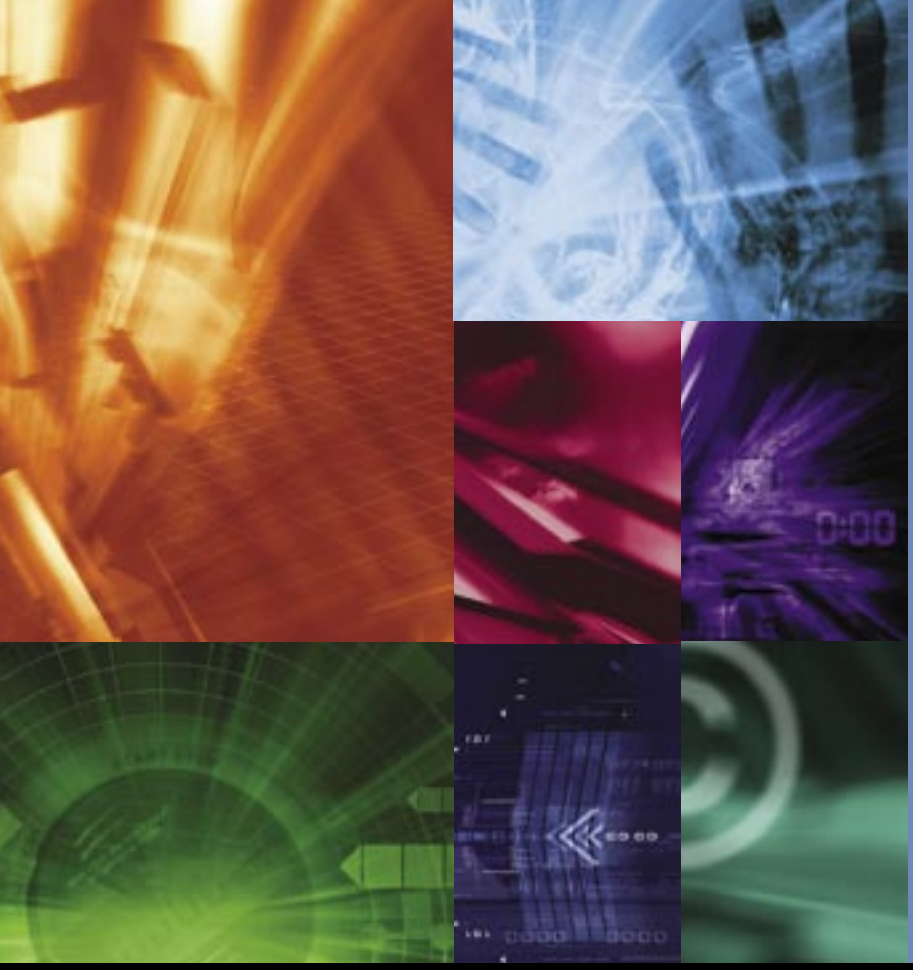
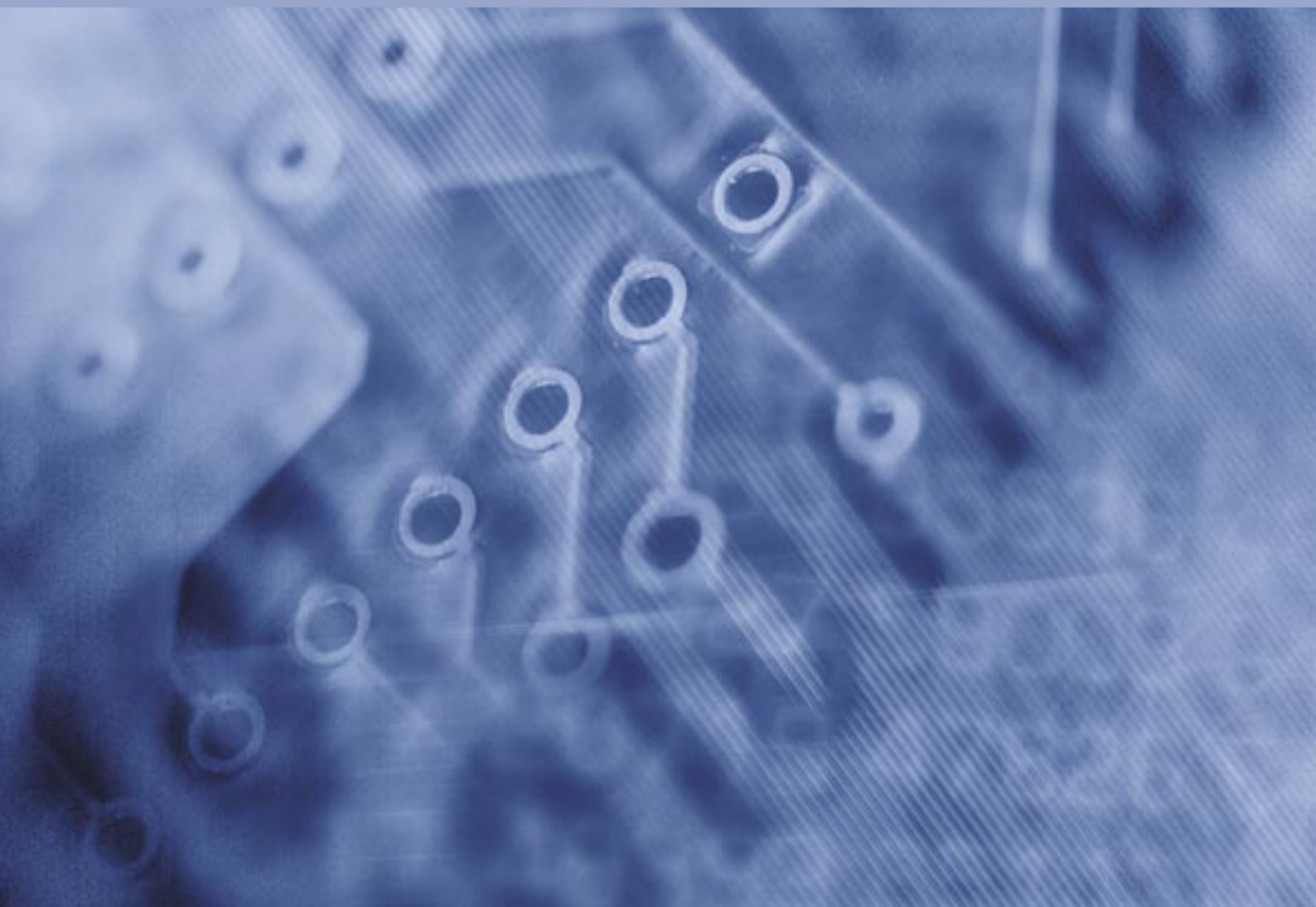


Australian Government

Department of Communications, Information Technology and the Arts

AUSTRALIA'S STRATEGIC FRAMEWORK FOR THE INFORMATION ECONOMY 2004–2006

'Opportunities and Challenges for the Information Age'



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'Opportunities and Challenges for the Information Age'

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Executive Summary

Introduction

This new *Strategic Framework for the Information Economy* provides the policy platform needed to address new challenges to Australia's position as a leading information economy. It has several distinct purposes:

- to explain the challenges and opportunities that the emerging information economy poses for Australia and why these are important to government, business and the ordinary citizen
- to show how Australia's policy response to the information economy is linked to wider national priorities and global issues
- to demonstrate that Australia's policy response to the information economy is coherent, both across the Australian Government, between the Australian, state, territory and local governments and with the position of international fora and our global peers
- to set out publicly the priorities and strategies that the Australian Government has adopted to achieve Australia's information economy vision over the next three years.

This *Strategic Framework for the Information Economy* sets out a vision for the information economy for 2004 to 2006, four broad objectives, four strategic priorities and sixteen supporting strategies for the information economy. The document comprises a short executive summary, two chapters and an appendix. The first chapter describes the opportunities and challenges of the information economy, the second chapter details Australia's vision, objectives and policy response (including the strategic priorities and associated strategies) and the appendix highlights some of the Australian Government programs, policies and strategies being undertaken by various departments and agencies towards addressing the four information economy priorities over the next three years.

Australia's vision for the information economy is where government, business and society are all connected, can participate with confidence, are open to innovation and can collaborate to maximise the economic and social benefits.

The 'information economy' was the term adopted by the Australian Government in 1997 to describe the transformation of economic and social activities by information and communications technologies (ICT). An information economy is one where information, knowledge and education are major inputs to business and social activity. It is not a separate 'new' economy—it is an economy in which the rapid development and diffusion of ICT-based innovation is transforming all sectors and all aspects of society.

Challenges and opportunities in the information economy

Australia cannot afford to neglect the challenges of the information economy transformation. Throughout history, major new technologies have led to predictable but far-reaching cycles of change. The ICT cycle has begun, but the change we have seen to date is merely the beginning. Successful adjustment to the technology will create a platform for long-term national competitiveness, the renewal of regional communities and stronger social cohesion. Whether we want to or not, there is no choice but to continue to adapt. The challenge is to ensure our response is strategic, coherent and effective.

Most developed countries recognise how serious these challenges are and they are pursuing ambitious information economy strategies. Australia must measure its response against these global peers, not against our own past performance, strong as it has been[1,2]. The global shift in the way information, knowledge and ICT is used is moving the emphasis away from individual enterprises and agencies towards much more advanced and efficient ICT systems that cross company, agency and sectoral boundaries. This trend is evident in both public and the private sectors.

As new systemic, structural and regulatory arrangements emerge, renewed commitment and greater collaboration will be required between government, private enterprise and all sections of society. This *Strategic Framework* has been developed to focus that renewed commitment and to mobilise effort needed to meet the challenge.

Emerging changes in the information economy

The emergence of the information economy is driven by two global developments.

1. *The importance of information, knowledge, skills and communication in both economic and social activities will continue to grow.*

Information, knowledge, skills and communications have been produced in greater quantities and used more and more intensively over the past centuries. They have driven vast increases in economic productivity, dramatic structural changes and the emergence of more open societies. They have led to faster innovation and will underpin further economic, community and social development. Consequently, basic ICT skill proficiency is increasingly being recognised as an essential third life skill alongside literacy and numeracy.

The combination of technology change, falling prices and renewed cost-consciousness is difficult for the ICT sector. The fundamentals suggest that it is unlikely that the industry will return to the high rates of industry growth seen in the 1990s. However, they also offer new opportunities and new markets and the industry continues to have a bright future. ICT customers need an adaptable, innovative ICT sector to advise on, to create, to build and to implement new ICT. There is no dichotomy between production and use of ICT. Both are needed in a successful information economy.

2. *These information and knowledge-intensive activities are themselves being repeatedly transformed by new information and communications technologies which keep emerging all the time.*

Information, knowledge, skills and communications can all be spread and enhanced through ICT. The technology makes it much easier to access, diffuse, communicate and manipulate large quantities of information and knowledge. This is doing two things: dramatically increasing the usefulness and accessibility of information and increasing the overall stock of information and knowledge.

The combined result is a disruptive process of change to our ways of working and living. The technology alone does not have this effect. It is the interface between our information-intensive society and the enormous ability of ICT to manipulate and communicate information that is so powerful.

We must respond to this transformation, otherwise we will lose ground to the other nations that do, and it will be difficult to maintain Australia's relative economic growth and social development. But if we succeed, a platform will have been laid down that will underpin Australia's long term performance.

