



Australian Government

Australian Communications Authority

International

Vision 20/20: Future Scenarios for the Communications Industry – Implications for Regulation

International Road Test Report

May–June 2004

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Executive summary

Two representatives from the Vision 20/20 team undertook an international road test of the preliminary outcomes of the project to date. It was also an opportunity to discuss strategic implications with relevant experts and agencies.

Overview

The international road test provided new insights on emerging technologies, business models and social issues, as well as feedback about the trends and drivers of change identified in the Vision 20/20 outcomes to date.

The Australian Communications Authority (ACA) received broad support for the timeliness of the project and its scope and objectives. We were encouraged to promote international awareness and consultation for the Vision 20/20 preliminary report, and to facilitate international participation in the project. The ACA was invited to collaborate with international agencies and organisations that have an interest in strategic communications analysis.

This consultation was also valuable for identifying gaps in our thinking, for highlighting issues that require development, and for testing the plausibility of certain aspects of our scenarios.

New insights on emerging technologies, or issues that need more emphasis

There are potentially radical changes in network architecture that may develop in the period to 2020, such as cooperative radio networks that are energy and spectrum efficient, and quantum communications.

New forms of communication are expected through developments in enhanced and augmented reality, and telepresence—video conferencing with more sophisticated video capture through holographics—that were suggested as being more likely than advanced forms of artificial intelligence.

Social issues

Governments are likely to be placed under more pressure by the community to design and implement effective measures to deal with the potentially harmful drivers of broadband, such as pornography, gambling, gaming and cyber crime.

The potential for negative community reaction to complexity, pervasive monitoring and being 'always online, always connected' needs more emphasis. While trends suggest consumers may have more choice, people are often overwhelmed by it. Some of the negative reactions that could slow down the pace of change include people taking 'information holidays' and online avoidance.

Industry structure and emerging business models

While the dominance of the broadcasting model may be challenged by peer-to-peer Internet-based video-streaming, mainstream media may continue to survive through superior product quality.

Decentralisation and distribution of communications systems may destroy older business models and allow innovative services to develop. However, over time, the cycle could be repeated with the more successful business models building economies of scale and scope, moving towards centralisation and market dominance.

Trusted brands that manage multiple devices and applications, providing integrated customer services, could also develop.

The need for flexibility and responsiveness may drive 'de-massification', where very large enterprises continue to set the rules but operations are transferred to fully-owned subsidiaries.

Information management and data storage services are likely to be growth areas in response to the volume of information available and the need to process and control it.

Regulatory challenges

Regulators that have a limited knowledge of communications systems run the risk of imposing unworkable regulations, or being manipulated by those willing to exploit knowledge-based weaknesses. An understanding of the system as a whole is necessary to manage systems-wide issues.

Regulatory policy should therefore be developed with the nature of the architecture in mind. For example, the development of an open source, seamless and near-ubiquitous communications system would necessitate industry cooperation. The regulatory framework should promote cooperation.

The trend to Internet-based communications will continue to drive the need for international collaboration in areas such as security, law enforcement, content, digital rights and identity management.

Guaranteeing continuity of supply is important now and the demand for it is likely to increase, with resulting increased pressure on the government and the market to ensure uninterrupted service.

The boundaries that define the communications sector will shift over time—how must the regulatory framework also evolve?

1. Background

Two representatives from the Vision 20/20 team undertook an international road test of the preliminary outcomes of the project to date. This international consultation was an important element of our project design right from the beginning. Our objectives were to identify the gaps in our thinking, to test the plausibility of the scenario narratives and to build an international network to provide ongoing input into the project.

2. Who did we see and why?

The Vision 20/20 road test participants were determined collaboratively. Having undertaken intensive research of communications futures work being conducted worldwide, the project team generated a list of interviews with organisations considered representative of the scope of the project.

This list was refined by the project Steering Committee with input from Vision 20/20 workshop participants and the ACA. The meetings included in the road test were dependent on mutual schedules and the participant list is therefore not exhaustive. The ACA welcomes additional feedback and acknowledges that the expertise of the people and organisations that were visited will enhance the depth of our deliberations.

The full list of international participants is at Appendix 1.

RAND Corporation

RAND Corporation is a non-profit research organisation that provides objective analysis and a problem-solving service for the public and private sectors worldwide. Of particular interest to the Vision 20/20 project is the RAND Information Sciences Group (ISG) – where ‘RAND researchers continue to create new methods and techniques while formulating perspectives on the policy and decision making implications of the information revolution’¹.

