

# digital by design

delivering better government services through information and technology

**PUBLIC CONSULTATION DRAFT**

**1 OCTOBER 2012**

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# 1. About this document

This is an independent review and commentary on the draft ICT strategy for the Victorian Government, prepared solely by Mark Toomey.

In addition to being submitted in its original form to VICTAC, this document is being provided as input to responses being prepared by the Australian Computer Society and by the Liberal Party of Australia Victorian Division Communications, Broadband & Technology Forum.

The review and commentary is presented in the context of the original document, and is identified by the use of “boxed purple text” as exhibited in this paragraph. Original content is unchanged save for the inevitable adjustment to page numbering that arises through insertion of additional comment text.

This is a draft strategy describing how the Victorian Government will design and use information and technology to deliver better government services. It provides high-level direction on the management and use of information and communications technology (ICT).

In June 2012, the Assistant Treasurer established the Victorian Information and Communications Technology Advisory Committee (VICTAC) and tasked it with overseeing the development of a Victorian Government ICT strategy.

The committee is led by an independent chair and includes representatives from the Victorian Government, the ICT industry, and corporate Chief Information Officers (CIOs).

ICT is, fundamentally, a tool of business. Business leadership and engagement are critical aspects in determining appropriate use of ICT and in realising the value of ICT investment. It would have been very useful for the committee to have included a small group of well-informed business leaders in government and industry roles, to give greater depth, strength and credence to the recommendations for business leadership and engagement.

Some stakeholders may question the credibility of the assertion that the committee chair is independent. While the credibility and capability of the chair is not in question, his role with an organisation that is routinely engaged to provide advice to government may raise the question of whether there is sufficient separation in this case, as there is little doubt that government will seek further assistance in implementing the strategy.

In the development of this draft, VICTAC has sought feedback from within Government and from external advisors, industry stakeholders, and now the public.

The strategy is a work in progress. The proposed actions, in particular will be further refined.

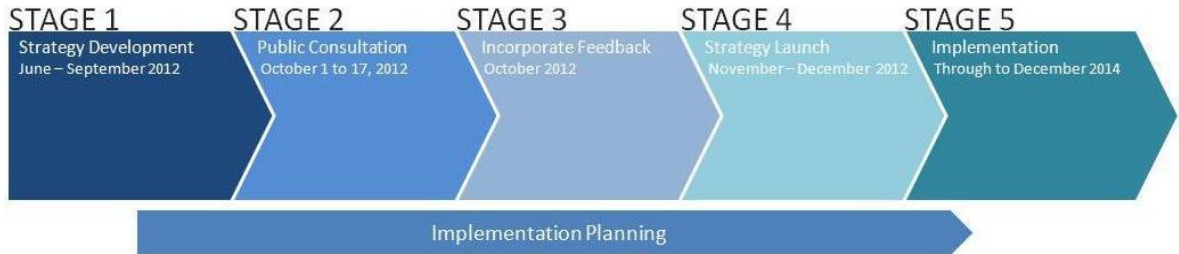
Following the public consultation period, feedback will be reviewed and incorporated.

The strategy will be presented to Government by December 2012.

The finalisation of the strategy is the first in a series of steps to improve ICT management and use. An implementation phase will follow and be supported by a more detailed implementation plan, necessary governance and organisational structures, funding and ongoing measurement and reporting. VICTAC and Government are well aware of the implementation challenges, and will be considering these over the coming months.

The strategy will be reviewed annually in a cycle of continuous improvement.

There is insufficient contrast between text and fill colours in the following diagram, making it difficult to read in printed form.



## 2. Overview

This document presents a useful start to a process of renewal in Victorian Government use of ICT. However, it is only a start. It needs to be reinforced and improves in several important areas, beginning with the government's philosophy of ICT use. Specifically, government, as is also the case in industry, must recognise that ICT is no longer merely a tool for automation. Rather, ICT is a fundamental business resource, used not just by individual organisations, but also used independently by other organisations and individuals within the overall eco-system.

As a business resource, successful planning, delivery and operation of ICT-enabled business activity is, unequivocally, a business leadership responsibility, and business leaders must be accountable for this. Further, the use of ICT by others in the organisation's eco-system, such as the use of social media as well as more traditional structured systems, impacts on the business activities of the organisation, and therefore must be understood and addressed in business terms.