So what does this process of change involve? Successful information economies share certain features:

- growing dependence on sharing knowledge and information between individuals, communities and organisations to coordinate economic and social relationships
- institutionalisation of continuous innovation, productivity improvement, and education and skills formation
- openness to the global economy through trade, investment and exchanges of information, knowledge and skills.

These features will ultimately be reflected in new business models, new industry structures, new kinds of social interaction and new forms of regulatory arrangements. To keep up with this information economy transformation, business, governments and society need to recognise that future success depends on the ability to be resilient and adapt to change. It requires a clear understanding of the drivers of small business, consumer and citizen participation, and a more flexible approach from both public and private sectors to accommodating small business and consumer needs and promoting higher uptake.

Technology and business developments have pulled ahead of the industry structures and regulatory arrangements that we have inherited from the 20th century. Examples include Internet content regulation, intellectual property protection, electronic privacy protection, critical infrastructure security and government service delivery.

In each case, Australia will need to develop new business and regulatory arrangements to address a dramatically changed environment and release the full benefits of the information economy.

The challenge is difficult because information and networks have their own rules that do not necessarily fit conventional modes of business and regulation.

In a networked world, bigger is better.

Electronic mail began as a tool for the research community. But once a critical mass of users was created, email grew into a global communications system. This is typical of networked services. Below a certain level of activity, growth is slow and difficult, but once the links between people become numerous enough, there is a sharp increase in efficiency and adoption. Australia's limited population of people and businesses makes it more difficult to achieve this 'critical mass' in markets for networked services. Australia needs to build scale by increasing Australian levels of participation and accessing global markets, but to maintain competition and choice at the same time.

A networked world is an interdependent world.

People and nations are increasingly dependent on one another for their information, knowledge, skills and security. Spam is a good example. Australia's national spam strategy must be complemented by global cooperation to be fully effective. But there are no obvious mechanisms to manage this global cooperation and no quick way to create them. Commercial forces cannot do it, because there are no commercial incentives for any single firm to take up this role when the benefits would be so widely scattered. The imperative will be national and global collaborations on information economy issues that bring together the players necessary to achieve solutions. This will require both government and industry leadership to promote collaboration within the domestic economies and between sovereign governments.

Solutions will also rely on effective alliances between government and the private sector with sections of society representing the academic, education and scientific community, the media, the cultural and creative sector, professional and industry bodies and community-based not-for-profit organisations.

The desire for global cooperation on shared information economy issues and concerns will see Australia continue to engage in important international forums and processes such as the World Summit on the Information Society and with bodies such as the Organisation for Economic Cooperation and Development (OECD) and the Internet Corporation for Assigned Names and Numbers (ICANN).

Information and knowledge can be consumed or shared without being diminished.

Information and knowledge can be spread at little cost, raising productivity across the whole economy and increasing the payoff to innovation. This is manifest in the spread of technologies like file-sharing networks. These networks accelerate the sharing of digital information and products, but they also threaten the legitimate intellectual property rights of creators and distributors.

Three inter-related long-term issues arise from these trends and they present core information economy challenges to all governments.

- A balance must be maintained between the incentives for knowledge creation (through intellectual property rules) and the promotion of knowledge diffusion and innovation, despite rapid technological change.
- Education and skills formation, and better management of information and knowledge assets, will become even more important national capabilities. Education systems and management skills will require ongoing adaptation to new and more complex demands.
- The innovation system, a key driver of wealth creation, is also bringing in new players and generating new global links and intersections. Innovation and research policy must continue to adapt to reflect these new realities.

Australia's policy response

Australia has already made significant strides towards an open, adaptable economy and society in recent years, but continued success cannot be taken for granted. Further economic growth and community development are required to meet future challenges. Increasingly, we will need to create and mobilise new capabilities and bring them to bear in a focused way. This will be an innovative, problem-solving society: in other words, an 'information' economy and society.

Australia's broad objectives for the information economy are:

- to promote social cohesion by ensuring that particular sectors, groups of Australians and regions are not left behind
- to secure Australia's information economy against external and internal threats and to promote Australia's interests in the emerging global information economy
- to remove barriers to information economy development
- to make government an exemplar in the use of ICT to improve citizen engagement, efficiency and effectiveness of service delivery.

These objectives translate into the Australian Government's **four strategic priorities and sixteen associated strategies for the information economy.**

1. Ensure that all Australians have the capabilities, networks and tools to participate in the benefits of the information economy.

Strategy 1.1 *Develop the networks and capabilities needed by people living in regional communities, Indigenous Australians, older Australians, people with disabilities and others facing economic or social barriers to participation in the information economy.*

Strategy 1.2 *Strengthen collaboration and capabilities in SMEs, not-for-profit organisations and key industry sectors to facilitate their participation in the information economy.*

Strategy 1.3 *Promote investment in broadband infrastructure, content, capabilities and networks in regional areas and in key industry sectors.*

2. Ensure the security and interoperability of Australia's information infrastructure and support confidence in digital services.

Strategy 2.1 *Protect Australia's critical infrastructures through effective partnership between public and private sectors.*

Strategy 2.2 *Improve the culture of security in both public and private organisations.*

Strategy 2.3 *Promote security research and development and improve capabilities for analysis of security threats and vulnerabilities.*

Strategy 2.4 *Develop and implement a national electronic authentication framework covering both private and public sectors.*

Strategy 2.5 *Protect personal privacy and consumer interests in the information economy.*

Strategy 2.6 *Ensure the interoperability of Australia's information infrastructure through effective partnership between public and private sectors.*

3. Develop Australia's innovation system as a platform for productivity growth and industry transformation.

Strategy 3.1 *Build an innovation culture through improved access to education and skills development.*

Strategy 3.2 *Maintain a globally competitive business environment for innovation.*

Strategy 3.3 *Achieve global scale and critical mass in priority research areas.*

Strategy 3.4 *Develop ICT research networks as a platform for enhanced national and global research collaboration.*

4. Raise Australian public sector productivity, collaboration and accessibility through the effective use of information, knowledge and ICT.

Strategy 4.1 *Develop governance and business arrangements that ensure accountability, efficiency, transparency and integration.*

Strategy 4.2 *Develop an Australian Government ICT investment and interoperability framework to support integrated services.*

Strategy 4.3 *Develop collaborative approaches across government that promote the creation, sharing, protection and accessibility of information and knowledge.*

Summary

The result of these priorities and strategies will be a stronger contribution by ICT and the information economy to Australia's economic, community and social development through higher productivity and better connectivity. They will facilitate Australia's next step into the economy of the 21st century by laying the groundwork for higher participation in the information economy, a more secure environment, a stronger national innovation system and more efficient and effective government service delivery.

1. OPPORTUNITIES AND CHALLENGES OF THE INFORMATION ECONOMY

The emergence of the global information economy presents both opportunities and challenges. The opportunities lie in applying information, knowledge and skills to improve Australia's economy and society and strengthen our global competitiveness. The challenges lie in developing the new 'ways of working' that are needed to realise its full potential.

This is not just a matter for governments. The challenges can only be properly addressed through collaboration between governments, business and the community to create the conditions for a successful information economy.

The emerging information economy is being driven by two separate global developments:

- the growing global importance of information, knowledge, skills and communication in both economic and social activities
- the dramatic impact of information and communications technologies (ICT) on information and knowledge-intensive activities.

The combined result is a disruptive process of structural change to our ways of working and living. The interdependence of the different dimensions of national power—diplomatic/political, information, military, economic, and socio-cultural—is growing stronger as 'information' makes an increasingly important contribution to the other four. The way that each dimension 'does business' is changing and they will increasingly complement and interact with each other. Our national response to that change will determine whether we succeed in applying the power of information and technology to our economic and social goals, or whether we fail.

If we fail to adjust we will lose ground to the other nations who succeed, and it will be difficult to maintain Australia's relative economic growth and social development. But if we succeed, a platform for growth and development will have been laid down that will underpin Australia's long term national performance.

Information, knowledge and communication in the global economy

The following information economy issues have emerged over the last five years.

- Strong and complex interdependencies and links are growing between organisations and individuals. These links are crossing company, sectoral, community, social, geographical and national boundaries, and disrupting traditional regulatory systems, accountability arrangements and risk management.
- It is becoming much easier to transfer information and knowledge globally, but this has upset traditional intellectual property arrangements. The balance between private knowledge creation and the public 'knowledge commons' has become highly contentious.
- Traditional distinctions between primary, secondary and tertiary industries are becoming less relevant as they all become knowledge industries. This is forcing industries to develop new capabilities, and new mechanisms to generate and maintain those capabilities.
- Education and skills formation has emerged as a key requirement for the information economy, but fast-changing demand patterns are placing pressure on traditional systems of education delivery and modes of learning. ICT also provides the opportunity for improving the responsiveness and reach of education.
- The complexity of knowledge creation and diffusion is growing and has exposed the inadequacy of 'linear' science-driven models for innovation policy.
- The mutual benefits of knowledge sharing mean that a globalised world is wealthier and more adaptable. At the same time, openness to the international trading system, investment system and knowledge base is changing many areas of the economy and society.

A successful response to the opportunities and challenges of the information economy must address the implications of these and many other changes. New approaches to the operation and regulation of the economy and society are required. The economic and social impacts of a technological revolution unfold over decades, so a measured step-by-step approach is needed.

ICT and the information economy

The information economy encompasses much more than just information and communications technologies. Nonetheless, ICT is the key enabler of the information economy, so the capabilities of the next wave of ICT will determine the direction of change.

This technological change has already had practical economic effects. There is a strong relationship between ICT and productivity growth. The OECD confirmed in *The New Economy, Beyond the Hype* (2001) that ICT is a key input to productivity growth. In its more recent *The Sources of Economic Growth in OECD Countries* (2003), the OECD also explained the different growth rates of OECD countries in terms of stable

macroeconomic conditions and a competitive environment, investment in education and research and development (R&D) and the development and diffusion of new technologies. It also confirmed that the upsurge in the use of ICT in the 1990s has produced higher productivity and economic growth.

But why does ICT have this remarkable impact in the first place? There are three reasons.

First, ICT has a strong affinity with information and knowledge. In an economy where knowledge, information and communications are central, a technology that significantly reduces the cost of storing, processing and communicating information is bound to have a strong impact. The Internet has magnified this impact by providing an international 'information infrastructure'. The telecommunications network, originally for voice communications, now supports a much wider range of communications, including audio, video and financial transactions.

Second, the cost of ICT continues to fall, making an ever-widening range of applications commercially possible. At the same time, the cost of building network infrastructure is falling faster than the cost of either computing or data storage facilities. It is increasingly cost-effective to connect to other people's ICT than to own and operate an internal ICT system. Innovative application of these new technologies in previously unrelated areas is also transforming the nature of products and services themselves, as well as how they are developed in non-ICT sectors of the economy.

Third, new ICT is emerging all the time, triggering new waves of innovation that drive long term growth. Current examples include:

- a new generation of user-friendly, handheld wireless devices that provide 'always-on' access to email, telephony, payments, and multimedia services
- technologies designed to connect the ICT systems of multiple enterprises or industries, and to deliver more efficient and user-friendly coordinated services to consumers and citizens. Examples include distributed computing networks for research and business, more efficient industry supply chains, and easier government service delivery for citizens
- high-capacity broadband links to support web services and content-rich services for entertainment, research, and collaborative work environments.

These technologies will do more than make business and personal communications more efficient. They will allow businesses and consumers to bring together 'integrated' information, transactions and services that will cut complexity and cost out of whole sectors of the economy. But this can only happen when businesses and government agencies, and ICT users and developers, learn how to work together to provide a seamless service to customers and citizens.