We were hosted by the Head of ISG, Dr Bob Anderson, at their Santa Monica, California, headquarters with links to their offices in Washington D.C. and Pittsburgh and representation from the United States regulator, the Federal Communications Commission (FCC).

Peter Schwartz

Peter Schwartz co-founded (and is the Chair of) the Global Business Network (GBN). Mr Schwartz is an internationally renowned futurist and business strategist, with a current research emphasis in areas including technology, financial services, telecommunications, media and entertainment, and the Asia–Pacific region.

MIT Media Lab

The Massachusetts Institute of Technology (MIT) Media Lab focuses on the ways in which electronic information overlaps with the physical world. The Communications Futures Program run within the Lab has two main arms of research:

- emerging architectures for communications in all forms;
- road-mapping the value chain for novel and existing architectures and enterprises.

The ACA met with Dr David Reed, co-inventor of the end-to-end argument, the fundamental architectural principle of the Internet. He developed Reed’s Law, a scaling law for group-forming network architectures. Dr Reed’s current research interests include concepts of viral communications.

¹ <http://www.rand.org/methodology/isg/>

Toffler Associates

Toffler Associates was established by renowned futurists Alvin and Heidi Toffler to assist organisations to move into a 'Third Wave' information society future. We met with two representatives who have expertise in communications, spectrum management and large-scale organisational strategic planning.

Collective Dynamics Group at Columbia University

The Collective Dynamics Group (CDG) at Columbia University in New York applies modern mathematical and computational techniques to problems relevant to the social sciences. Examples of current projects include the structure and evolution of social networks, the dynamics of disease epidemics and cultural fads, the role of social information in financial markets, and the use of the Internet as a tool for social science research.

Alcatel

Alcatel provides communications solutions to telecommunication carriers, Internet service providers and enterprises for delivery of voice, data and video applications to their customers or to their employees. Alcatel operates in more than 130 countries.

The Club of Amsterdam

The Club of Amsterdam is an independent, international think tank that supports thought leaders and knowledge workers to form opinions, visions and agendas about preferred futures. We were hosted by Mr Felix Bopp, Chief Executive Officer of the Club of Amsterdam, and met with a selection of their members.

The Commission for Communications Regulation

The Commission for Communications Regulation (ComReg) is the Republic of Ireland's communications regulator. ComReg is responsible for the regulation of the electronic communications sector (telecommunications, radiocommunications and broadcasting transmission) and the postal sector.

ComReg have a Forward-Looking Program (FLP), which is designed to identify and raise awareness of new and emerging telecommunications technologies in the information and communications technology (ICT) sector. This program also looks at how regulation should evolve in the future.

Office of Communications

The Office of Communications (Ofcom) is the regulator for the United Kingdom's communications industries, with responsibilities across television, radio, telecommunications and wireless communications services. Ofcom is currently undertaking a strategic review of the UK's telecommunications sector.

London School of Economics and Political Science

The London School of Economics and Political Science (LSE) Department of Media and Communications undertakes research on the relationships between social and technological change. It looks at issues in the emerging digital world, seeking a better understanding of their dynamics in ways that can be communicated to academic, industrial and governmental audiences.

We met with Dr Gordon Gow, Professor Robin Mansell, Edgar Whitely and Gus Hosein. Professor Mansell currently holds the Dixons Chair in New Media and the Internet at LSE, with responsibility to develop research in three key thematic areas:

- globalisation and governance

- technology innovation and social transformation and
- the causes and consequences of social inequality in the design, use, and consumption of new media applications, including the Internet.

Dr Gow's research looks at the social processes that influence growth and change in large technical systems and communications regulation in theory and practice.

BT Exact

BT, which evolved from the former government-owned British Telecom, is a significant provider of communications services in the United Kingdom. BT Exact, its research, technology and IT operations business in the UK, has a futurologist who provides a futures think tank capacity to examine concepts for the future of communications.

Department of Trade and Industry

The Department of Trade and Industry (DTI) has the mandate for creating the 'best environment for business success in the UK'. DTI is responsible for administering the *Communications Act 2003* and prepared the *Communications White Paper – A New Future for Communications*, looking at communications in the 21st century.