To underpin the effective transition into a new era of ICT use in government, where ICT is a fundamental business resource used as a basis for business planning, business establishment, business operation and for engagement between the business and its eco-system, there must be a new, effective approach to governance and management of ICT, in which there is:

- clearly and appropriately assigned responsibility for ICT decision-making;
- appropriate development of business strategy which leads and defines the use of ICT, complemented by plans that assure the successful realisation of ICT-enabled business goals;
- a sound and compelling justification for all investment AND disinvestment in ICT, including expenditure on design, construction and deployment of new capability as well as maintenance and operation of existing capability;
- rigorous attention to ensuring that all aspects of ICT performance meet well-defined and appropriate goals, with the primary measures of performance and capability being in terms of business activity and outcomes;
- a robust, unambiguous approach to conformance in respect of ICT use in the Victorian Government, encompassing adherence to laws, codes of behaviour, contractual, ethical and professional obligations, and the appropriate determination, promulgation and enforcement of internal rules that affect all levels of ICT decision-making;
- deep understanding of, and respect for, the behaviour of people as individuals and in communities, reflected in the plans and decisions regarding the use of ICT by the Victorian Government.

These six points reflect the core principles for effective governance of ICT as set out in the Australian and International Standard for Corporate Governance of ICT, AS/ISO /IEC 38500. This form and level of guidance on governance of ICT exists in no other standard or framework on governance of ICT. A comprehensive explanation of AS/ISO/IEC 38500 is available in my book, *Waltzing with the Elephant*, available from Infonomics.

To be complete, this document must include a high level implementation plan, including details of the governance arrangements that will be put in place to ensure that the plan is implemented as intended, and in its entirety, recognising that many pressures will come to bear that may thwart achievement of the government's intent.

The strategy provides high-level direction on the management and use of ICT.

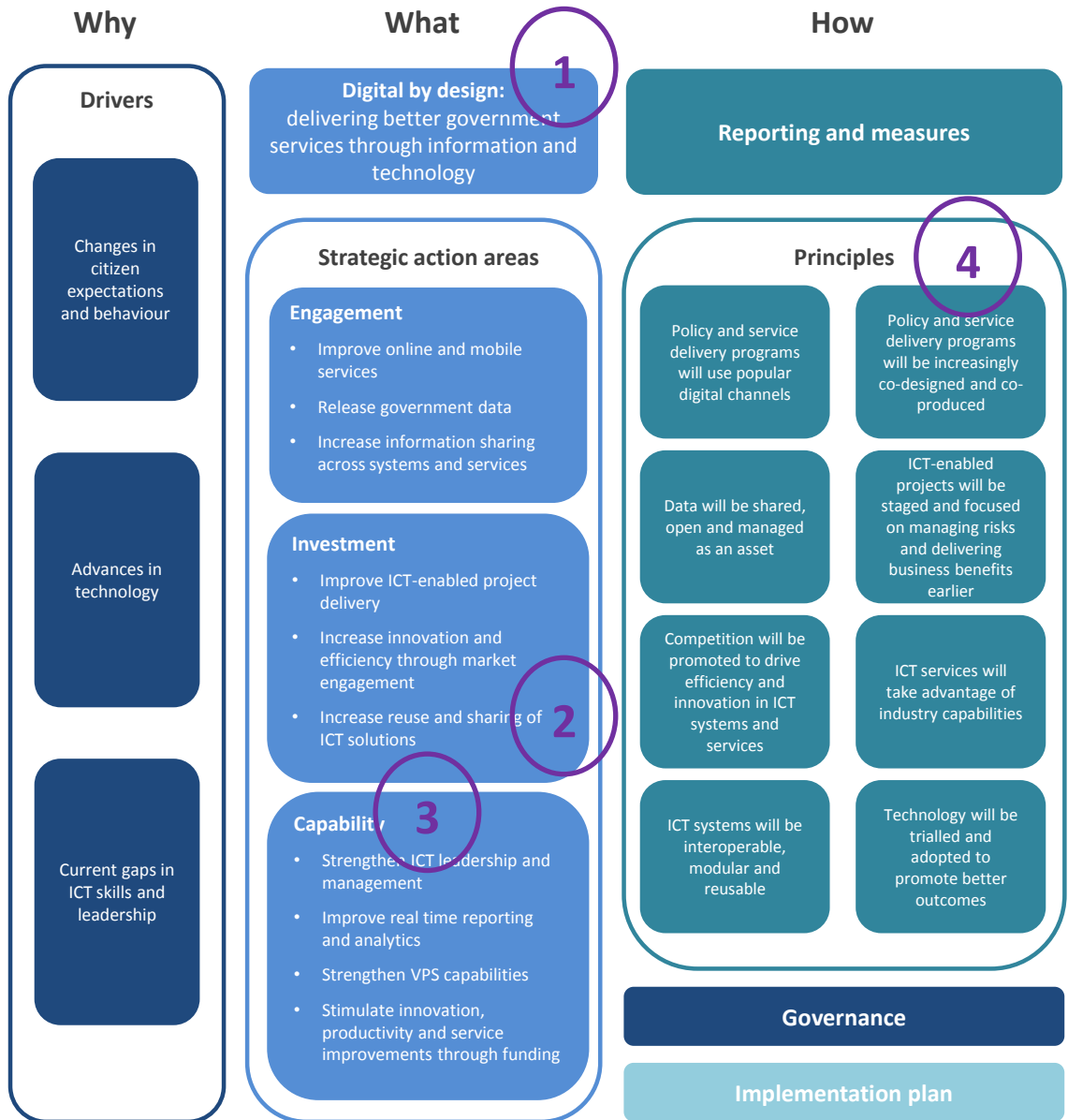
It has been developed in response to three drivers: changes in citizen expectations and behaviour; advances in technology; and current gaps in ICT leadership and skills.