The combination of technology change, falling prices and renewed cost-consciousness is difficult for the ICT production sector. These factors suggest that it is unlikely that the industry will return to the high rates of industry growth seen in the 1990s. However, they also offer new opportunities and new markets, and the industry continues to have a bright future. ICT customers need an adaptable, innovative ICT sector to advise on, to create, to build and to implement new ICT. There is no dichotomy between production and use of ICT. Both are needed in a successful information economy.

Over the next few years, these features will ultimately be reflected in new business models, new industry structures, new kinds of social interaction and new forms of regulatory arrangements. To keep up with this information economy transformation, business, governments and society need to recognise that future success depends on the ability to be resilient and adapt to change. It requires a clear understanding of the drivers of small business, consumer and citizen participation, and a more flexible approach from both public and private sectors to accommodating small business and consumer needs and promoting higher uptake.

But for now, a gap has opened up. Technology and business developments are pulling ahead of the industry arrangements and government regulation that we have inherited from the 20th century. Obvious examples include Internet content regulation, intellectual property protection, electronic privacy protection, critical infrastructure security, and government service delivery.

In each case, we will need to develop new organisational arrangements and regulation to address a dramatically changed environment and release the full benefits of the information economy.

The information economy transformation

These kinds of gaps are the normal result of a technological revolution. This is not the first time this kind of change has happened. Examples include the steam engine in the late 18th century, railways in the mid-19th century, electricity and steel making technology in the late 19th century, and motor vehicles in the early 20th century. Each wave of new technology caused dramatic shifts in the structure of the economy and society, generated new industries, and required new institutional and regulatory responses.

These technological revolutions have all followed broadly similar trajectories stretching over a period of fifty to eighty years.[3]

- An 'installation period' when the new technology is invented and diffused and financial markets invest in new business models. Regulation and society lag behind during this period.
- A 'turning point' where the gap between technology and business on the one hand, and regulation and society on the other, creates barriers to further development and provoke a financial crash.
- A 'deployment period' when the lessons of the crash are learned and the new 'ways of working' of the engineers and business people are embodied in new institutions, regulations, and social relationships. If successful, the result is prosperity and stability—if not, the result is economic and social underperformance.

The beginning of the ICT installation period can be dated from the release of the first microprocessor in 1969. The ICT turning point was the 'dot com' crash of 2000, which had similarities to the 'canal panic' of the early 19th century and the 'railway mania' of 1847. The full deployment of ICT will probably take several more decades.

Consistent with previous technological revolutions, the lasting result of the 21st century 'dot com' crash has been renewed emphasis on getting business and social benefits from technology. ICT is now recognised not as a panacea but as a business tool that needs complementary capabilities and management frameworks. This is shifting the business and policy focus away from technology, and towards the organisational, economic, social and regulatory arrangements required to deploy and exploit it.

The gap between the technology and business models of the information economy, and the institutional and regulatory practices inherited from the 20th century is real. It is creating opportunities and challenges in each industry sector.

- In the **finance** sector, significant progress has already been made towards a multi-channel mode of operation (over-the-counter, phone and online). In particular, Australia is a world leader in online banking. However, there are still no systems in place to reliably confirm the identity of online consumers. Also, consumer protection and other mechanisms to underpin trust in online markets require ongoing development. Treasury agencies and the financial sector are now actively addressing these issues.
- In the **health** industries, better management of clinical data and new ways to manage and monitor patients are improving clinical outcomes. This requires many issues to be addressed, including new privacy and information handling rules, new technical and data standards and interoperability, and new investment and business models for health service delivery. Health agencies around Australia are collaborating on these issues, for example on Health*Connect*, the proposed national electronic health record network, and the proposed National Health Privacy Code on the handling of health information.
- In the **community** sector, not-for-profit organisations are slowly adopting ICT to transform their administrative operations and service delivery, and the ways in which they engage with government, the private sector and the community. Deployment remains uneven however, as many small organisations struggle to acquire the means and capabilities to become effective ICT users.
- In the **education** sector, ICT has great potential to improve the quality and reach of education. National and international delivery of online education services requires further deployment of broadband infrastructure and solutions to interoperability problems in education networks, as well as managing online identity issues. Education agencies are actively collaborating on national investment and standards issues.
- In the **defence** sector, the transition to network-centric warfare is allowing armed forces to deliver enhanced combat effectiveness through the linkage of the Australian Defence Force, national and coalition systems and decision-makers into an effective and responsive whole. At its core, network-centric warfare seeks to translate an information advantage into a war-fighting advantage. Underpinned by information

connectivity, this requires new concepts and doctrine for command and control, planning and conducting operations, delivering departmental administration and the degree of interoperability between our forces and those of our allies, and other Australian response capabilities. The Department of Defence is addressing the long-term implications of these challenges.

- In the **mining** sector, Australian-produced ICT has helped the mining industry to prosper—through improved efficiency, improved capacity to deal with complexity, increased market responsiveness, reduced downtime and increased safety—despite the ongoing robust and intense global competition that it faces. ICT technologies have included: stockpile management systems; 3D graphical solutions for ore body evaluation and blast and mine design; software for mineral sampling and quality analysis; data management associated with seismic monitoring and geologic sensing; monitoring equipment condition and maintenance management; and communications technologies for business management, mine supervision and data collection and transfer. However, despite having international 'brand' recognition, the small size and domestic, single sector and single customer focus of many mining ICT firms reduces the ability of other sectors of the Australian economy to benefit from their solutions[4].
- **Research and development** activities, enabled by ICT networks, can now cross company, industry and international boundaries, allowing Australian research and industry to participate in the global research effort and gain better access to the global knowledge base. This demands new collaborative arrangements and capabilities to manage research activities and intellectual property, as well as national innovation policies that accommodate this mode of operation. Science and industry development agencies are working to establish these new innovation policies.
- In the **communications and media** sector, a broad range of global content-based and export-oriented goods and services are developing, including interactive multimedia, digital film and television, computer and online games, educational content production, digital publishing and online music. However, the market for cultural content cannot develop ahead of broadband rollout; yet at the same time broadband development is hindered by limited availability of content. Broadband and digital content policies are addressing this nexus.
- In the **manufacturing** sector, a NOIE study[5] concluded that, in addition to microeconomic reform, new technology, including ICT, has made a much more significant and direct contribution than previously understood. Major ICT-related innovations have included incorporation of (computerised) numerical controllers into machines, robotics and local area (LAN) communication and control networks in factories. However, there are wide disparities in the productivity growth rates of different manufacturing industries, and it appears that less high-tech, capital intensive industries are recording lower productivity growth. The study noted the importance of 'technological paths' in determining productivity growth. It also found a strong correlation between domestic ICT inputs and productivity growth, suggesting that ICT was a central factor driving productivity growth.

- In the **government** sector, shared ICT infrastructure investment will become the norm and agencies will be able to aggregate the service offerings of other agencies to provide packaged 'integrated services'. The main obstacles are not the technologies. They are the new government agency accountability requirements, new information handling rules and new investment models for shared infrastructure that will be required. The Australian Government is evolving the collaborative arrangements needed to manage these across agency and even across government boundaries.

When the disparate systems of different government agencies and private enterprises can interoperate, then complex transactions will be made much easier. The benefits will be more efficient use of infrastructure capital and a more competitive, customer-oriented services sector. That is the promise of the technology. But this level of integration will require new business and regulatory arrangements to govern cross-organisational services and protect business activities.

The information economy agenda

Interdependence, new institutions and new regulations

A networked world is an interdependent world. People and nations are increasingly dependent on one another for their information, knowledge, skills and security. This requires new national and global collaborations on information economy issues because individual private enterprises and government agencies cannot solve these issues without the cooperation of others.

Some information economy issues that require a collaborative approach include:

- security of information infrastructure
- control of spam email
- proof of identity in networked transactions
- protection of privacy and intellectual property
- regulation of illegal and restricted content
- adoption of interoperability standards for connecting networks and other ICT systems.

These national and global collaborations are needed to bring together the right players to share burdens appropriately and achieve agreed frameworks and solutions in these areas. These frameworks and solutions include both technical interoperability and standardisation, and the business procedures and protocols that support market operation.

Government also has a role in these collaborations, for three reasons.

- No single actor can create these system-level frameworks and solutions. They require multi-lateral or cross-sectoral agreement, sometimes at the international level, and occasionally they require government regulation to entrench them.
- There is no conventional business case for private enterprise or public agency involvement in creating these collaborations because the benefits of collaboration flow across the whole market, economy or society, and usually cannot be captured by single participants. Therefore, collaboration will often require facilitation and leadership by government.
- Government agencies are sometimes active participants in key marketplaces, and must directly participate in collaboration and adopt the agreed frameworks and solutions.

Without these collaborations, and the government support and participation they require, suboptimal outcomes will occur. These suboptimal outcomes may include reduced competition, reduced security and confidence in ICT systems and services, erosion of property rights, and market fragmentation and loss of critical mass. This could stall investment, participation, and technology deployment, and reduce productivity gains.

Innovation, intellectual property and human capital

Information and knowledge are different to physical goods. They can be consumed or shared without being diminished. This means that information and knowledge can be spread at little cost, raising productivity across the whole economy. But this makes it hard for the original creators of information and knowledge to capture their deserved rewards, and this discourages commercial investment in information, knowledge, and information-intensive goods and services.

The creation of information and knowledge is increasingly institutionalised in 'national innovation systems' and 'global innovation systems' that touch all aspects of the economy and society. These systems include research and development organisations in government, commercial innovators in business, users of innovation in the community, the links between them all, and the business and cultural environment for innovation that they all share. All elements of this system must be healthy in order for the innovation system to function.

The information economy intersects the innovation system in two key areas. Firstly, ICT is a powerful platform for the collection, processing, storage and communication of information within the innovation system. Successful development of this platform will require new collaborations and capabilities to share investment, manage the technology, and promote ICT as a platform for innovation across the wider economy. Secondly, heightened innovation in the ICT industry itself is needed to ensure that new ICT continues to enable cross-economy innovation and productivity growth.

Commercial innovation is rewarded through creation of intellectual property that is temporarily owned (such as copyrights and patents). In some areas, the ease of digital copying has disrupted the control of intellectual property. In others, the centralised control of knowledge resources has disrupted the free flow of information. A balance must be re-established between knowledge creation and information diffusion in order to optimise both. The traditional balance between the creator/innovators and the users of content and technology has been upset as digital copying and digital protection technologies have entered an arms race. In addition, competition policy concerns have arisen around the monopolistic use of some intellectual property and the scope for price discrimination within global intellectual property markets.

A balance between the creation of knowledge, the diffusion of knowledge and the promotion of competition is crucial. Revision of intellectual property rules, along with initiatives like open source software, open repositories for digital content and research publications, and other public and private initiatives directed towards the creation of a 'knowledge commons' will all contribute towards striking this balance.

Government has a central and complex role in this area. It creates and sustains intellectual property rights through legislation. It creates and sustains a knowledge commons through the research, education and library systems. It is the caretaker of public collections of cultural and heritage material. It supports, promotes and encourages broad public access to the arts and culture. It is a major creator, owner and supplier of intellectual property in its own right. The challenge for governments is to coordinate all of these roles to achieve a productive balance.

It is not enough to create and disseminate information and knowledge. It is also necessary to have people and societies that know how to use them. For this reason, an effective education and skills development system to develop human capital which recognises the increasing importance of cross-disciplinary skills is an essential building block of an information economy.