Institute for International Socio-Economic Studies

The Institute for International Socio-Economic Studies (IISE) in Tokyo conducts research that focuses on major changes in the way we live and the socio-economic issues emerging from the ongoing development of the information society. In the ACA's meeting with the ISSE, we also met with representatives from Nippon Telegraph and Telephone Corporation (NTT) and Toyo University.

Some of the people we met with are also members of The Centre for Global Communications (GLOCOM). Established in 1991 by the International University of Japan as a social science research institution, Glocom studies the information society as well as Japanese society from the perspectives of social systems theory and comparative civilizations study.

Office of the Telecommunications Authority

Office of the Telecommunications Authority (Ofa) is responsible for regulating the telecommunications sector in Hong Kong, and their work includes technical and economic regulation of telecommunications services, enforcement of fair competition and radiofrequency spectrum management and satellite coordination.

3. Feedback

The international road test provided valuable information about issues, trends and developments that the project team had not previously been aware of, and about matters raised in Vision 20/20 research but not expressed in the scenario narratives. All of these issues need to be considered in identifying regulatory implications, and in the development of options to guide strategic decision-making.

Identified gaps

These issues were identified as gaps in our scenario development process.

Business models

Business model concepts are implied but not defined in our scenario development work to date. It is important to understand the possible nature of consumer bases, commoditisation and industry frameworks. Discussions with international representatives did not necessarily relate specifically to the Vision 20/20 scenarios; rather we discussed their views of models that are likely to evolve to meet the needs of their understanding of the plausible future.

Some interviews identified the possibility of 'de-massification' of the system—large monolithic companies would still exist, but would be represented through fully owned subsidiary companies. Rules would still developed at the enterprise level. Big companies would need to think like small businesses to survive and evolve.

While private media would continue to evolve, mainstream media may continue to play an important role by offering higher quality services. The broadcasting model may be replaced by peer-to-peer Internet-based video streaming.

Along with product bundling, customer support is also likely to be bundled. This could result in a dilution of service through multiple bundling, or a comprehensive complaint and service management system.

An infrastructure supporting many devices and applications could provide aggregated services for customers. Software upgrades would be part of the customer service package and relationship. A long-term communications-based relationship with customers could develop, where service providers promote trust in their brand and other service differentiators.

Traditional telecommunications carriers could lose their applications service relationship with customers to software providers and cooperation protocol makers, and even providers of distributed sensory networks. Carriers may well continue to have a role in the provision of connectivity, but have a declining role in services.

Content

One comment received was that regulators tend to ignore the three greatest communications and social challenges—known as the 3Gs, or girls, gambling and gaming. These are recognised as the three primary drivers of broadband take-up and generate huge revenues, but regulation of these areas has lagged behind developments, perhaps because they are difficult and sensitive areas or—as in the case of gaming—largely misunderstood. In developing regulatory frameworks for the future, all aspects of society must be considered.

We were encouraged to look more closely at the changing nature of media, including trends in private development and distribution. We also discussed concepts of localised media, such as 'hot spot' newsletters, where content is distributed and received electronically and defined by location.

Enhanced or augmented reality

Developments in enhanced or augmented reality are expected to become at least as prominent as virtual reality or artificial intelligence (AI) over the next 15 years. Enhanced reality is achieved by electrochemical stimulation of the brain using a photonic porthole such as the eye or ear. Augmented reality uses a combination of the real scene viewed by the user and a virtual scene generated by a computer, which augments the scene with additional information.

Social issues

Some comments received identified a lack of emphasis on societal concerns in the Vision 20/20 scenarios—some of the scenarios generally imply an Australian society where access, education and consumer protection is not only a right but uniformly applied.

Questions were raised about Australia's plans for access to future services by special needs groups, such as people with a disability, including consultation measures to ensure that as many potential users as possible are considered at the design stage.

From a regulatory perspective, it is appropriate for our analysis to draw out issues such as the consequences of a worsening 'digital divide'. What are the implications of the 'always on' society, and what role, if any, should a communications regulator play in ensuring access and useability?

The ACA will seek comments on access issues from government and community representatives from the health, education, disability services, ethnic communities and other relevant areas.

Human behaviour

A recurring theme of our interviews was that likely or potential consumer responses to new and innovative technologies and services will be shaped by similar motivations that have been common to human behaviour over thousands of years.

While choice is often promoted as a desirable objective—this is certainly the case in consumer policy development—many people are overwhelmed by the reality of too many options, and good information is potentially lost or undermined.

