broadband services.

• It is likely that software agents will emerge by 2010 that provide software that is personalised, knows the users' interests and habits, and performs tasks it thinks useful to support the user. Call centres may progressively advance the development and utilisation of spoken, natural interfaces which in some instances offer comfort zones for particular users.

As speech becomes a more common form of input and output to any machine by 2010 it will be critical that it be based on non-proprietary core building blocks.

4.) Disruptive Technologies

• Clayton Christensen's notion of 'disruptive technologies' – i.e., those that can 'disrupt' industries, unleash innovation in firms and offer differentiation in the range of products and services – is likely to lead to significant modification of the Internet by 2010. Important changes in the marketplace will continue to be driven by users' preferences and create structural institutional disruption i.e., peer-to-peer services (music and film), Voice over Internet Protocol (VoIP), disintermediation (travel) and reintermediation (financial services). Such changes are likely to have profound long term consequences.

• In the preparation of *Smart Internet 2010* an overview was often put that "we don't want more and more technology for the future–we need communications services that will help people run their lives." The best Internet based applications towards 2010 will not necessarily succeed because they offer higher levels of technology performance, but because they are seen as being practical and affordable to consumers with obvious usefulness in their lives, sometimes as 'low tech/low touch' applications.

• One of the development issues that emerges out of the debates surrounding disruptiveness is whether supplies and developers need to think more in the future in terms of *adaptation* than originality of creation. Robert Morsillo, Group Manager, Consumer Affairs, Telstra, offered the view:

"Technologies are often constructed first and foremost for an elite group of users and only afterwards diffuse into and become adopted by a broader community. While a technology, such as the plain old telephone service (POTS), may now be adopted by the vast majority of Australian households, it is quite possibly an "alien" artefact for others, including for remote Indigenous communities. The challenge, then, is to determine whether *alternative technologies* may be possible, and to determine what *adaptation* may be needed in the existing technology, and/or in the supplier's processes and procedures, and/or in the user group, to achieve better (communications) outcomes".

5.) A Medium Of Its Own

• Douglas Rushkoff noted that "we haven't really created a medium indigenous to the Internet yet", but suggested that the forthcoming changes would be about major shifts away from text and towards video. He further commented that: "I think literacy and everything that goes along with it; cause and effect, abstract thinking, fragmentation, individuality are all things that are going to submerge as a more non-linear understanding of the world emerges."

• Stowe Boyd argued that in the future the Internet would shift away from belonging with the personal computer. He argues that "high powered mobile devices and ubiquitous connectivity will shift the Internet away from being a PC experienced domain, and we will see an enormous shift away from slow-time interaction via reading and writing web pages, toward real-time interaction (a la IM, VoIP, and increasingly video). In 2010, 50% of everything being put on the web will be the record of real-time interactions."

• Howard Rheingold suggested that "the oversimplified way to look at it is that in 2010 we could have a very rich cultural and intellectual and political medium online, with millions of producers as well as billions of consumers -- in music, instead of one or two

megastars who make billions for their global companies, there will be hundreds of thousands of garage bands, each with its loyal constituency of a few thousand. We'll see people building on each other's work and transforming media."

6.) The Mobile Internet

- For Danah Boyd ubiquity is the key. She argued: "I can be wherever, whenever and access information at my fingertips. This will be done through a mobile handheld. The computer will be resigned to be that which we produce text on. Communication technologies will be fractured by trusted networks. Instant messaging will be the primary tool of communication of the new workforce and there will be a generational divide. Basically, it's what we're already seeing... only mobile is key."

- The growth of *'texting'* and next generation mobile phones has created the space for a range of social interactions to occur beyond the place-boundedness of the home, office or school. Mobile digital lifestyles will create new forms of social interaction as fluid, network-enabled *swarms* of users exploit technology to coordinate group action, collaborate, create and exchange content at an unprecedented scale and speed.