The productive use of information requires people with the skills to use and manage it. Education and skills formation, and information and knowledge management are therefore a crucial component of the information economy and society.

Regulatory and business arrangements in all of these areas will shape the future information economy. It is impossible to completely predict these arrangements because they will depend on technology, society and market developments over the next decade. Nor will the solutions always be purely national because the information economy is global. An incremental, consultative approach that maintains flexibility and has close regard to international developments is required until the dynamics of the information economy are better understood.

2. AUSTRALIA'S RESPONSE

Australia has made significant strides towards a more open, adaptable economy and society over the last twenty years. In the economic sphere, Australia is committed to an economic framework of open and competitive markets, fiscal and monetary discipline and the rule of law. These fundamentals have underpinned impressive growth, productivity, employment, and export performance in recent years.

The strong link between Australia's economic and social development and the Government's information economy strategy was explicitly recognised in the *Investing for Growth*[6] statement in 1997. Major initiatives in that statement included:

- strong information economy leadership and the development of a national *Strategic Framework for the Information Economy*
- the generation of business and consumer confidence by creating a light-handed regulatory framework to support and encourage a private sector-led development of the information economy
- the encouragement of the use of government online services by placing all appropriate Commonwealth services online by 2001.

A *Strategic Framework for the Information Economy* adopted in late 1998 set a national vision for the information economy in Australia and identified priorities for action. It envisioned enhanced access to services and training, stronger economic development, a culture of innovation and diversity, improved government service delivery and new information-based strategic capabilities that lead to competitive advantage and social cohesion.

The policy coherence achieved with the 1998 *Strategic Framework for the Information Economy* allowed more to be achieved than any single government or industry sector could have achieved alone. Australia's *Information Economy Progress Report* released in November 2002 recorded the substantial successes in each area of this vision[7].

Australia's future as an information economy

Continued economic growth and social development are required to secure Australia's future. The productivity gains that effective ICT investment and deployment can add in a competitive economy will be vital[8]. Increasingly, our economy will create and mobilise new capabilities and bring them to bear in a focused way. This will be an innovative, 'problem-solving' society: in other words, an 'information' economy and society.

Australia's vision for the information economy is where government, business and society are all connected, can participate with confidence, are open to innovation and can collaborate to maximise the economic and social benefits.

Australia cannot afford to stand still if we are to achieve this vision. The information economy challenge has changed since Australia's original 1998 *Strategic Framework for the Information Economy* was produced. Information economy leadership was then measured largely by the sophistication of a country's e-commerce regulatory framework. Today, many countries are catching up with our regulatory position. Most developed countries like Australia have ambitious, explicit information economy strategies. The focus is shifting to the achievement of real benefits in the economy and society.

Australia is still well placed to capture a leadership position in the global information economy. The transparency, openness, innovation, diversity and skills of Australia's institutions and its people are the foundation of our national competitiveness, social cohesion, and global leadership in the twenty-first century.

Australia's objectives for the information economy

The role of the Australian Government is to facilitate, to catalyse, and to collaborate, but not to usurp business and community initiative. The roles of government, business and community are distinct and mutually supportive but cannot be substituted. Each must accept its share of responsibility.

Australia has *multiple objectives* for the information economy, summarised as follows.

To promote stronger communities and social cohesion by ensuring that particular sectors and regions of Australia or groups of Australians are not marginalised by change.

There is a danger that some Australians could be left behind during a period of structural change, with potential for damage to social cohesion and a backlash against continued development.

To secure Australia's information economy against external and internal threats, and to promote Australia's interests in the emerging global information economy.

The traditional role of government as keeper of the internal peace and defender against external threat has come into sharp focus in the current international environment. This objective includes network security, but extends to government's role as a regulator in areas such as privacy and consumer protection. Many of the fundamental policy settings of the information economy will be determined globally. This does not require a separate international strategy but it requires that Australia address both national and international dimensions of the issues.

To remove barriers to information economy development.

Open markets are an important element of the national response to the information economy. The flexibility and adaptability of markets make them particularly beneficial in times of change and uncertainty, when different business strategies are being trialled. However, some barriers demand government action or new regulation, and some require collaborative action by all sectors.

To be an exemplar in the use of ICT to improve citizen engagement, efficiency and effectiveness of service delivery.

Government has much to gain from ICT-based efficiencies. It is also an important exemplar in the use of ICT, and has an indirect but significant impact as a major participant in Australia's information economy that must be thoughtfully managed.

Australia's information economy priorities and strategies

The capacity of the information economy to make these contributions will depend on the continued deployment of ICT across the Australian economy and society and the gradual transformation of business and regulatory arrangements. Government, business and the wider community face several challenges that were not clearly apparent in 1998.

The need for scale and critical mass in markets for information-intensive activities and ICT infrastructure, and the need for capabilities, knowledge and skills needed to sustain this critical mass in a small, open economy.

Action to promote access and participation serves social cohesion, but it also serves the economic objective of sustainable markets. Although there may be no stand-alone business case to extend services to marginal markets, higher levels of skill and participation will improve returns to ICT and related investment across the whole economy. This is important in a small economy like Australia that needs to build scale.

The absence of business, governance and possibly regulatory arrangements to manage the security and interoperability of information infrastructure.

This is important in both the security and interoperability of ICT networks, and to local innovation. Commercial incentives for investment in security and interoperability are weak because the benefits are spread across the whole economy and cannot be captured by individual commercial players and participation in international standards development is expensive. Lack of security or interoperability can fragment markets, raise costs and discourage participation.

The development of Australia's innovation system to reflect the growing role of ICT in the knowledge and information-based economy.

Effective use of ICT plays a critical role in innovation. Innovation is also affected by the ICT infrastructure available in terms of the scope, conduct and management of both research and commercialisation. Successful use of ICT is needed to create a more flexible and accessible research system, promote links and commercialisation, integrate Australia into the global research effort, and raise productivity across the economy.

The need for a comprehensive management framework for public sector participation in the information economy.

Governments are already a major user of ICT and have significant scope to address the challenges outlined above. Successful use of ICT will translate into significant citizen and cost benefits, but only if new collaborative ways of managing ICT services and investment can be agreed between agencies and all three levels of government. If this is achieved, governments can provide a critical mass and a focus for collaboration and innovation that will accelerate information economy development. Some progress has already been made, but more is required.

The Australian Government's four strategic priorities for the information economy are designed to address these challenges.

FOUR PRIORITIES FOR THE INFORMATION ECONOMY

1. **Ensure that all Australians have the capabilities, networks and tools to participate in the benefits of the information economy.**
2. **Ensure the security and interoperability of Australia's information infrastructure, and support confidence in digital services.**
3. **Develop Australia's innovation system as a platform for productivity growth and industry transformation.**
4. **Raise Australian public sector productivity, collaboration and accessibility through the effective use of information, knowledge and ICT.**

Implementation of the four priorities

The four information economy priorities reflect Australia's unique circumstances. They focus on issues that extend across portfolio and sectoral boundaries, and require a collaborative response. There are also many portfolio-specific, sector-specific and agency-specific activities that, though important, are not recorded in this document.

Priority 1: Ensure that all Australians have the capabilities, networks and tools to participate in the benefits of the information economy.

Those communities that make effective and creative use of information, knowledge and ICT will benefit most from the information economy. These capabilities are a catalyst for employment opportunities, a tool for building stronger communities and social capital, and as a means of connecting isolated populations and economically and socially disadvantaged groups. Successful participation in the information economy by all sectors of the Australian economy and society is an imperative for two reasons.

- More participation leads to greater efficiency and productivity growth. If critical mass is achieved, then costs fall for both customers and investors, attracting participation and establishing a cycle of investment and demand.
- More participation leads to greater equity and social cohesion, and increased community capacity and individual opportunity to achieve economic and social goals.

The strategies under this priority are focused on communities where an emphasis on increased opportunity and inclusion will contribute to increased capacity for economic and social development and wider uptake and effective use of technology.

Key areas include:

- regional communities, Indigenous Australians, older Australians, people with disabilities, and those others who face specific economic and social barriers to participation, such as low income families
- small and medium enterprises (SMEs) and not-for-profit organisations, where skills, capabilities and knowledge are still underdeveloped
- industry sectors with a 'strategic footprint' that can drive wider developments
- broadband markets where a combination of competition and targeted assistance will remove barriers to network facilitated innovation and transformation.

The key strategies for this priority over the next three years will be:

Strategy 1.1 *Develop the networks and capabilities needed by people living in regional communities, Indigenous Australians, older Australians, people with disabilities and others facing economic or social barriers to participation in the information economy.*

Strategy 1.2 *Strengthen collaboration and capabilities in SMEs, not-for-profit organisations, and key industry sectors to facilitate their participation in the information economy.*

Strategy 1.3 *Promote investment in broadband infrastructure, content, capabilities and networks in regional areas and in key industry sectors.*

Priority 2: Ensure the security and interoperability of Australia's information infrastructure, and support confidence in digital services.

Australia has critical infrastructures in many sectors, including communications, energy, water, finance and transport. All are 'critical' because their failure would affect the entire economic and social system, or affect Australia's ability to ensure national security. Each of these infrastructures is increasingly dependent on information infrastructure for monitoring and controlling their operations, however, the information infrastructure is itself also reliant on access to electrical power and other services. The result is a complex set of interdependencies and vulnerabilities.

Like other modern economies, Australia now relies on a well-functioning networked information infrastructure. Our increasing dependence on e-commerce and a host of other applications throughout the economy increases

both our vulnerability to attack and the economic consequences of such an attack. Most of Australia's critical infrastructure is privately owned or operated, however there are strong externalities that undermine private incentives to ensure security. Neither government nor business alone can ensure protection, so business-government partnerships are required.

Similar partnerships are required on interoperability issues for similar reasons. Interoperability is the capacity to transfer and use information across different technology systems. Interoperability cuts costs and accelerates deployment of technology by making technology, services and infrastructure re-useable. It unlocks value by integrating data sources and creating greater flexibility to meet customer needs. It reduces cost and complexity so that e-business participation can be justified, not just for large firms and governments but SMEs and other users with low transaction volumes. It requires collaborative agreement on technical standards and business protocols that support cross-enterprise and cross-sectoral activities.

Much of Australia's information infrastructure is now part of a global system, creating interdependencies and vulnerabilities that stretch beyond Australia's shores. Our planning must be cognisant of these wider global dependencies and be included in our strategies, where appropriate.

The Australian Government's approach to these issues include:

- building collaborative arrangements across enterprise, agency and sectoral boundaries to share the burdens of security and interoperability
- encouraging a culture of security across the nation
- increasing research and development on e-security issues
- addressing online authentication, privacy and consumer protection issues to promote confidence in online transactions.

The key strategies for achieving this in the next three years are:

Strategy 2.1 *Protect Australia's critical infrastructures through effective partnership between public and private sectors.*

Strategy 2.2 *Improve the culture of security in both public and private organisations.*

Strategy 2.3 *Promote security research and development, and improve capabilities for analysis of security threats and vulnerabilities.*

Strategy 2.4 *Develop and implement a national electronic authentication framework covering both private and public sectors.*

Strategy 2.5 *Protect personal privacy and consumer interests in the information economy.*

Strategy 2.6 *Ensure the interoperability of Australia's information infrastructure through effective partnership between public and private sectors.*

Priority 3: Develop Australia's innovation system as a platform for productivity growth and industry transformation.