We need to consider the impact on people of a world of increasing complexity and change, of seamless near-ubiquitous connectivity, pervasive monitoring and information processing. How will people adapt to the increasing speed of technological change—to what extent can early adopters sustain such a rate of change?

What if things slow down because people refuse to take up new technology? Indeed, would people force a slowdown by deliberately rejecting new developments? What will people do with technology? How will technological developments meet social motivations? What do people want to achieve in their day to day lives? Action such as taking information holidays and voluntarily opting out of using technology could increase as people seek ways to cope with rapid change.

A plausible regulatory response to the increase in the rate of technological development might be an increase in bureaucratic layering of rules and protocols; a human response to the intrusive effects of more and more information and the need to process and control it.

Digital rights management

Digital rights management (DRM) refers to the control and protection of digital intellectual property (content), including documents, images, video and audio. DRM limits what a user can do with that content even when in possession of it. The arrangements made to manage digital rights might be a combination of encryption and validation processes, or any other means used to secure and control access to digital content.

The continuing decentralisation of technology has obvious implications for DRM. Decentralisation and distribution erodes traditional business models and enables innovative services to develop. It is important to consider the potential impact on commoditisation. How do people make money? What is the role and influence of the consumer? What new organisations and industries will emerge? I-tunes is a good example—Apple, a consumer electronics company, is now one of the biggest online legal traders of downloadable music².

A new approach to DRM is being examined under the Cyber Trust and Crime Prevention Foresight project in the United Kingdom³. Known as 'generally accepted digital principles', the idea is to start with broad brush principles that could be refined over time. Universal application may not be currently feasible because:

- developing and implementing the principles at a global level may be dependent on a universal language of ethics encompassing diversity
- different approaches around the world to freedom of speech illustrate the difficulty of the task and
- micro-practices of regulation tend to be different.

A framework to develop the principles would be required. During the road test, it was suggested that existing collaborative mechanisms such as the OECD are too broad and are unlikely to result in principles with sufficient level of detail. We will continue to explore this issue in our ongoing international liaison.

We need to understand the underlying forces or drivers in each of our plausible futures that would drive digital rights management.

² <http://www.apple.com/itunes/>

³ <http://www.foresight.gov.uk/cybertrust.html>

Issues that need more emphasis

Some issues presented in our scenario development process require further exploration or refinement.

Viral communications

Viral communications⁴ is the concept of infrastructure-free communications systems—where the user brings their own infrastructure.

This has the potential to drive radical change in radiofrequency spectrum management and communications network infrastructure design within the next 15 years. It challenges current assumptions, including the scarcity of spectrum and the need to divide it into frequency bands and allocate it to license holders. It also challenges current interference management practice. Systems architecture consisting of a network of cooperating transmitters and receivers, or ‘frequency-hopping’, was first developed during World War II. Recent developments in software-defined radio enable radios to adapt as conditions change.

A current area of study is viral radio—energy and spectrum efficient radiocommunications systems that scale almost without bound. Cooperation protocols would enable each radio to cooperate with other radios for the delivery of information—a radio network architecture based on end-to-end design, without the need for a central radiator or pre-existing core. The network intelligence lies at the ends, where network users support service innovation driven by the user. Viral radio offers the prospect of radical change from the traditional approach of a centralised network provider installing services in anticipation of user take-up.

Adding nodes increases spectrum capacity—a ‘Moore’s law’ of spectrum. In this variation of the open communications commons, it can be said that ‘the sheep bring their own grass’. As more and more nodes cooperate, there is less chance of system failure—the dropout of one or two nodes will not affect the system and data will simply be redirected, undermining the power of and opportunity for attack.

This form of communication could potentially have the same level of impact that the Internet had on wired communications. It has significant implications for consumer electronics because every platform could connect. It could also be useful for sectors that work in distributed sensors, such as security firms. What if fire sprinklers could communicate as well as sense heat or exit signs could talk to each other, directing people and identifying blockages?

Viral radio may be considered as an alternative local access network. It would take a very high degree of coordination between nodes to transmit over longer distances, although a phased array antenna system could potentially be a new core.