- Some innovations representative of *mobile futures* include:

    a.) Location-based services that allow users to coordinate activities with their social network via mobile phones and other hand-held devices. These tools give users the power to meet-up offline in a spontaneous fashion by alerting members of affiliation groups (family, friends, work colleagues) the whereabouts of relevant parties via a mobile messaging service. These applications also have the potential to be used for pull marketing by service providers (restaurants, tourist attractions) and provide content to augment places of interest (maps, city guides, search).

    b.) The convergence of mobile devices, digital cameras and weblogs (web diaries) has led to the emergence of 'moblogging'. This growing trend sees users take pictures and automatically post the content to a weblog from their mobile phone. Moblogging represents the configuration of disparate tools that allows user-generated content to be instantaneously shared with a global Internet audience. Moblogging has been used at trade shows to reveal new products, as a means of documenting social activities with remote audiences, and has become part of the wider 'citizen journalism' movement.

    c.) Following the success of peer-to-peer (p2p) file-sharing, mobile phone companies have begun prototyping mobile p2p applications that will give users the ability to exchange content on the move. Improvements in network and handset capabilities will see mobile p2p used by anonymous, globally distributed users to share, swap and trade music, movies, games and other user-generated content via increasingly sophisticated mobile and hand-held devices.

- The state of mobile Internet in 2010 will be greatly influenced by the collective actions of carriers, equipment manufactures, content providers and users. Critical areas for resolution are the development of industry wide interoperability standards and design systems that enable both post-paid and pre-paid callers to participate in mobile innovations.

7.) Stakeholder Product Innovation

• A new product development paradigm has emerged regarding possible new Internet based applications and services which is likely to be extended towards 2010. Put simply, we have come from an era since the mid 1990s of an Internet developers' playground and have now moved into a communications environment that has become increasing driven by the complexities of users preferences, both commercially and socially.

• Andrew Odlyzko of AT&T Labs has argued that the 1990s development phase of the Internet and the personal computer, especially with Microsoft's dominant operating systems, were superb at serving developers, and reasonably good at serving the early adopters, or the 'power users' as he called them, but overall development "was not optimised for the bulk of end users." The Microsoft development computing model of the great 'killer application' of the 1990s will not be replicated for the Smart Internet of 2010. Instead, the applications innovation process will be less corporate-driven and much more about small scale adaptation, mixing and matching, and providing solutions to problems for users.

• The contemporary development phase of the Internet has seen the unexpected emergence of applications that are driven by users, such as email, text messaging, Google's PageRank™, collaborative filtering and peer-to-peer services, initially with music. None of these successful Internet based innovations were planned or foreseen by the major business stakeholders. These innovations emerged from a demand driven/user needs paradigm rather than a supply driven business model. This development phase is expected to be more enhanced towards 2010 – an era of the adaptive user environment. The emergence of this phase raises many issues about new institutional practices about product and service development.

• Newer thinking about the human factors in product development has shifted away from functionalist usability testing towards attempting more to capture social and behavioural knowledge early in the development design cycle.
John Fabre of Telstra suggested:

"When it comes down to deriving technology solutions based around identity, privacy and trust, social science research literature has been empirically lacking, business analysis 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."

8.) Domains Towards 2010:

Digital Games

- 'Player-producers' and social networks will empower Internet gaming and create hybrid genres to 2010. Microsoft and Sony's new consoles integrate 'player-producers' and e-commerce capabilities but pressure remains on developers to resolve IP issues. By 2010 'player-producers' will have 'crossed the chasm' from fandom (community of fans) to mainstream games development. This shift will revolutionise game design tools, develop Open Source games systems, deepen the cultural context, and unleash 'sustaining' innovations, according to Katie Salen and Eric Zimmerman.

- Digital culture will provide rich future contexts for videogames development. It synthesizes aesthetics and ideas from computer science, avant-garde art, critical theory and the new academic discipline of games studies. Digital culture provides a collaborative space for digital lifestyles, creativity, and user-driven innovation. It generates complexity and novelty via fans, subcultures and open systems (Katie Salen and Eric Zimmerman). The 'play ethic' also creates new synergies with other creative industries.