Innovation is an important economic policy issue for Australia. Innovation is the key to long-term international competitiveness, ongoing and sustainable economic growth and better living standards, and offers the best prospect of meeting the productivity challenge posed by our ageing population. This is also widely recognised in other OECD countries, which have increased their commitment to innovation policy in recent years.

Developing the innovative capacity of a country is a long-term process. The innovative capacity of Australia today is largely the product of the past fifty years of education and training. In particular, education is integral to the innovation process by which people acquire new skills (including ICT), new knowledge with critical and constructive thinking, and adapt in the face of a constantly changing environment. If we are to further develop this innovative capacity we must continue to raise the educational outcomes of all Australians.

It is widely recognised that the innovation process is complex. It is driven by interactive flows of information between webs of actors—consumers, entrepreneurs, companies, research institutions, educational institutions including universities and the wider global innovation system. Increasingly, ICT networks carry those flows, breakthroughs happen at the interface between ICT and other disciplines, and the innovation system, the information economy and ICT all intersect.

The emergence of the information economy is itself, a major innovation, as significant as the invention of printing and the spread of mass literacy. It is enabling a transformation that requires a cultural, regulatory and business environment that supports innovation and experimentation. The innovation process has the same imperatives of collaboration and scale as any other information activity. Thus it is imperative that the national innovation system achieve stronger synergies through national collaboration, global scale in key activities and closer integration into the wider global innovation system.

The Australian Government's strategies for innovation in the information economy are designed to address these two intersections.

First, the Government is helping to strengthen the environment for innovation by:

- building an innovation culture and a knowledge society through investment in education, skills formation and ICT literacy
- building an innovative, competitive business environment through support for the creation, production and exploitation of technical knowledge, organisational knowledge and commercial R&D in primary, manufacturing and services sectors
- developing a national ICT capability and the Australian ICT industry.

Second, it is building an innovation system for the information economy by:

- prioritising national research activities to achieve critical mass and global impact
- creating new infrastructure, capabilities and coordination mechanisms to integrate national research activities and connect to the global research effort.

Key strategies over the next three years will be:

Strategy 3.1 *Build an innovation culture through improved access to education and skills development.*

Strategy 3.2 *Maintain a globally competitive business environment for innovation.*

Strategy 3.3 *Achieve global scale and critical mass in priority research areas.*

Strategy 3.4 *Develop ICT research networks as a platform for enhanced national and global research collaboration.*

Priority 4: Raise Australian public sector productivity, collaboration and accessibility through the effective use of information, knowledge and ICT.

The term 'e-government' is used to describe the impact of ICT and the online environment on the operation and administration of government. E-government may be defined as ... *the transformation of public sector internal and external relationships through Internet-enabled operations and ICT to optimise government service delivery, constituency participation and internal government processes*[9].

Increasingly, citizens expect services tailored to their needs—whether individuals, families, businesses or community groups—rather than to the business structures and arrangements of government departments and agencies. They also want government services to be convenient and, where appropriate, combined (or integrated) through a single point of access. The latter presents special challenges in Australia where government is structured federally. At the same time, governments demand greater efficiency from their agencies. ICT is a powerful tool for better policy, program and service delivery outcomes. ICT costs can be large, but the costs of the related changes to business practice are much larger. Consistent with other capital investments, ICT requires a business case that often will not only encompass the direct and indirect technology costs, but also the business process and change management costs. Often the net benefit of the business case rests on the long-term efficiencies in service delivery that these changes generate.

As whole-of-government approaches become more common in the way agencies conduct their business, information sharing plays a critical role in generating better decision making and program delivery. Sharing information can also result in more empowered and efficient consumers of government services, which in turn can lead to better informed consumers more likely to participate in the policy development process. This leads to a heightened requirement for improved system interoperability between agencies around shared infrastructure, information standards and protocols and the reuse of existing data.

The Australian Government's e-government strategy is outlined in the document *Better Services, Better Government* (November 2002). The strategy identifies six objectives:

1. ensure convenient access to government services and information
2. deliver services that are responsive to the needs of individual Australian households, business and civic organisations
3. integrate related services
4. build experience, user trust and confidence in the use of new technologies
5. enhance closer citizen engagement in policy formulation and processes
6. achieve greater efficiency and a return on investment.

The most important issues that arise from this e-government agenda are focused on governance and business processes. They include:

- helping agencies address whole-of-government considerations for security, authentication and ICT sourcing without diluting their accountability requirements
- developing investment and operational models for shared investment in interoperable communications and transaction infrastructure
- managing citizen engagement, including the development of whole-of-government information management, channel management and service distribution strategies
- promoting recognition of the need for change and process management strategies to complement ICT investment, and developing agency capabilities for ICT, information and knowledge management.

In addition, the Australian Government is a major participant in service and information markets. Its activities are sufficient to influence and stimulate the markets it engages. It is important that these activities are designed to develop, and not distort, information economy markets. This requires that government service delivery strategies, including those using ICT and the online environment, be developed within a wider policy framework of technology and competitive neutrality.

This will be an iterative process. Each level and agency of government will deal with these issues differently as they strive to meet the expectations of different stakeholders.

The key strategies for e-government over the next three years will be:

Strategy 4.1 *Develop governance and business arrangements that ensure accountability, efficiency, transparency and integration.*

Strategy 4.2 *Develop an Australian Government ICT investment and interoperability framework to support integrated services.*

Strategy 4.3 *Develop collaborative approaches across government that promote the creation, sharing, protection and accessibility of information and knowledge.*

APPENDIX: AUSTRALIA'S INFORMATION ECONOMY STRATEGIES

Priority 1: Ensure that all Australians have the capabilities, networks and tools to participate in the benefits of the information economy.

Strategy 1.1

Develop the networks and capabilities needed by people living in regional communities, Indigenous Australians, older Australians, people with disabilities and others facing economic or social barriers to participation in the information economy

The Australian Government's response in 2003 to the Regional Telecommunications Inquiry (RTI) was to provide $180 million over four years to consolidate recent improvements to regional telecommunications, and build on earlier initiatives such as the $400 million Networking the Nation program. Initiatives to benefit regional communities include:

- $15.9 million to extend land-based mobile phone services to small population centres and key highways in regional Australia
- $4 million to extend a satellite handset subsidy for people in areas of Australia outside terrestrial and mobile phone coverage
- $10.1 million funding to provide IT training and support services in areas where commercial training or support services are not accessible
- the development of strategies to sustain online access centres for public access, training, and government services, including to Indigenous communities
- a comprehensive 'future-proofing' package to ensure that people in regional areas continue to share equitably in the benefits of technology progress
- the Australian Government will examine the outcomes of work between Telstra and representatives of people with disabilities to resolve any services concerns.

The Australian's Government's $70 million Rural Transaction Centre (RTC) program administered by the Department of Transport and Regional Services (DOTARS) is funding RTCs in small regional communities around Australia, providing improved access to banking, Electronic Point of Sale (EPOS) facilities, and other essential services. From 1 July 2003, applications for RTC-like facilities are being made under Regional Partnerships.

The Telecommunications Action Plan for Remote Indigenous Communities (TAPRIC), administered by the Department of Communications, Information Technology and the Arts (DCITA), will improve telecommunications services to Indigenous communities. It includes the development of interactive language training resources for use by communities that will allow five Indigenous language groups across Australia to have access to language resources online. Indigenous communities will also benefit from RTI initiatives such as improved access to broadband services, IT training and support services, the requirement upon Telstra to maintain a local presence, and regular reviews of the telecommunications needs of regional Australia.

The Australian Government's *Stronger Families and Communities Strategy* contains important initiatives involving the use of ICT to help build stronger communities:

- the Family Community Network Initiative, administered by the Department of Family and Community Services, received an additional $8.5 million over four years in the 2002 Budget. It provides grants to disadvantaged communities for information and ICT access, community networks, and training
- the Can Do Community web site allows communities to showcase capacity-building solutions to local problems, including through the creative use of ICT
- the Volunteer Small Equipment Grants 2004 initiative will assist hundreds of community organisations to purchase up to $5,000 of IT equipment to support their volunteer work.

The Department of Education, Science and Training (DEST) and Australian National Training Authority (ANTA) are enhancing ICT literacy levels, and helping to build 'learning communities' around Australia, by:

- funding and support to the Adult and Community Education (ACE) sector, which plays a major role in delivering a wide range of basic computer and Internet literacy training to adults in communities across the country
- the *Basic IT Enabling Skills (BITES) for Older Workers* program, worth $23 million over four years, providing basic computer skills to those aged 45 years and over who are unemployed or welfare dependent and have no previous post-school qualifications in ICT
- Adult Learners Week, featuring hundreds of learning events and activities focusing on computer and IT literacy, Internet training, Internet for seniors, and new uses of the web such as online banking
- support and funding for Adult Learning Australia's *Learning Communities Catalyst* website (*http://www.lcc.edu.au*).

Strategy 1.2

Strengthen collaboration and capabilities in SMEs, not-for-profit organisations, and key industry sectors to facilitate their participation in the information economy

The Australian Government's activities in support of SMEs, not-for-profit organisations, and specific sectors will address strategic issues, not individual firms, and focus on structural and systemic barriers to uptake of e-business. These activities fall into two areas, increasingly in collaboration with industry associations.

1. Encouraging the creation of sectoral infrastructure and capabilities

Many elements of the e-business infrastructure are shared or operate by mutual consent. This requires either natural competitors or members of supply chains to cooperate, and this cooperation requires a collaborative framework.

Some specific sectors will also be priorities over the next three years. The freight industry is a provider of services to many other sectors of the economy, and uptake of ICT in this industry will have significant productivity effects for the whole economy. DCITA, the Australian Logistics Council, the Department of Transport and Regional Services and other stakeholders will collaborate to improve interoperability, especially through the take-up of global messaging standards. Under the *Health Online: A Health Information Action Plan for Australia* released by the National Health Information Management Advisory Council, there has already been significant progress towards new ways of delivering health services that harness new ICT. In March 2004 the Australian Government, in coordination with the state governments, announced that $80 million will be invested in state-wide rollout of Health*Connect* in Tasmania and South Australia from 1 July 2004 to 1 July 2007. This proposed national electronic health record network would assist with better patient care (through fewer medical mistakes) and lower ultimate costs (through less duplication). The Information Technology Online (ITOL) program has also funded a consortium of not-for-profit organisations to develop the Better Business Processes in the Community Sector project. The project will streamline the delivery of business services across the community sector.

2. Building knowledge and capability within individual enterprises

The Australian Government will continue to provide a range of guides, resources and case studies to assist people, businesses, organisations and communities to improve their access to and use of ICT. The core of these resources will be the *e-businessguide*, which provides SMEs with information on getting online and maximising e-business benefits. The guide is available at *www.e-businessguide.gov.au*.

Industry associations provide an important channel for stimulating SME uptake of e-business. DCITA is working with industry associations in the development and implementation of specific e-business projects. In collaboration with DCITA, the Internet Industry Association has produced a portal that helps small businesses to understand and respond to e-security threats and access information and advice on issues such as spam, viruses and fraud. DCITA is also providing direct support to the Australian Chamber of Commerce and Industry (ACCI) in the development and implementation of workshops for small businesses in different sectors.

Strategy 1.3

Promote investment in broadband infrastructure, content, capabilities and networks in regional areas and in key industry sectors

The Australian Government's policy framework for the growth of broadband infrastructure, content and services has three main components:

- promotion of competition in communications infrastructure and service markets
- strategic assistance for broadband infrastructure in regions and sectors where market dynamics are weak
- a digital content industry action agenda to facilitate creation of new digital content and services.