The strategy sets out objectives and actions focused in three key areas and proposes eight principles to guide ICT decision making. The implementation phase will be supported by a more detailed implementation plan, governance and organisational structures and ongoing measurement and reporting.

There is insufficient contrast between text and fill colours in the following diagram, making it difficult to read in printed form.

The following points refer to the numbered markers on the diagram overleaf:

1. Better government services cannot be delivered merely through information and technology: these are passive elements. What is required for better government services is **effective use of** Information and Technology, which requires a strategic intent for services and service delivery that is informed by an understanding of what is, and what will be possible through the use of ICT. This must be complemented by ongoing business commitment to and engagement in detailed planning, implementation and operation of new, better ICT enabled services.
2. Reuse and sharing of ICT solutions is a laudable objective, provided that there is recognition of the reality that ICT solutions are designed around specific business models. Flexibility to adapt to varied business models is expensive and, while continually improving, has not attained, and will not for some time reach the utopia of infinite flexibility. Thus, reuse and sharing must be determined through pragmatism of adopting **standardised business models where standard solutions are employed**, and using fit-for-purpose solutions where the business model is necessarily unique.
3. A critical capability for contemporary and future organisations is **business leadership of ICT-enabled change**. Such leadership must begin at the top of the organisation, and should be reflected in its highest level of strategic planning, where the opportunities and impacts of ICT use in the organisation and in its eco-system must be recognised. Business leadership for ICT must be pervasive throughout the organisation, not in terms of ICT supply, but in terms of ICT use, leading to effective business engagement in planning and delivering the outcomes expected from the effective use of ICT.
4. The importance of business leadership, ownership, engagement and accountability cannot be overstated and should be reflected in the adoption of a ninth principle: **Business leadership and accountability for ICT enabled change, outcomes and benefits.**





### 3. Why the Victorian Government needs an ICT strategy

In a modern public service, ICT underpins and often shapes service delivery. Reinvigorating the way we use information and technology can result in major benefits. ICT provides the channels for government to connect with businesses and the community, it automates processes and it makes transactions more convenient. In a time when global and national economic factors have resulted in significant pressure on the Victorian Budget, improving the management and use of ICT provides an opportunity to raise productivity across the public sector.