- New critical perspectives may resolve the videogame violence debate. 'Immersive' technologies and the creativity of 'play' partly explain the addictiveness of some videogames. Violent imagery remains popular due to 'high concept' industry pressures and the collective failure to imagine alternatives. Massively Multiplayer Online Games, for example, enable collaborative virtual teams and intergenerational dialogue.

- The Australian videogames industry faces critical barriers to remain internationally competitive to 2010. It needs an integrated national strategy, access to venture capital and entrepreneurial managers, R&D tax incentives for Australian content, education pathways that simulate industry practices to develop an 'incubator' model for university-industry collaboration, and for more participants to adopt Agile/eXtreme project management techniques.

Entertainment Services

- 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 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. This will liberate consumers from the anti-market forces of free-to-air commercial networks and program distributors.

- Broadband **'peercasting'** technologies, and the possible 'death' of television spectrum broadcasting, makes Open Source Television (OSTV) a disruptive technology of the first order, according to Mark Pesce. '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.

eHealth

- Australia's eHealth landscape faces challenges to 2010 that include cost increases for care delivery, shortages of healthcare professionals, and demographic pressures. The Smart Internet Technology CRC recognises that user-centred design (UCD) insights are crucial for designing and implementing robust eHealth systems that can 'do more and better with (relatively) less', by understanding patients rather than short-term reliance on technology fixes.

- The CRC's model expands the eHealth domain from interactions between healthcare professionals and patients to include those between patients and devices, applications and services that empower patients to become active participants in managing their own healthcare. The CRC's model has three dimensions: prevention (using 'smart' technology to help users manager their healthy lifestyles); maintenance (helping patients with a health condition to live independently in the home and community); and empowerment (enabling patients to become more active and responsible in decision-making about treatment and care). The CRC also prioritises the needs of people with disabilities; the elderly, and the chronically ill (including young people).

- The CRC conducts research, development and commercialisation of notable eHealth solutions. These include: mobile and personalised devices, applications and services that enhance patients' care management; home based intelligent environments that monitor patients and are linked to care providers; and community based intelligent environments that integrate tele-medicine, virtual healthcare services and community self-help groups.

Banking and Financial Services

- Paradoxically, online banking and financial services are likely to grow steadily in Australia, despite widespread stated concerns about security and privacy issues, and overriding reservations by users about the lack of trust in the Internet as a platform. There also appear to be changing attitudes towards privacy within particular groups. For example, the 24/7 obsessive workers now appear willing to offer to suppliers a great deal of their personal information which hitherto they were reluctant to release to companies to store in their databases. Where the communication service offers a quick, convenient way of processing transactions, members of the 24/7 brigade appear to be willing to trade off more risks than ever before.

9.) Social Networking

- A new phase of Internet services is emerging from 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), social networks and increased access among user groups, according to Clay Shirky.

- Social networks have the potential to move beyond simple dating and referral services to become a significant application for the mobile digital lifestyle. By incorporating location-based technologies users will be able to determine the proximity of friends of friends, seamlessly exchange pictures, music and movies through mobile blogs and engage in 'peercasting' using novel combinations of these networked multimedia. These fluid socially networked interactions will accelerate and amplify information sharing, and in doing so alter the nature of work, family life and the economy.

- The power of social networks enables users to embrace the 'collective intelligence' of their surrounding social environment. Early adopters have begun a move away from traditional media sources to rely on trusted sources in their network of friends, family and fellow travellers for reviews, feedback, and advice about the latest product or service. By 2010 these empowered consumers will form ad-hoc lobbies with formidable power to influence the fate of brands, companies, and products that fail to deliver value, quality, and maintain ethical standards.

10.) Open Source

- Open Source software provides the infrastructure for dispersed teams of programmers to collaborate, enables the development of customised solutions and provides low-cost alternatives for business and the public sector. The success of Open Source will continue, as more organisations recognise that 'cooperative models' of production can be employed at the enterprise level, without diminishing for-profit business models.