A competitive, innovative business environment for the whole ICT sector is the central plank of the Australian Government's approach to improving the delivery of advanced telecommunication services across Australia. The introduction of full and open competition in the telecommunications market from 1997 has resulted in new suppliers and services, lower prices and greater choice for consumers. The Australian Government, through the Australian Competition and Consumer Commission (ACCC), is facilitating the dissemination of information on broadband price, service subscription volumes and market shares to better inform the market.

The benefits of competition are not evenly distributed, particularly in regional areas and certain industry sectors. To address these gaps, the Australian Government has introduced initiatives to stimulate broadband demand and to drive broadband rollout:

- $50 million has been provided for a National Communications Fund to support the rollout of large-scale infrastructure and high-speed telecommunications networks to deliver education and health services to users in regional and rural Australia
- the $60 million Advanced Networks Program currently supports a variety of advanced network projects that promote experimentation in, and commercialisation of, leading-edge optical and wireless network technologies that will have benefits for regional areas
- elements of TAPRIC, such as the Online Access Centre Business Study and Internet Access Program, provide enhanced broadband access to remote areas.

The Australian Government's response to the Regional Telecommunications Inquiry included funding of $142.8 million for initiatives to make the economic and social benefits of broadband available to an increased number of Australians. These initiatives represent the Australian Government's contribution to the *National Broadband Strategy* and also address many of the recommendations of the Broadband Advisory Group Report, *Australia's Broadband Connectivity*. The report found that while there is considerable investment in broadband infrastructure, a coordinated approach is required to develop a truly national broadband network.

Key elements of the *National Broadband Strategy* include:

- the $107.8 million Higher Bandwidth Incentive Scheme to ensure wider availability of affordable broadband services
- the $23.7 million Coordinated Communications Infrastructure Fund to build on broadband infrastructure developments in the health and education sectors
- the $8.3 million demand aggregation brokerage program to consolidate demand at regional and sectoral levels to attract broadband investment.

The Australian Government also assists specific sectors:

- the post-production film sector, through support for the FIBRE industry consortium to develop and implement demand aggregation strategies
- broadband technology will be rolled out to rural and regional general practitioners to enable better delivery of clinical services and practice management. For example, broadband connectivity will provide access to HIC Online, enabling Medicare claims to be lodged directly from medical practices via the Internet to the Health Insurance Commission (HIC)
- funding has been committed for e-research networks in higher education and public research agencies (discussed under Priority 3).

New broadband content and services are also necessary to attract broadband infrastructure investment. Broadband content and services are the R&D platform for the media and service sectors, and also develop Australia's cultural identity. In many areas, responses are already underway:

- current efforts to digitise cultural collections and content for education, research and commercialisation will assist both digital content industries and audiences
- the Australian Government's Digital Agenda Amendments introduced in 2000 updated the copyright regime to account for networked content and services. The amendments are currently being reviewed by the Australian Government to ensure that their implementation is consistent with the Act's broad objectives
- the Government has recently launched a Digital Content Industry Action Agenda to identify barriers to development and to coordinate industry action to address these barriers.

Priority 2: Ensure the security and interoperability of Australia's information infrastructure, and support confidence in digital services.

Strategy 2.1

Protect Australia's critical infrastructures through effective partnership between public and private sectors

Much of Australia's critical infrastructure is owned by the private sector. The Australian Government has built up collaborative arrangements within and between the public and private sectors to carry forward a comprehensive and coordinated response to critical infrastructure threats.

The Information Infrastructure Protection Group (IIPG), led by the Attorney-General's Department, is a strategic policy group comprising key Australian Government agencies, designed to identify critical threats to Australia's information infrastructure. In addition, the Business-Government Task Force on Critical Infrastructure has brought together industry leaders with key policy-makers to promote a partnership between business and government to protect the integrity of the nation's critical infrastructure.

All recommendations of the Task Force's 2002 report are now being implemented, including the establishment of the Trusted Information Sharing Network (TISN). The TISN was launched on 2 April 2003.

The TISN is comprised of Infrastructure Assurance Advisory Groups (IAAGs) for different key industry sectors, which will share information and analysis on the medium to long-term aspects of infrastructure protection. A Critical Infrastructure Advisory Council (CIAC) oversees the operations of the TISN. The CIAC consists of representatives of each critical infrastructure sector, a representative of each of the states and territories and representatives of relevant Australian Government agencies, and provides advice to the Attorney-General on the national approach to protecting critical infrastructure.

At its December 2003 meeting CIAC endorsed the establishment of three Expert Advisory Groups: an IT Security Expert Advisory Group, a critical infrastructure protection Futures Group and an Expert Group dealing with the Built Environment.

The IT Security Expert Advisory Group is comprised of academic specialists, vendors, consultants and some industry association representatives who are leaders in the e-security field. It reports directly to CIAC and held its first meeting in February 2004. This Group provides advice on technical solutions to problems identified by the sectoral groups and on emerging IT security trends that have the potential to impact on all industry sectors. It will also assist in the review of critical infrastructure protection research proposals and provide suggestions on specific research and development projects to the CIAC.

The May 2004 Budget allocated $50.2 million over four years, across eight agencies, to critical infrastructure protection. Some of the key measures to be implemented include the development of modelling and analysis capability to identify cross sector interdependencies and an ability to test for weaknesses and exposing vulnerabilities to national information infrastructure.

Australia is also active in international discussions on national information infrastructure protection and participates regularly in bilateral and multilateral discussions with other countries. These discussions provide a powerful opportunity for different countries to draw on the experiences of others and develop agreed approaches.

Strategy 2.2

Improve the culture of security in both public and private organisations

The Australian High Tech Crime Centre (AHTCC) established in July 2003 is a national body formed through collaboration between state, territory and Federal police services to coordinate action by law enforcement agencies on technology-related crime. The AHTCC's work will also involve education and prevention of high tech crime.

AusCERT is the not-for-profit national computer emergency response team for the private sector in Australia. It is an authoritative source of advice on the latest vulnerabilities affecting computer systems and the relevant response and recovery strategies. AusCERT has established a website *www.national.auscert.org.au* to facilitate access to the National Information Technology Alert Service and to the National IT Incident Reporting Scheme in order to collect and analyse reports about computer security incidents and to better inform the Australian public.

Three projects providing security advice specifically to SMEs are:

- *Trusting the Internet*, a publication which helps Australian small and medium businesses understand the key issues of Internet security
- the *e-businessguide*, which provides a range of information and resources, including information about security related issues, written for small business owners and their advisers and published as both a website (*www.e-businessguide.gov.au*) and booklet
- the e-security portal, *www.security.iia.net.au*, developed by the Internet Industry Association in collaboration with the Australian Government, which provides an entry point for e-security information.

Security issues within the Australian Government are addressed through the Information Management Strategy Committee (comprising of heads of key agencies), and the associated Chief Information Officers' Committee. (These are addressed in more detail at Priority 4).

Australia is also an active member of a number of international fora, including the OECD (Organisation for Economic Cooperation and Development) and APEC (Asia Pacific Economic Cooperation). Australia chairs the e-Security Task Group with the APEC Telecommunications and Industry working group (TEL). The OECD released its *Guidelines for the Security of Information Systems and Networks: Towards a Culture of Security* in August 2002. Australia, through the Attorney-General's Department, played a lead role in their development.

Strategy 2.3

Promote security research and development, and improve capabilities for analysis of security threats and vulnerabilities

In December 2002 the Prime Minister announced Australia's four national research priorities, which included Safeguarding Australia. The Australian Government has several policies and programs that address these priorities.

Several Australian Government agencies, including the Attorney-General's Department, the CSIRO, the Defence Signals Directorate (DSD) and the Defence Science and Technology Organisation (DSTO) fund e-security R&D projects. The E-Security Coordination Group, which is comprised of security and law enforcement agencies, is also examining strategies to reinforce and harness Australia's e-security R&D. R&D will focus on the assessment of interdependencies and vulnerabilities, both virtual and physical, and developing solutions to them.

Strategy 2.4

Develop and implement a national electronic authentication framework covering both private and public sectors

The Australian Government is addressing the issue of authentication on several fronts:

- through an *Australian National Authentication Framework* covering all sectors
- through an *Australian Government Authentication Framework* under the auspices of the Chief Information Officer Committee (CIOC) for the Australian Government
- promoting the use of authentication services in public and private sectors
- acting against identity fraud in both online and offline environments.

The Government recognises the importance of a national approach to authentication, because many of the primary identity documents originate with state and territory authorities but are widely used in the private sector and community. Work is progressing between Australian Government and state and territory government experts in this area, and will ultimately lead to consideration of an *Australian National Authentication Framework* to address technical, business and regulatory issues associated with identity and authentication. A Privacy Impact Assessment has been conducted as part of the development of the *Framework* to address privacy concerns.

An *Australian Government Authentication Framework* for the Australian Government sector will be developed by the CIOC's Authentication Working Group and will form an important component of the *National Authentication Policy Framework*. A whole-of-government approach to authentication is necessary because authentication processes may involve different agencies. The three policy objectives of a whole-of-government approach to online authentication are:

- consistency of user experience
- matching appropriate authentication options to different types of transactions
- matching appropriate technology to different authentication options.

The Australian Government will also encourage and integrate authentication solutions in public and private sectors. For example, the ANZ Bank has received *Gatekeeper* accreditation for the digital certificates it issues to business clients. Using those certificates, clients will be able to secure sensitive transactions with both the bank and any Australian Government agency employing the *Gatekeeper* standard (eg. the Australian Taxation Office and the Customs Service).

A whole-of-government study involving states and territories will also be undertaken to enhance the identification and verification processes for government agencies and to identify other measures to combat identity fraud. The prevention of identity fraud and building trust in primary identity documents are essential elements of the Australian Government's authentication framework.

Strategy 2.5
Protect personal privacy and consumer interests in the information economy

The Attorney-General has policy responsibility for privacy, and the *Privacy Act* will provide the co-regulatory framework for privacy protection efforts over the coming three years. The legislation spells out the relevant privacy principles, creates an independent statutory office of the Federal Privacy Commissioner with responsibility for privacy in the public and private sectors, and governs the collection, retention, uses and disclosure of personal information.

DCITA will work with the Attorney-General's Department in international fora (the OECD and APEC) to progress privacy protection. This includes proposals to the OECD for binding codes for multinational firms with trans-border data flows and proposals that APEC member economies adopt privacy principles based on the OECD principles.

The Government undertook an inquiry into the growing problem of unsolicited commercial electronic messages, commonly referred to as spam. The inquiry recommended a multi-layered approach to spam, combining national legislation, international collaboration, industry codes of practice, technology, and an education and awareness-raising program. The *Spam Act 2003* principally prohibits the sending of unsolicited commercial electronic messages without prior consent. DCITA is coordinating a broad-based educational

program in partnership with industry leaders about the Act and spam in general. DCITA and industry bodies will also promote the development and use of technological measures and codes of practice to reduce spam, and are also encouraging and pursuing international cooperation in various international fora.

Consumer protection laws are generally applicable to e-commerce transactions in Australia. To help businesses meet their consumer protection obligations and to provide guidance on best practice in consumer protection online, the Australian Government has developed a best practice model for businesses offering online services entitled *Building Consumer Sovereignty in Electronic Commerce: A Best Practice Model for Business.* The model is based on the OECD Guidelines for Consumer Protection in the Context of E-commerce. The ACCC and the Australian Securities and Investments Commission (ASIC) will also monitor online service providers for compliance with consumer and securities fraud laws.