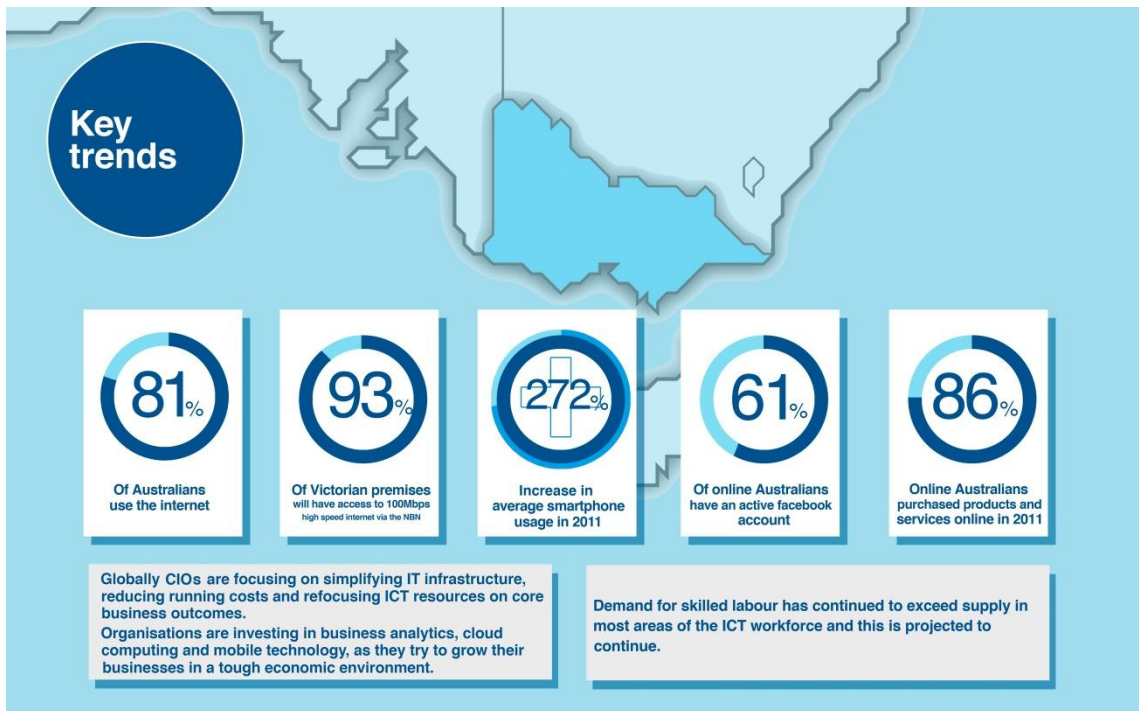
As presented, the text conveys attachment to past models of ICT use which, while important, are merely the tip of the iceberg in terms of what should be in place today and what will be demanded by the community in the future. Two factors must be recognised from the outset:

1. ICT enables new business models, new products and services, and new levels and standards of performance. This reality is commonplace in the commercial and social arenas, and is conditioning expectations of government as well.
2. ICT enables customers to act independently of suppliers. The era when an organisation could determine and foist its own ideas on ICT on its constituents is past, and now constituents are empowered to do as they please, including finding and engaging alternate suppliers, and using social media to engage with, criticise and campaign against suppliers. In this context, in many cases, government is relegated to the role of a supplier and must meet the standards expected of suppliers in general.

In terms of raising “productivity across the public sector”, it may be appropriate to emphasise the opportunity for effective, efficient and acceptable USE of ICT to improve the productivity of government service delivery and citizen engagement.

This ICT strategy has been developed in response to three key drivers:

- changes in citizen expectations and behaviour;
- advances in technology; and
- current gaps in ICT skills and leadership.



### 3.1 Changes in citizen expectations and behaviour

ICT has changed the way people shop, bank and communicate. Consumers expect online services to be easy to use, and available when and where they need them. For the first time in 2011, accessing government services or information was among the ten most popular online activities for Australians.<sup>1</sup> Seventy-eight per cent of Australian internet users accessed government services/information online.<sup>2</sup> Government services and transport, timetable or traffic made up two of the three most requested applications for development last year.<sup>3</sup>

The increased use of mobile devices like smart phones has created demand for location-based services. Mobile devices comprised 10.5% of the Victorian Government’s website traffic in May 2012, up 256 per cent from May 2011<sup>4</sup>. It is predicted that by 2016, global mobile data traffic will outgrow global fixed data traffic by three times.<sup>5</sup>

The ICT ecosystem in which government and business operates has changed irrevocably. No longer does any organisation have absolute and sole control over the technology environment in which it operates. Past practices of negotiated control over mutual use of ICT between “consenting entities” continue to be relevant, but cannot accommodate the new reality of ICT anarchy, in which consumers and business can use ICT as it sees fit to, in many ways, seize control of the agenda for the government. While social media is perhaps the prominent form of anarchy in which opinion develops and becomes pressure on government, there are many more potential opportunities in which an unfettered community will use ICT to extend and perhaps usurp the role of government. Already, government is moving to free availability of government data and this is being taken up by business and community for exploitation in myriad ways. But why should this be the limit? Imagine a scenario where business, and perhaps community organisations, uses ICT to disintermediate front line government service delivery – using published interfaces to access core functions, but wrapping these in more attractive, value-adding delivery channels.