Viral regulation

An evolution to a viral architecture would require a new approach to regulation. Comments were made that basing future regulatory measures on current network design rather than viral communications would be counter-productive. For example:

- If you burden the system with too much regulation it may not evolve to a full viral architecture, for example, the cost of providing interception capability may be such that the system cannot achieve economies of scale.
- Historically, government has determined an individual’s or entity’s physical address. Where control is decentralised to the user, the user would define their virtual address, for example, email. What would the regulatory implications be? To what extent would that erode sovereignty in areas such as the ability to tax or control content?

⁴ <http://dl.media.mit.edu/viral/>

- Viral communications could be more secure if user self-interest drives encryption take-up in an open communications environment. What would that mean for the capacity of others, including government, to provide protection for consumers and to facilitate law enforcement?
- Regulatory policy should be developed with the nature of the architecture in mind. If you want a cooperative system, there should be a cooperative framework consistent with the end-to-end principle—open source regulation.

Continual supply

If we think of the future as the info-sphere, with huge bandwidth available to the user, then the user will demand uninterrupted service. Would the underlying network infrastructure be too important to leave to the market to ensure continual supply? Is there likely to be a strong case for national infrastructure of importance?

Business, governments, consumers and citizens are likely to not only demand continual supply, they will expect to have trust in the system. Continual supply and trust dimensions may include:

- network integration and communications network intelligence performance
- Internet and messaging security
- software reliability and
- identity verification, authentication and encryption.

Systems security

Open systems Internet architecture allows undesirable elements to emerge, such as spam and viruses. While it is relatively easy to isolate system issues, viruses and the like may be able to overwrite this ability.

Risk assessment and evaluation needs to include the consequences of local or widespread system failure. There would be substantial challenges in ensuring all vendors retro-fit high levels of security over open source architecture, including logistical difficulties. This should not be a barrier to improving security.

Comments were received that it is preferable to avoid working towards preventing everything at the design stage; it is more efficient to learn how to control fast growing problems. A systems approach is necessary, for example, in regulating transport, it is ineffective to control individual roads and ensure they run smoothly, instead you look at the transport system as a whole and manage system-wide issues.

Data storage

In the initial research stage for Vision 20/20, an interviewee referred to his PDA as his 'external brain'. References for his working and personal life were managed within this device, and he described losing it or leaving it at home as 'amputation'. Advances in storage and processing power means that, even before 2020, it may be possible to have your life recorded on a storage device the size of a pill.

These data storage and processing powers also mean that information can be collected about you, with obvious privacy and security implications.

The process of digitalising everything has already commenced⁵. At some point over the next 15 years, for example, it may be possible to purchase a device with every movie ever made, accessible only on a pay-per-view basis, which is a digital rights management solution.

Environmental issues

There is a growing awareness for the need to manage the impact of our activities on the environment. Areas of interest to the communications sector include waste management, recycling, energy consumption and eco-design. The communications industry could cooperate in

⁵ one example is <http://www.archive.org/>

developing appropriate international covenants and protocols, particularly in sectors of high take-up and abandonment such as mobile phones.

Geopolitical issues

It was suggested that we had not put enough emphasis on the nature of Australia's relationships within the Asia–Pacific region. Other issues to consider include the continuation or variation of existing worldwide geo-political tensions, the consequential social and economic implications, and the effect this would have on communications and regulatory infrastructures.

Real-time productivity

The majority of our interviews discussed the potentially huge savings in managing data and information. Payments are likely to be scalable, for example, as your wage goes up, your tax is increased at your next pay, and if the government achieves extra efficiencies, or projected expenses are not required, taxes reduce. These changes could be made automatically.

Issues for review

These issues were represented in our scenario development process and were challenged or questioned by our international colleagues. Several drivers of change in our scenarios may not be as robust as is assumed, particularly globalisation, the pace of change, advanced artificial intelligence and the willingness of people to work from home.

Globalisation

Continuity of globalisation is assumed in all five scenarios. This view was not uniformly supported in the ACA's road test. Potential barriers to ongoing economic integration include:

- the advantages of globalisation are not distributed universally; reactionary forces may gain ascendancy or the 'digital divide' may grow to the point where growth is undermined
- localised or global economic shock

Artificial intelligence

Feedback on artificial intelligence prospects suggest that advanced applications acting as substitutes for human judgment may elude science—how do you program human thought?—and are of greater uncertainty. A large number of external rule-making exercises would need to be undertaken. It would be interesting to gain a deeper understanding of the human drivers behind the desire for artificial intelligence functionality.