The Australian Government recognises that the establishment of a national health privacy framework is essential to the future success of e-health initiatives. Work in this area is being progressed through the National Health Privacy Working Group under the National Health Information Group. The Australian Government has worked with the states and territories to develop a National Health Privacy Code, which is intended to provide a nationally consistent approach to managing personal health information. The Code has been referred to jurisdictions for consideration and the development of a preferred position on its implementation.

Strategy 2.6

Ensure the interoperability of Australia's information infrastructure through effective partnership between public and private sectors

The Australian Government will undertake several initiatives to improve interoperability across the economy:

- encouraging industry and sectoral standards-setting activities
- projects to address interoperability issues within specific industry sectors in areas such as standards frameworks for e-business solutions
- projects that address interoperability issues that affect many sectors in areas such as online authentication, payments, and e-security
- collaborative arrangements to manage cross-sectoral projects and strategies in both private and public sectors
- the ultimate development of a *National Interoperability Policy Framework.*

Standards Australia is the peak body for industry standards setting in Australia. Standards Australia has conducted pilots for e-business registries, and leads an industry working group to establish e-business registries of messaging and interoperability standards.

The Australian Government is also working with specific industry and sectoral associations through the Information Technology Online (ITOL) program. The promotion of e-business systems is:

- supporting sectoral projects that encourage interoperability and alignment between technology and business needs
- providing tools and methodologies for managing variation and convergence among e-business standards and technology platforms
- establishing sectoral registries of messaging standards that facilitate harmonisation, re-useability and scalability in e-business
- creating governance structures and industry capabilities to facilitate collaboration.

Collaborative arrangements are being established in a number of key sectors. The Australian Logistics Council for the transport sector is one example, and similar collaborative arrangements exist in financial services, health and education sectors. In order to address cross-sectoral issues, the Government will work with private sector enterprises with a 'strategic footprint' across Australia's information economy, in the financial sector, the transport/logistics sector and the ICT sector amongst others.

Complementary public sector activities are also in progress. The Integrated Transactions Reference Group (ITRG) of the Online Ministerial Council (representing Australian, state, territory and local governments) is developing principles for collaboration, model agreements, standards and toolkits to support e-service delivery across jurisdictions. This work will ultimately constitute a national framework that encourages service delivery across jurisdictional boundaries. A new *Interoperability Technical Framework* has already been created that establishes technical policies and standards for electronic information and transactions to operate across Government agencies and jurisdictions.

The Health ICT Standards Committee (ICTSC) is developing a number of key standards needed to underpin the safe and secure electronic exchange of health information. These include messaging standards and client and provider identification standards.

Australian and state government agencies are being encouraged to implement these government frameworks as a step towards full interoperability among agency networks, and external business and community networks.

Priority 3: Develop Australia's innovation system as a platform for productivity growth and industry transformation.

Strategy 3.1

Build an innovation culture through improved access to education and skills development

The education and training sector has a number of mechanisms in place to respond to the particular challenges and opportunities posed by the rapid development of ICT and the information economy. Collaboration across all states and territories and across all parts of the sector is vital. This collaboration is facilitated though cross-sectoral committees such as the Australian ICT in Education Committee and the ICT in Schools Taskforce, which report to Ministers through the Ministerial Council on Education, Employment, Training and Youth Affairs (MCEETYA).

The education and training action plan, *Learning for the Knowledge Society: An education and training action plan for the information economy*, is currently being renewed. Key issues that the renewed strategy will address are:

- integrating ICT into education, training and research to improve learning and research outcomes and to develop an innovative and flexible population
- using ICT to increase access to quality education and training and achieve greater equity in educational outcomes
- using ICT to assist in national consistency in learning outcomes, to benefit all those who need to change their place of education and training
- developing agreed national approaches on research and evaluation
- meeting the sector's broadband, digital content and professional development needs
- addressing the ICT literacy needs of those outside of the formal education and training system
- positioning Australia to benefit from globalisation of education and training.

In addition, MCEETYA Ministers have endorsed a proposal of the Performance Measurement and Reporting Taskforce for 3-yearly national sample assessment of students' ICT skills and knowledge at years 6 and 10, and authorised the development of assessment instruments and key performance measures with a view to a first full assessment taking place in 2005.

Initiatives are also underway to promote lifelong learning and to facilitate and improve ICT skills development and up-grading, and retraining, in the vocational education and training (VET) and higher education sectors.

Backing Australia's Ability—Building Our Future Through Science and Innovation continues support for the long term sustainability of Australia's skills base in enabling sciences (including ICT) and encouraging positive attitudes to science and innovation.

Initiatives include:

- encouraging the take-up of careers in science, mathematics, technology and engineering (e.g. Questacon – Smart Moves Programme)
- improving the skills and recognising the achievements of our science teachers (e.g. the Science Connections Programme)
- improving the quality of science, mathematics and technology teaching and learning, and encouraging school-based innovation (e.g. the Fostering Scientific, Mathematical and Technological Skills and Innovation in Government Schools Initiative, and the Boosting Innovation, Science, Technology and Mathematics Teaching initiative).

Strategy 3.2

Maintain a globally competitive business environment for innovation

Over several years, the Australian Government has developed a business environment supportive of innovation.

- Public sector research provides the knowledge base and the research skills to underpin private sector innovation. This public investment is more than competitive with expenditures in other OECD countries, although historically, Australia appears to have directed a relatively small proportion of this investment towards ICT R&D. This investment is allocated through research institutions and grants bodies such as the Australian Research Council and the National Health and Medical Research Council
- Business expenditure on R&D (BERD) is encouraged primarily through the 125 per cent R&D tax concession. The 125 per cent R&D tax concession is supplemented by R&D START, a competitive grant and loans program which primarily benefits small companies
- Productive foreign direct investment, including direct investment in the ICT sector and R&D activities, is actively encouraged through Invest Australia's investment attraction strategies.

The Government's May 2004 statement *Backing Australia's Ability—Building Our Future Through Science and Innovation* (BAA–BOFTSI) extended the five year commitment made in 2001 through *Backing Australia's Ability* (BAA) to strengthening the national innovation system. This combined $8.3 billion, 10 year commitment includes a range of measures to strengthen the national innovation system by:

- Strengthening the ability to generate ideas and undertake research
- Accelerating the commercial application of ideas
- Developing and retaining Australia's skills base.

1. Strengthening our ability to generate ideas and undertake research

BAA provided significant new investment to strengthen Australia's research base, including a doubling over 5 years of the national competitive research grants administered by the Australian Research Council (ARC), new investment in research infrastructure, and Centres of Excellence in ICT and biotechnology. BAA–BOFTSI will maintain the doubled level of funding for the ARC's National Competitive Grants Programme, provide an additional $1.1 billion investment in R&D infrastructure (including support for the establishment of collaborative research projects), and extend funding and support for the ICT Centre of Excellence (NICTA) and the Building of IT Strengths (BITS) Advanced Networks Program.

BAA also introduced significant new incentives to stimulate increased business investment in R&D. These include a new 175 per cent tax concession to further encourage companies to increase R&D efforts, a rebate to assist small companies to undertake R&D, and continued direct grant assistance. These incentives will be retained under BAA–BOFTSI.

2. Accelerating the commercial application of these ideas

BAA improved the flow of finance into research commercialisation by:

- boosting the Cooperative Research Centres (CRC) Program by 80 per cent over five years at a cost of $227 million
- increasing funding for the Commercialising Emerging Technologies (COMET) program to assist firms to improve their commercialisation and management skills
- providing $100 million over five years for an Innovation Access Program to enhance the access of Australian firms to new technologies, including e-commerce business solutions especially for small and medium enterprises
- establishing and contributing $78 million towards a competitive Pre-Seed Fund, administered by private sector fund managers, to assist commercialisation of R&D undertaken by universities and public sector agencies
- following the announcement of the BAA, the Government introduced significant tax reforms for the Australian venture capital industry to encourage investment with:
  - flow-through tax treatment for registered venture capital funds and funds-of-funds structured as limited partnerships
  - exemption for certain foreign investors in these funds from Australian tax on their returns from their investment in these funds
  - capital gains tax treatment of the carried interest payments made to the managers of these funds.

Under BAA – BOFTSI:

- an additional $100 million will be provided for COMET, extending the program to 2011
- an additional $65 million will be provided for the CRC program from 2005–06, which will be refocused to generate industrial, commercial and economic outcomes
- funding the Pre Seed Fund will be extended until 2010–11
- the BITS Incubator program, which provides finance and advisory services to young ICT companies, will receive funding of $36 million to extend the program until 2007–08. This will allow a number of existing incubators to move towards self sustainability
- a new $1 billion Commercial Ready program will be introduced from 2006–07, merging R&D Start, Biotechnology Innovation Fund and elements of the Innovation Access program. Commercial Ready will combine support for competitive research, proof of concept and early stage commercialisation activities.

3. Developing and retaining Australian skills

The Government's skills strategy is to increase university places in critical fields, support ongoing skills development for work and life, enhance science and technology literacy, provide for increased access to online learning opportunities, and boost our skills base through immigration.

BAA initiatives include:

- providing $151 million over five years for an additional 2000 university places each year, with priority given to ICT, mathematics and science
- introducing 25 new Federation Fellowships worth $225 000 a year for five years. In addition, the number of Australian Postdoctoral Fellowships were doubled from 55 to 110 and remuneration improved
- providing $34 million to the Le@rning Federation initiative over five years, matched by state and territory funding to help develop online curriculum content for schools. This will enhance student access to quality learning opportunities and integrate ICT into the learning process.

Under BAA – BOFTSI, funding of $200 million will be provided over five years from 2006–07 to continue support for the additional 2000 targeted higher education places introduced in BAA.

Developing the Australian ICT industry and national ICT capability

The Government's ICT industry development strategy recognises the importance of the industry to the economy in terms of both its direct contribution and its critical economy-wide enabling role in improving productivity, driving business efficiencies and stimulating and supporting innovation and business transformation.

- The *ICT Framework for the Future* is being implemented with a focus on key elements in the innovation infrastructure to support the longer-term development of the industry and the growth of a leading edge and globally competitive, national ICT capability. The *Framework* builds on the substantial foundations put in place by the Government in recent years, including the Government's $8.3 billion ten year commitment to science and innovation through BAA and BAA–BOFTSI and other initiatives, including support for ICT start-up companies and reforms to the taxation of venture capital.
- Funding for NICTA will continue development of a world class research institution that takes Australia's ability to create and exploit ICT to a new level.
- Australia's profile as an ICT investment location is being promoted through the implementation of an ICT Investment Attraction Strategy within the National Investment Framework.
- The growth of ICT SMEs is being facilitated through measures such as:
  - the R&D tax offset that provides eligible small, growing firms with access to immediate cash relief
  - the ICT Incubators, Commercial Ready and COMET programs to assist with the commercialisation of ideas
  - assistance to access new markets through initiatives such as the Export Market Development Grants and joint Government-industry initiatives to make it easier for SMEs to sell to government and big business in Australia.

Strategy 3.3
Achieve global scale and critical mass in priority research areas

Flowing from BAA, the Australian Government in December 2002 announced four national research priorities and their associated priority goals. These are intended to focus public investment in research into key areas that can deliver significant economic, social and environmental benefits to Australia. The four research priorities are:

1. an environmentally sustainable Australia
2. promoting and maintaining good health
3. frontier technologies for building and transforming Australian industries
4. safeguarding Australia.