What this means is that government now must be mindful not only of the increasingly sophisticated demands of citizens, but also of the potential for new business models to emerge where government has only core responsibility, and little if any control at the front line.

It is clear that Victorians want government services that are online, easy to use, and delivered through their mobile devices. However, the rate of adoption of consumer technologies by government is traditionally slow.

New technologies are also re-shaping the consumer-service provider relationship. Social media facilitates peer-to-peer advice and support, wikis are used to co-author information and crowd funding sites bring together suppliers and investors in new ways.

Governments are realising that they can tap into crowd resources and that not everything has to be developed internally. Citizens and businesses are helping to create policy, and design and deliver services. Victoria has the added advantage of a strong local ICT industry ready to contribute to co-design and co-production processes.

The Victorian Government is already moving to open data access which will allow industry and citizens to build new products and services based on data we all own. This is a key step but more can be done to encourage input and participation in government service delivery.

### 3.2 Advances in technology

Across Australia, underlying ICT infrastructure is being enhanced. Access to high-speed broadband will open up opportunities for quality multi-party video conferencing and remote services. Victoria needs to look at how it can exploit these channels, particularly to improve services for Victorians living and working in regional areas.

Access to data and the ability to process it are improving. Smart networks, remote sensors and GPS-enabled devices are gathering information on power usage, air and water quality, temperature and traffic flow. Social media interactions can be analysed, revealing new connections and insights. Government is an information-based enterprise and improving the way we manage and analyse data is central to improving service delivery and outcomes.

The uptake of managed ICT services is increasing. The speed, flexibility and economies of scale offered by cloud computing are prompting organisations to rethink what needs to be delivered in-house. With current financial constraints the Victorian Government is looking at these alternative delivery models.

The critical point that must be made in this discussion is that changing ICT capability enables, and frequently demands, new business models, new products, new services, new capabilities within organisations, new relationships and so on. These are not matters for attention by ICT specialists. Rather, they are the fundamental responsibility, as they always have been, of business leaders, managers and planners who must now understand ICT from the perspective of its capability and impact. This expectation of “ICT Savvy” does not presume that business managers become technicians, but rather demands that business managers who are not qualified accountants nonetheless have a measure of savvy regarding the use and management of financial resources.

### 3.3 Current gaps in ICT leadership and skills

Victoria has experienced some expensive failures in ICT-enabled business change projects. However, such projects are critical for productivity and service delivery reforms. The solution is not to avoid ICT-enabled projects but to address the past failures through a more rigorous and considered approach.

The last sentence may be seen as indicating that the cause of recent failures is properly understood and accepted. This may not be the case, particularly considering that there have been repeated reports by the Auditor General highlighting the same core problems. A more rigorous and considered approach will work only if it includes the mandatory engagement and accountability of top line business leaders in setting the agenda and delivering the outcomes for ICT, with a pragmatic and deeply inculcated awareness that ICT investment is, first and foremost, investment in business change, and therefore a primary responsibility of business leadership.

Demand for skilled labour has continued to exceed supply in most areas of the ICT workforce and this is projected to continue, especially as skills required become more sophisticated.<sup>6</sup> The problem of attracting and retaining a skilled ICT workforce is compounded for government because often it cannot match industry rates in specialist areas.

To some extent, ICT professionals are motivated by matters other than money. In particular, Victoria has the opportunity to build a reputation as a world leader in government use of ICT, and in doing so will give many ICT professionals the opportunity to learn and build leading edge applications, techniques and skills. Such experience and personal growth will help maximise opportunity for these professionals in the commercial markets at home and abroad. Instead of Australian's going abroad to seek learning opportunities, they could be going abroad to take Australian (and particularly Victorian) knowledge to the world.