- Open Source and p2p filesharing will continue to ignite legal disputes and highlight the need to balance economic reward with freedom of expression in an 'information commons'. Changes to Australia's Intellectual Property (IP) legislation arising from the 2004 Australia-US Free Trade Agreement (AUSFTA) will continue to be a major source of tension. Australia's creative industries and consumer groups will maintain opposition to any strong IP regime that imposes harsh penalties on the fair modification of copyrighted content, devices, and applications.

- The Creative Commons movement provides the legal and cultural mechanisms for the expansion of the Open Source model beyond software, and provides opportunities for content producers to gain control over the use of their products in a variety of contexts. Creative Commons type initiatives could catalyse the birth of a parallel creative economy. This would give producers the ability to engage directly with each other's material, and their audience, leading to new forms of collaboration and the development of innovative cultural products.

- The flowering of Open Source software, DIY media and 'remix culture' will see the rise of professional-amateurs (pro-ams) whose practices form new modes of production, distribution and exchange in areas of software (Linux), game development (Ultima Online), film (Machinima), radio (podcasting) and knowledge production (Wikipedia). The Open Source model of collaboration provides 'pro-am' groups with the ability to work flexibly, for the advancement of knowledge and the pursuit of social capital.

- Together Social Networking, Open Source and p2p will disrupt more areas of social life as users self-organise to form "communities of practice" with other like-minded individuals. These highly adaptive swarms will force media and entertainment monopolies to re-evaluate value creation, change politics through blogs and Smart Mobs (Rheingold), impact business through boycotts, and develop new modes of innovation through what Benkler describes as 'commons-based peer production'.

11.) Users with Special Needs

- *Smart Internet 2010* has the potential to greatly enhance the lifestyle of people with special needs. Harold Hartfield, of the Australian Federation of Disabilities Organisations, argues that the Internet by 2010 could be "a truly empowering medium of communication", as accessing information by the Internet becomes *enabling in life as opposed to disabling*. He argues that video streaming over Internet Protocol, with high speed broadband presents the deaf community with real time communication via their own language, Auslan. Similarly, the blind and vision impaired, with suitable adaptive screen reader technology, can access information via the Internet like any other Australian. For Australians with serious dexterity issues, voice recognition technology provides independent access to the Internet, and this ought to help many more people in the near future. Equitable access to the Internet for people with disabilities, however, necessarily involves two essential components–affordability and the right adaptive equipment.

12.) Putting Users First

- The overriding conviction which underpins *Smart Internet 2010* is that users ought to be central to strategic thinking about what kind of an Internet might emerge by the year 2010, and how related innovation is best fashioned. This viewpoint is made in the multiple contexts of commercial, economic, social and cultural perspectives. A broad range of human factors must be analysed to gain a better understanding of those that influence the take-up of new communications technologies and services. Some of the most important human factors are cultural and lifestyle determinants; issues relating to user needs and usability factors; perceptions of affordability and long term value; and how users trade-off risk and value when making decisions about various channels of communication.

- 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. This connectivity will provide an infrastructure required to deal with civilisational complexities, to support awareness of cross-cultural dialogue, and to develop a truly global consciousness for the 21st century.

V. Visions of 2010

Smart Internet 2010 asked "What might the Internet be like in 2010?" and "How might we be different?" This selection of quotes summarises the provocative alternatives and rich insights from our Australian and international experts. Their visions articulate a multiplicity of options that range from probable to preferable futures. Our interviewees highlight some of the implications of these changes from a user perspective towards 2010. These visions may be used for advocacy, dialogue, and as strategic inputs by business analysts and government policymakers.

Doug Rushkoff: "Non-linear understanding of the world"

The main changes will be away from text and towards video. All the chat will be video, global television networks will have figured out how to do single streams. I think we'll start to see a lot more aural and visual culture rather then this highly text based culture and we'll see a lot more giant immersive collaborative gaming spaces online. We haven't really created a medium indigenous to the Internet yet. We've translated letter writing and movie making and even the web, library making to the Internet space. The only thing that seems native to it so far is gaming, which really came up with interactive television. The hyperlink aspect of the web is native; it's a translation of footnotes. It's still a vestige of the text-based world. I think because the Internet is an outgrowth of television it's going to end up being the visual rather then text. I think literacy and everything that goes along with it; cause and effect, abstract thinking, fragmentation, individuality are all things that are going to submerge as a more non-linear understanding of the world emerges.[1]