These priorities will build on national research strengths while seeking new opportunities in emerging areas. They recognise the key role of ICT as an enabler of a broad range of industries. While ICT is relevant to all of the priorities, two—the frontier technologies and safeguarding Australia—have significant ICT components.

'Promoting an innovation culture and economy' (frontier technologies) was one of four new goals included in the research priorities framework in November 2003 to give greater emphasis on how people are affected by, and respond to, the challenges and opportunities confronting our nation.

Several significant BAA and BAA–BOFTSI initiatives are designed to scale up Australia's research effort in critical areas. Examples include the Co-operative Research Centre (CRC) Program, and the specialist research centres such as the National ICT Australia Centre of Excellence (NICTA). The ARC Research Networks program will also support creative, inter-disciplinary research that is not averse to risk-taking.

In response to the National Research Priorities and an independent review of its impact in this area, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) has refocused its existing ICT research into a new ICT Centre. As well as carrying out core ICT research, the ICT Centre is engaging other CSIRO Divisions to apply leading-edge ICT to key applications in order to develop new technologies for Australian industry. The Centre is also actively fostering collaboration with other ICT research agencies, including NICTA, the DSTO, and the ICT-focused CRCs.

The National Collaborative Research Infrastructure Strategy to be introduced under BAA–BOFTSI will link infrastructure funding more closely to the national research priorities.

Strategy 3.4

Develop ICT research networks as a platform for enhanced national and global research collaboration

Good research is increasingly conducted by national and global teams, and through shared data sets. It involves access to very large scale data collections and computing resources, complex simulations, and high performance visualisation back to the individual users to create virtual, global research teams.

The national ICT research platform provides new scope for building critical mass within specific fields, and improved access to overseas research communities and their major facilities. The development of a strong ICT research infrastructure will both lift the productivity of R&D and provide the capacity to deal with the increasing density and sophistication of information. The research community is at the forefront of technical management solutions for the next generation of ICT systems.

The foundations for distributed computing were laid in September 1998 with a grant of $19.5m over four years for an Australian Partnership for Advanced Computing (APAC) to develop an Australia-wide computing and communications systems infrastructure, supported by coordinated programs in research, education and technology diffusion. The Government has also committed additional funds of $29 million under the Systemic Infrastructure Initiatives over 2004-2006 to enable APAC to play a national role in delivering essential components of the emerging eResearch environment.

In May 2001 the BITS Advanced Networks Program (ANP) provided new funding to support the development, trial and demonstration of advanced communication networks, experimental networks and test beds:

- GrangeNet—a $14million, 3-year grant for a high-speed backbone network linking universities and research facilities in Australia and overseas
- CeNTIE—established to develop and prove new technologies required for the business systems of the information economy
- m.Net—to establish a leading edge wireless communications network in Adelaide and connected to GrangeNet and CeNTIE.

An extension of ANP's funding until 2006-07 under BAA–BOFTSI will allow GrangeNet, CeNTIE and m.Net to continue and intensify their research and explore opportunities for commercialisation of leading edge broadband applications.

In addition, the Australian Government has allocated nearly $69 million to position Australia in the centre of global research networks with the establishment of the Australian Research and Education Network (AREN) in late 2003. AREN is a research and education broadband network serving the higher education sector, especially in regional areas. The Government has also strengthened Australia's innovation capabilities by providing $155 million for major national research facilities.

A key focus of BAA–BOFTSI is to boost collaboration between key players in the national innovation system, as well as encourage linkages with international science and access to global research and technologies. The package includes $542 million over seven years for a National Collaborative Research Infrastructure Strategy, which aims to foster greater research collaboration and the collaborative use of infrastructure, and a five year $55.5 million International Science Linkages program.

The ARC's National Competitive Grants Program will emphasise and support collaborative networks that span traditional research fields.

Coordination of relevant capabilities and governance arrangements that regulate access, authentication, privacy, intellectual property ownership, standards, security and database management are equally important.

While some research communities have begun to modernise, the issues of compatibility of data collection, storage and access are similar in several sectors:

- the scientific research community, which relies on shared access to networks and facilities, and increasingly, global networks and facilities
- the education sector, that overlaps the scientific community in some areas
- the social sciences that rely of databases of statistical information that underpin social studies and government policy development
- the service industries that rely on digital content databases for innovation.

At present, higher education is the only sector that addresses these issues collaboratively. In order to address e-research issues across all sectors, a national policy framework for e-research that spreads learning, and shares infrastructure and cost between sectors will be developed. This strategy will address:

- sharing of investment in infrastructure
- standards for transmitting, storing and managing data
- development of management capabilities for ICT networks, databases, research collaboration and commercialisation
- policies on access to intellectual property, including researcher, library and public access to copyright, scientific, statistical, and content resources
- emerging quality of service issues as data and networks become business-critical in the economy.

Priority 4: Raise Australian public sector productivity, collaboration and accessibility through the effective use of information, knowledge and ICT.

Strategy 4.1

Develop governance and business arrangements that ensure accountability, efficiency, transparency and integration

At the national level, in 2002 the Australian Government established the Information Management Strategy Committee (IMSC), comprising the Heads of major departments and agencies, to facilitate whole-of-government approaches to ICT investment, governance and management.

The IMSC is responsible for:

- fostering a 'big picture' approach to ICT issues with agencies responsible for individual ICT arrangements
- setting collaborative strategies and achieving cooperation between Australia Government agencies to transform government and deliver more integrated services
- encouraging a cooperative approach to decisions on standards, investment, security, privacy, shared infrastructure, and reuse of intellectual property
- ensuring that decisions reflect the impact and benefits across government, rather than on individual agencies alone.

A Chief Information Officer Committee (CIOC) reports to the IMSC and is developing strategic ICT architectures, standards and proposals for shared services. Working groups have been established to consider security infrastructure, authentication, identity management for Australian Government employees, sourcing and channel management. It also promotes information and knowledge sharing, and places a high priority on a trusted and secure government service environment.

The IMSC is also developing strategies for agencies to achieve cost-effective procurement of ICT goods and services in a more highly developed e-government environment. The governance and operational arrangements being developed within the IMSC will provide both accountability of government operations and transparency of government functions, whether those services are provided directly by government or through non-government service providers.

The Online Ministerial Council (which includes Australian Government and state, territory and local government representatives) has established the *Integrated Transactions Reference Group* (ITRG) to develop principles for collaboration,model agreements, technical standards and management toolkits to support e-service delivery across government jurisdictions. The ITRG is progressing an integrated service delivery framework project to provide specific guidance to government departments and agencies on service provision involving multiple government agencies in one or more jurisdictions. The aim is to codify the backroom processes necessary to provide integrated services, regardless of the number of agencies or jurisdictions involved.

The *Integrated Service Delivery Framework* will provide:

- a customer-centric view as the primary driver to service integration
- a step-by-step approach to reaching agreement between jurisdictions on collaboration, starting with endorsement of high level principles to underpin service integration
- an approach that looks beyond technology to include legislative requirements, governance issues, and financial and business processes
- wide-ranging model agreements for use between agencies
- a toolkit to support agencies in implementing integrated services.

In the health sector, the National Health Information Group (NHIG) and the Australian Health Information Council (AHIC) were established in late 2003 to provide an integrated approach to planning, managing and resourcing projects across jurisdictions and the private sector. A more integrated approach better positions the health sector to harness ICT to support strategic health reforms.

Strategy 4.2
Develop an Australian Government ICT investment and interoperability framework to support integrated services

Business cases for ICT investment have traditionally been developed on an agency-by-agency basis. Investment in common or shared infrastructure requires different approaches because:

- the benefits of individual agency investment in shared infrastructure may be spread across and between levels of government
- infrastructure priorities and payback timeframes may differ between participants
- interoperability between the business and ICT systems of government agencies, and between the public and private sectors, is needed to reduce costs across the economy.

As previously indicated, the Online Ministerial Council and the IMSC are important mechanisms for the development of cross-agency and cross-jurisdiction frameworks for integrated services. A complementary framework for investment in shared infrastructure will facilitate the development of multi-agency and cross-jurisdiction integrated services.

The investment framework will include models for determining costs and benefits, return on investment, and governance of shared systems, including maintenance, liability, accountability, and change and content management.

The Australian Government has commenced the development of mechanisms to foster shared ICT infrastructure and investment. The *Interoperability Technical Framework* is the first step in this work. The *Interoperability Technical Framework* establishes policies and standards for electronic information and transactions to operate across Government agencies and jurisdictions.

National and state agencies are being encouraged to implement the framework as an important step towards interoperability among agency networks, and with external business and community networks.

The *Interoperability Technical Framework* will evolve to cater for emerging technologies and changing standards both within Australia and internationally. A key challenge will be to maintain alignment between the government arrangements and emerging arrangements in the private sector.

A wider 'interoperability business framework', that will also address business issues in integrated service delivery, is in the early stages of planning and will be developed over the next three years.

Strategy 4.3

Develop collaborative approaches across government that promote the creation, sharing, protection and accessibility of information and knowledge

Working more successfully across Australian government agencies, other jurisdictions and the private sector relies on better information sharing and requires structured approaches to the collection, reuse and sharing of data and information. An agency's approach to the management of its information holdings must be driven by its business requirements.

However, this needs to be done in a way that gives due recognition to whole-of-government business requirements, as well as agency-specific requirements. Agencies must manage the tension between the integration of these priorities. Understanding when information needs to be shared and establishing agreed frameworks and protocols are essential to create this balance.

Providing services to citizens in a multi-channel environment—online, on the phone, at the counter or in writing—requires greater sophistication and levels of collaboration and information sharing among government agencies. Whole-of-government information management and channel management strategies will be developed and supplemented to address the need for inter-agency collaboration.

Better management, decision-making frameworks and support tools will help agencies to enhance discoverability of and appropriate access to their information and services, both internally and externally. Agencies will also be able to better identify which connections and channels are significant and whether new connections or channels need to be established. Examples such as the Business Entry Point for business services (in the Department of Industry, Tourism and Resources) demonstrate the benefits that can be achieved.

This challenge will be met through a series of information and content management standards, principles and processes applicable to all Australian Government agencies. These include:

- standards for branding, design, navigation, content management, security and privacy
- practical adoption of the concept 'create once, use many times' to provide a basis for better information sharing for whole-of-government requirements in areas such as aggregation of content through subject-specific portals for community groups, agriculture, families, business, Indigenous, culture and recreation, regional, education, seniors, employment, women, environment, youth, health, immigration, industry and science
- accessibility to those with disabilities or with technological constraints, and the provision of resources to facilitate access to the Internet
- discoverability through the adoption of the Australian Government Locator Service (AGLS) metadata standard, a national standard recently endorsed by all Australian governments and issued by Standards Australia for tagging online content
- publishing guidelines for language usage, information presentation and production designed to improve efficiency, quality and accessibility of government information
- archiving and record keeping standards currently being maintained by the National Archives of Australia designed to ensure legal compliance and accountability for agencies as well as corporate memory and efficiency.

In particular, the IMSC is focusing on improving government service delivery and creating efficient links between government services and customers in a complex service environment. The Government's channel management strategy will guide agencies on ways of identifying the appropriate channel, or combination of channels, for the delivery of government services to citizens. Traditional channels will retain an important place in this strategy.

While at an early stage of its work, a number of guiding principles have been identified for effective channel management and hence improved and more efficient government service delivery. These principles relate to cooperation (commitment and trust, integration, collaboration, partnership), customer focus and choice (customer centric, access and choice, engagement) and channel-relevance (value creation, integrity, adaptability).

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