Consideration should be given to the Victorian Government becoming an intentional, and highly capable incubator of talent for the next generation of ICT use. As part of such a scheme, there should be recognition of the value in workplace training and development for ICT professionals who have, in many instances and particularly in the contracting market, had insufficient opportunity and incentive to build not just their technical skills, but their interpersonal and business skills.

Leadership of ICT-enabled initiatives in Victoria has traditionally been delegated to technical experts. To ensure success executive business-level sponsorship is needed. Implementing this strategy and delivering service improvements will need the same executive business-level leadership and coordination.

The above is perhaps the most profound point to be made in this report, and it deserves to be made with maximum prominence. However, the point is also understated.

The success of this strategy, and the future success of ICT investment by the Government of Victoria, demands absolute engagement in, ownership of, and accountability for the efficient, effective and acceptable use of ICT at the highest levels of governance and management across the entire state government. In this context, there must be clearly defined roles and other arrangements for directing and controlling the use of ICT at the levels of cabinet, agency heads and agency executives, including but certainly not limited to ICT executives.

There is clear and unarguable evidence now in place for the value that comes from such top level engagement, with one notable contemporary example being the depth of engagement and oversight exercised by the current and immediate past CEOs of Commonwealth Bank, as it completely replaced its core business systems over a five year project.

## 4. Objectives

The *digital by design* vision is to deliver better government services through information and technology. To support this vision, the Victorian Government has outlined objectives in three key action areas.

### **Engagement: Using ICT to create easier and more personalised services at lower cost**

Government will move towards:

- easy access to government services and information based on citizen preferences, more services available online and more personalised services;
- unlocking government data and working with citizens and businesses to innovate and build new solutions where appropriate; and
- systems able to interoperate, allowing citizens to interact more easily with the Victorian Government.

### **Investment: Improving how government invests and works with the ICT industry**

Government will move towards:

- a focus on clearly identified business outcomes, risk minimisation, early industry engagement, staged projects and adapting processes to make the best use of existing market offerings;
- reusing and sharing solutions across government where possible; and
- enabling and harnessing competition and market capabilities to deliver innovation, efficiency and productivity.

### **Capability: Improving ICT governance and planning, building internal capability and encouraging innovation**

Government will move towards:

- a clear ICT strategy, governance and accountabilities;
- building skills in commercial engagement, business engagement, architectural design, information management, customer focus and problem solving; and
- an innovative culture that delivers productivity and better services.

The goals presented here are necessarily high level, and are broadly endorsed.

A vital capability to add is the capability to envision, design and deliver radical change in government business models that are enabled by innovative use of ICT, including scenarios where the innovation includes hand-off of previously government-exclusive activity to independent third parties. In many future scenarios, government may be limited to the roles of “manufacturer” and “regulator” of the fundamental elements on which service delivery is based.

## 5. Principles

ICT decision making in the Victorian Government will be guided by the following principles:

**1. Policy and service delivery programs will use popular digital channels**

Government will make its information and services easier to access and use through digital channels. Services will make use of popular consumer technologies like smart phones and social media.

**2. Policy and service delivery programs will be increasingly co-designed and co-produced**

Government will consult and involve citizens and businesses in the design and production of policy and service delivery programs where it is appropriate to do so.

**3. Data will be shared, open and managed as an asset**

Data will be shared across government and with businesses and citizens, to support integrated service delivery, better decision making, and innovation. Data will be made available in open, machine-readable formats. Data will be managed as an asset of the State with clear accountabilities.

As noted in the Overview section, the importance of business leadership, ownership, engagement and accountability cannot be overstated and should be reflected in the adoption of a ninth principle: **Business leadership and accountability for ICT enabled change, outcomes and benefits.**

Agency heads and their leadership teams will be responsible and accountable for ICT use within their organisations, regarding ICT as a business resource at the same level as which they regard financial, human and other resources. As such, these leaders will be responsible for setting the agenda for the current and future use of ICT, and they will be accountable in the manner of the Westminster System of Government (and not in the parodied form illustrated in the television series *Yes, (Prime) Minister*), for its successful delivery.

To maximise effective use of ICT across the entire government, arrangements should be established to provide coordinated leadership and accountability for rationalisation and standardisation of business practices and the underlying ICT enablers, and for capability development programs that necessarily cross the boundaries of individual agencies. Such arrangements should also facilitate collaborative design of new generations of government service delivery spanning agencies.