Danah Boyd: "Mobile is key"

Ubiquitous. Mobile. First, there will be an information look-up component. I can be wherever, whenever and access information at my fingertips. This will be done through a mobile handheld. The computer will be resigned to be that which we produce text on. Communication technologies will be fractured by trusted networks. Instant messaging will be the primary tool of communication of the new workforce and there will be a generational divide. Media management will be chaotic, but everyone will be constantly sharing their creations in trusted groups. Brazil and Japan will be the primary pressure points on sociable technologies and the United States will have an entirely different construction of what that should be. Global technology connections will not eliminate xenophobia and more people will face run-ins with others from around the world. Basically, it's what we're already seeing… only mobile is key. And it will be wireless, VoIP mobile (unless legislation moves forward). The Telcos are dead in the water.[2]

David Rooney: "More commercial, less diversity"

I wonder if we will call anything the Internet in 2010? My sense is that convergence is going to be driven by big network television mostly in America. I think it will become a more commercial place but probably with less diversity. The big corporates will come to dominate. It'll be easier for people to go to Amazon, Fox or Disney. At the grass roots level, I think you'll see the blogging and Wikipedia stuff continue to grow. I think you'll see more virtual communities of practice in a number of different areas, mostly to do with cultural production. There won't be any dial-up access. How well you operate on the Internet will depend on interface design. I think the rent-seeking behaviour of the big Telco's has to have a lid put on it.[3]

Stowe Boyd: "A shift towards real-time interaction"

High powered mobile devices and ubiquitous connectivity will shift the Internet away from being a PC experienced domain, and we will see an enormous shift away from slow-time interaction via reading and writing web pages toward real-time interaction (a la IM, VoIP, and increasingly video). In 2010, 50% of everything being put on the web will be the record of real-time interactions. Likewise, corporate use of the Internet will shift away from mass marketing brochureware, and take on the flavour of social media, if not the complete spirit.[4]

Mark Pesce: "Informational pressure threatens hierarchies"

The world has changed far more than we are actually prepared to accept right now. The biggest thing that no one talks about and yet is still the most pervasive thing in our lives is informational pressure. The primary function of human beings in the West is to be information processors, and the more information we process, the more information there is to process. There's a constant informational pressure and it's deforming our culture, it's deforming our language, it's deforming all of the institutions that have to deal with it. Everything is deforming under that informational pressure. Rather than assuming the inevitable outcome of informational pressure is collapse, I'm assuming that this is a dissipative system, and in fact that informational pressure produces a higher form of organisational order. Certain institutional forms of organisational order, such as hierarchies, don't survive informational pressures well. They where born in order to satisfy informational pressures, but as McLuhan noted, when you speed anything up, one of its effects reverses. So the production of hierarchy, which was one of the functions of informational pressure, is now reversed into rhizomality.[5]

Cory Doctorow: "The Internet in our pockets"

I think that we'll have lots more filesharing. I think all that social wisdom about the Internet being in our pockets will be more and more true. Computers are really good at remembering stuff and humans are really good at understanding stuff. I think we'll see more and more of those partnerships. One of the things that I hope we'll see more of is computers that understand our reactions to things and that allow us to organise our own world and help our friend's organise their world.[6]

Darian Stirzaker: "Lifestyle is key"

New areas of consideration are things like: potential lifestyle, community/tribal needs, mobility, ease of being able to use the multiple access methods seamlessly, and ego gratification. What I call 'other enablers' are like digital cameras, iPods, next versions of Sony Playstations which are broadband and potentially higher speed wireless [2.5 & 3G] capable. These other enabling devices are more likely to shape lifestyle and convenience needs than the access technology itself.[7]

Howard Rheingold: "Millions of producers"