Video

The level of take-up of video applications like conferencing in the Vision 20/20 scenarios was both challenged and supported. Ongoing and prevalent issues about humans interacting virtually, including language and cultural differences, time zones, and video-conferencing quality were raised. It is assumed that face-to-face communication will always be richer—why else would people physically co-locate? Will technology ever be able to overcome these factors?

Despite the current disadvantages associated with video-conferencing, its use continues to expand beyond the corporate boardroom. A good example is in Estonia, where cabinet meetings can be held online, allowing members that are overseas to participate⁶.

Quantum

Our narratives are optimistic about the ability of quantum computing to revolutionise data storage and processing capacity. Our discussions with our road-test participants soon identified a lack of uniform understanding about exactly what quantum means for communications. While some referred to working examples of quantum cryptography as evidence of the power and useability of quantum optics, others questioned its applicability in the communications context.

⁶ <http://www.guardian.co.uk/online/talktime/story/0,13274,1166562,00.html>

Recent advances in quantum mechanics have apparently demonstrated its capacity for instantaneous and secure communications. Of particular interest is the work being conducted by the Australian National University Quantum Optics Group⁷. In the United States, BBN Technologies, in conjunction with Harvard and Boston Universities, has recently built the first Quantum Key Distribution Network⁸. It is evident that we need to take the potential quantum applications into account.

Wireless

While many interviewees were optimistic about the prospects for wireless as an alternative local access network, this view was not universally held. The main area of uncertainty for our interviewees was the ability to develop sustainable wireless business models.

Understanding the global consumer

Consumer and citizen reaction to advances in communications, including pervasive monitoring and connectivity, are uncertain and are likely to vary widely between cultures and values. Demands for consumer protection and a negative response to actual experiences of intrusive technologies would act as weights on the pace of change.

Conversely, individuals could be prepared to compromise on their expectations of privacy for a perceived benefit, for example, in health monitoring.

Discussion of these issues varied widely in each of the countries that we visited. The implications of possible responses may be crucial to the development of communications. The ACA encourages further input from interested parties, including consumer protection and rights organisations.

Managing information

The so-called information glut is not new—people have always had to make choices, reasoned or not. It may be that the problem is not so much in the increase in information but the social aspects of the selection process.

The information divide is likely to increase and be increasingly recognised as a social issue—how do people opt in or out of something they are not aware of and how is distribution of awareness (education) managed? Research into the privacy issues surrounding the release of g-mail⁹ would be instructive.

Vision 20/20 methodology

In general, the discussions held during the road test established that scenario planning is highly regarded. Emphasis was placed on the value of:

- identifying hidden assumptions
- developing indicators to track scenario direction
- identifying the emergence of control points.

However, it was also recognised that it is the analytical outcomes of the scenario development process that provide the substance for further exploration, not the scenario narratives.

The ACA was encouraged to plot the scenario narratives against each other to graphically consider the relationships between the plausible futures.

Research into complexity theory was suggested to provide guidance on how multiple jurisdictions, organisations and processes could evolve into self-organising forms, with evolving structures and properties.

⁷ <http://photonics.anu.edu.au/qoptics/index.html>

⁸ <http://www.bbn.com/networking/quantumcryptography.html>
<http://quantum.bbn.com/dscgi/ds.py/View/Collection-11>

⁹ <https://gmail.google.com/?dest=http%3A%2F%2Fgmail.google.com%2Fgmail>

There was support for the idea that the future will emerge from single groups with common ideologies driving change. It was recommended that we widen our consultation to include targeted subject matter expert groups, or individuals such as technologists, scientists or sociologists, in addition to our current mixed group approach. The ACA is planning to undertake this kind of specialist consultation on several issues raised in our road-test.

Scope of Vision 20/20 Project

The ACA was encouraged to extend the scope of its Vision 20/20 project to a globally networked project with active international participation. Global connectivity requires effective international cooperation in developing and applying standards and protocols—the Australian perspective must not be considered in isolation.

Trends in convergence have led us to take an exploratory approach to what may constitute ‘communications’ to develop foresight about the ‘big picture’ of future environments and the implications for regulation. It is now time to ask how far regulatory convergence should go.

Our discussions recognised that if regulators have a limited or inadequate knowledge of the communications system they run the risk of:

- imposing regulations that cannot be implemented
- being manipulated by vested interests exploiting knowledge-base weaknesses.