Finally, it is essential that business ownership and accountability span the entire ICT asset lifecycle, as decisions regarding maintenance and replacement or retirement of systems should ultimately be driven by business considerations.

**4. ICT-enabled projects will be staged and focused on managing risks and delivering business benefits earlier**

Projects with significant ICT requirements will be designed, delivered and measured based on clearly articulated business benefits. Large projects will be broken into smaller, more manageable stages to improve delivery timelines and reduce the risk of project failure.

**5. Competition will be promoted to drive efficiency and innovation in ICT systems and services**

Competition will be used to drive efficiency and innovation in ICT systems and services. Government will favour shorter contract terms and open standards to increase competition and guard against single vendors securing a disproportionately high share of government business.

**6. ICT services will take advantage of industry capabilities**

Government will analyse the market's capability to deliver value for money and innovative solutions that improve the delivery of government services. Commercial-off-the-shelf software or outsourced services will be adopted in most cases. Government will engage early with stakeholders and industry, focusing on business outcomes and adapting processes to avoid customisation.

**7. ICT systems will be interoperable, modular and reusable**

ICT systems will be designed and upgraded to encourage reuse and interoperability. Agencies will reuse and share solutions, and engage in joint procurement where requirements are closely aligned.

**8. Technology will be trialled and adopted to promote better outcomes**

Technology will be trialled so that government can explore options and take advantage of new technologies at lower risk. Agencies will be given greater flexibility and incentive to be innovative in service design and delivery.

## 6. Engagement

The scenarios presented in this section readily illustrate a range of promising advances in the use of ICT. However, most of the illustrations cited involve “tacking on” to current systems and practices, rather than major redesign of business and it is in this context that many of the high profile project problems have occurred. The future that we glimpse through this discussion depends on a highly developed capability to plan and deliver major business redesign, across government, within agencies, and between government and external agencies. Each section in this chapter should be revised to emphasise the importance of capability to design and implement business change from the top down, and the capability to effectively govern such change.

### Using ICT to create easier and more personalised services at lower cost

The Victorian Government will ensure that systems and policies are in place to allow Victorians to interact more easily with government. Reduced customer effort is the emerging key service benchmark, replacing customer satisfaction. The community already has high expectations of service quality and availability. It expects services to be available anywhere, at any time, and on any device.

Too often, government does not keep pace with community expectations. Victorians are accustomed to efficient and personalised services online. They are using ICT more and more in their daily lives – online banking, shopping from mobile phones, keeping in touch with family on Facebook and following news on Twitter.

Moving service delivery online, both through mobile applications and online access, will reduce the cost of some government services. These savings can be redirected to the frontline or fund other government initiatives.

Engagement – Victoria’s direction	
FROM	TO
Limited or inconvenient choices on how citizens interact with the Victorian Government.	Easy access to government services and information based on citizen preferences, more services available online and more personalised services.
Government developing systems and services on behalf of citizens.	Unlocking government data and working with citizens and businesses to innovate and build new solutions where appropriate.
Citizens having to repeat information because government systems do not work together.	Systems able to interoperate, allowing citizens to interact more easily with the Victorian Government.



## 6.1 Digital engagement with Victorians

The Victorian Government will make information and online services easier to find and use. Citizens will be given more control over how their personal information is used. Giving appropriate permission is key to more personalised and integrated services. Information will be managed securely and appropriate access will be streamlined.

Access to more services online will make interacting with government easier for Victorians living and working in regional locations.

Making greater use of online and mobile channels provides more options to Victorians and helps minimise costs. To reduce costs and ensure we are using the right channels, we will take a more integrated approach to channel management.

Government will make greater use of consumer channels such as mobile applications, social media and internet-enabled television. We will not do this alone. Where appropriate, we will make data and systems available to the ICT community to create services and applications.

Government systems will be designed to be able to share information, subject to privacy legislation and other considerations, and be better able to manage service delivery online.

### Case study: Better Health Channel Mobile Application

In September 2011 the Department of Health launched a free iPhone and iPad application to help Victorians take control of their health and wellbeing anytime, anywhere.

The application responds to citizen preferences to get their health information online and on the go. In 2011, 74 per cent of Australians who used the internet looked for health and medical information online and medical applications were also among the most popularly requested applications for development.

The mobile application builds on the quality information Victorians have come to expect from the Better Health Channel. It delivers comprehensive, reliable and easy to understand information – all of which has been quality-assured by medical experts.