The oversimplified way to look at it is that in 2010 we could have a very rich cultural and intellectual and political medium online, with millions of producers as well as billions of consumers -- in music, instead of one or two megastars who make billions for their global companies, there will be hundreds of thousands of garage bands, each with its loyal constituency of a few thousand. We'll see people building on each other's work and transforming media -- the way the users of the personal computer, Internet, and web did. Or the small number of companies that control most of the communications and content in the world will use law and regulation, baked into the hardware itself, to make sure that the only innovators are those who work for them, and who sign over the lion's share of their work to their masters.[8]

Contributors

Trevor Barr is Professor of Media and Communications at Swinburne University of Technology, and User Environments 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. He was the inaugural Director of the Australian Electronics Development Centre, an initiative of the Commonwealth and Victorian governments to develop small and medium sized companies in information based industries.

Trevor Barr has been a regular national media commentator for a long period, notably on ABC Radio, with AM and PM, Background Briefing, and regularly on Terry Lane, but also on Australia's leading news and current affairs television programs, including Four Corners, and the 7.30 Report. In May 2001 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.

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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.

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Susan Moore, Inaugural Research Professor of Psychology, Swinburne University of Technology is a social psychologist whose key research focus concerns individual decision-making and the social and personal factors that influence that decision-making. Her interests are in the area of adolescent sexuality and risk-taking, in particular the relationship between positive and negative risk-taking and risk perception, and in risk-taking and health. Professor Moore has taught in tertiary institutions for over twenty-five years, is a qualified secondary school teacher and has experience as a school counsellor. Her research has been published in several books and over 70 refereed journal articles in areas concerned with human development and is a regular media contributor on psychological issues.

Mandy Salomon is a media and communications consultant with clients in the banking, building and communications industries. Mandy has worked extensively as a filmmaker, journalist and radio broadcaster. She has a particular interest in an interdisciplinary approach to technology futures. Her paper, 'Digitising Democracy: the impact of new media on the 2004 federal election', appeared in Metro, the screen and digital culture journal.

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. He has Bachelor of Multimedia (Media Studies) and BA (Honours) degrees, and has taught social science subjects from TAFE to Masters level. 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.

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Paul Turner is a Senior Research Fellow at the School of Information Systems, University of Tasmania, and Vice-President of the Tasmanian e-Health Association. Prior to moving to Australia in 1999, Dr Turner was a research fellow at CRID (Computer, Telecommunications and Law Research Institute) in Belgium where he worked on a variety of European Commission contracts in the technology domain. He has also worked as an independent information and telecommunications consultant in a number of countries in Europe and was for three years editor of the London-based monthly publication Telecommunications Regulation Review.

Since moving to Tasmania, Dr Turner has been involved in conducting and coordinating IT research at basic, applied and strategic levels across a range of industry sectors with a particular focus on Internet technologies, Computer Forensics and eHealth. At the University, Dr Turner is responsible for research with the Smart Internet Cooperative Research Centre that involves collaboration with 10 other Australian Universities, a number of major Corporates and a large number of SMEs.

In 2003 and 2004 Dr Turner was elected as Vice-President of the Tasmanian e-Health Association (TEA). The TEA was established to ensure connectivity between the IT and health sectors and to enable Tasmania to respond to the challenges and grasp the opportunities emerging in e-Health.

Dr Turner has produced more than 75 peer reviewed academic publications for conferences, journals and books.

Endnotes

[1] Sharp, Darren (2004i). Interview with Douglas Rushkoff. (13 December 2004).

[2] Sharp, Darren (2004d). Interview with Danah Boyd. (17 September 2004).

[3] Sharp, Darren (2004k). Interview with David Rooney. (21 December 2004).

[4] Sharp, Darren (2004g) Interview with Stowe Boyd. (14 October 2004).

[5] Burns, Alex & Sharp, Darren (2004). Interview with Mark Pesce. (14 July 2004).

[6] Sharp, Darren (2004e). Interview with Cory Doctorow. (27 September 2004).

[7] Stirzaker, Darian (2004). Internal CRC email. Head Channel Management, Telstra Consumer and Marketing, 15 February 2004.

[8] Sharp, Darren (2004b). Interview with Howard Rheingold. (27 August 2004).

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