The ACA through its Vision 20/20 project can provide some strategic direction on international cooperation architecture and process options, taking account of institutional and jurisdiction weight on change.

Indicators

An important objective is to identify emerging business structures, architecture and technologies as well as tracking scenarios. The trick is to look for early warning signs of disruptive technologies and services, and how consumers react.

Cooperation and collaboration

There was an overwhelming level of support for the ACA’s Vision 20/20 project and several organisations urged continued engagement with the international community.

Industry representatives are concerned about the risk of regulatory uncertainty constraining innovation and investment. There is a growing acceptance that industry development can only evolve from the current understanding of a short term future.

There is a window of opportunity for the ACA’s Vision 20/20 project to lead international debate on communications regulatory futures, with solid support for taking a broad strategic approach to communications futures. Some were sceptical about the likelihood of political support for cooperation between nations that currently do not see eye-to-eye about geopolitical issues.

Offers of cooperation included promoting the project and facilitating broader international awareness and consideration of the issues raised. There was a high level of interest in attending future Vision 20/20 forums and in responding to the preliminary report discussion paper. ACA participation in relevant international forums and projects was also encouraged.

Upcoming events or processes already under way that the ACA has been invited to participate in include:

- MIT/Cambridge University Communications Futures Program:
 - Aim is to understand and improve the health of the communications industry. Research program includes:
 - Models of industry structure using tools such as systems dynamics modelling.

- Viral communications addressing aspects of wired or wireless ad hoc, scalable and cooperative networks.
 - System architecture studies.
 - Policy studies.
 - Specific work programs under way include:
 - Regulation and competitive dynamics.
 - Technology and regulatory dynamics.
 - Architecture for internet security.
 - The rise, fall, and rise of internet telephony.
- OECD Information and Communications Policy division is planning to launch an ICT foresight project and invited our participation.
- OECD conference in Portugal, October 2004, looking at the future of universal service obligations.
- The US General Accounting Office is developing a National Indicators Initiative, a 15-year project designed to identify and monitor measures of social good. This needs to be an international effort and collaboration is encouraged, with the possibility that the activity may ultimately be transferred to the UN. One size will not fit all—indicators should be flexible to accommodate regional or national values or other unique identifiers.
- DTI—partnership in discussion and expansion of European progress towards 2010.
- Club of Amsterdam—participation in January 2020 forum, Summit for the Future, Amsterdam, January 2005. The objective is to gain critical insights and a deeper understanding of the issues that will shape the ‘knowledge society’.
- Alcatel has offered to provide an ambassadorship role to promote global consideration of Vision 20/20 and raise awareness of the importance of communications foresight. This would facilitate international strategic conversations in response to the issues we have identified.

4. Where to from here?

The feedback received in the international road test will be assessed by the ACA's project team and incorporated into the Vision 20/20 preliminary report. The ACA welcomes feedback on the issues raised in this paper and the forthcoming preliminary report.

5. **Appendixes**

International participants

Alcatel

www.alcatel.com

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Director, Regulatory Affairs

Stephane Ducable
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www.criticaldistance.org

Commission for Communications Regulation (ComReg)

www.comreg.ie

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Further research

In addition to the issues outlined in the main body of this paper, recommendations were received that the ACA conduct further research and consultation in the following areas:

- complexity theory
- quantum entanglement
- layered regulation theory
- Professor Lawrence Lessig's research, including his work on regulating cyberspace and the architecture of innovation (see articles at www.lessig.org/content/articles/)
- concepts of 'social good' in regulatory development
- the application of economic models to human behaviour – is the speed of change supported by the consumer?
- concepts of global networking, with regional variances
- industry perceptions of open source regulatory models
- international protocols and drivers of eco-sustainability
- comparing the benefits of working with subject matter expert focus groups as opposed to mixed groups
- haptics and 'active skin'—for an example, see www.btexact.com/whatsnew/newsreleases?doc=42791 and
- localised media.

The following resources were recommended as useful in the course of the road test:

- Steven Weber, *The Success of Open Source*
- George Johnson, *A Shortcut Through Time: The Path to a Quantum Computer*
- Peter Schwartz's article for *Fortune Magazine*, March 2004, on 'The Top Ten Companies in 2054' (by subscription)
- Katie Hafner's work on The Well online community—for example, see www.wired.com/wired/archive/5.05/ff_well_pr.html
- information and articles at www.itandpeople.org.