The application provides:

- easy access to information about health conditions by category, body part, or through the A-Z index;
- treatment and first aid information for a range of common conditions and injuries;
- a 'find a health service' function, allowing users to locate doctors, dentists, pharmacists, physiotherapists and other health service providers based on their current location; and
- a quick list of key health contacts including Nurse on Call, Kids helpline, poisons information and Lifeline.

Since its launch, the application has been downloaded by over 83 000 people and received widespread consumer and sector acclaim – including being featured by Apple in the best applications of 2011 App store rewind program. The application has a 4.5 out of five star rating and was a winner in the 2012 Australian Mobile Awards.

A new version of the Better Health Channel Application featuring personalised health alerts and notifications for heat wave, UV, pollen, smog and hundreds of healthy recipes is due for release in late 2012.

## 6.2 Sharing information across systems and services

The Victorian Government will improve information sharing across government systems and services. Interoperability is needed so systems can work together to deliver more integrated services to businesses and the community.

However, interoperability can also add costs to system development, it is not needed across all systems and services, and it can be achieved in different ways. For these reasons the development of interoperability framework needs to be coupled with an understanding of government's structure or enterprise architecture.

Together an interoperability framework and architecture will identify the common systems needed across multiple agencies and the communities or clusters of interoperability. An example of a community which needs to interoperate are the State's emergency services organisations. Often these communities will cross levels of government and include industry partners.

Having a clearly articulated approach to interoperability and documented standards also supports engagement with ICT industry suppliers. Interoperability should allow for vendor change and avoid lock-in.

### **Case study: Primary Care Partnerships**

Increasing rates of chronic disease, an ageing population and high-cost treatments all place strains on the health system. The Victorian Government Department of Health is tackling these challenges through Primary Care Partnerships (PCPs). PCPs have made it easier for the community to navigate the health system, brought agencies in neighbouring areas together to tackle local priority health issues and promoted integrated chronic disease management based on data. PCPs have over 800 member agencies including hospitals, community health services, local government and social services.

These achievements are underpinned by effective information sharing. The Victorian Service Coordination Practice Manual provides the agreed minimum standard for how agencies work together and includes a consistent approach to obtaining client consent to share information. Standard information definitions and forms mean agencies can collect and share client and program information efficiently through their information systems. Technical standards based on these agreed practices and definitions have also been developed for software vendors. Industry has responded with multiple vendors offering standards compliant health software at no additional cost to Government.

The improved processes for information exchange, put in place by PCPs, also position Victoria at the forefront in this area of national E-Health.

## 6.3 Unlocking the value of government data

In August 2012, the Victorian Government launched the DataVic Access Policy to promote open access to government data that will drive innovation, create new business opportunities and enable new services. The Victorian Government holds, creates and collects a vast amount of data, including demographic, economic and spatial information, which will be released and reused by developers and the broader Victorian community.

Access to data is part of a broader movement to co-production of public services. Governments have realised that not all services have to be developed internally. Rather than engaging directly in smart phone, web or other software developments, governments are releasing raw data and allowing the market to develop new and innovative products and services. In other jurisdictions the private sector has delivered these products and services quickly and at no cost to government.

The United States government's *data.gov* website hosts 420 000 datasets from across 172 agencies. Around 1 500 applications have been developed using the data. At least 30 other countries have established similar data web sites.

### DataVic Access Policy

The DataVic Policy will provide greater public access to Victorian Government generated or owned data. It promotes use and reuse by the community and businesses to support research, innovation and evidence-based decision making. Moreover, it will improve the efficiency and effectiveness of government by encouraging better data management practices and sharing.

Data will be released in accessible formats, free or at minimal cost. Data will be easy to find and released consistently across government. Naturally, some data will still need to be protected for reasons of privacy, security, commercial confidentiality and legal privilege.

Data is available online at [data.vic.gov.au](http://data.vic.gov.au)



## 6.4 Co-design and co-production of public services

Government will work with Victorians in the design and delivery of public services. We will use interactive or social technologies to engage with citizens and business. We will be a fast follower in the use of these technologies to meet community expectations.

The concept of co-design is an emerging trend for business and government. Organisations are evolving from simply informing or transacting with their customers to involving them in product and service design.

Customers typically contribute business product ideas, vote on the best ones and may even be involved in reviewing prototypes. In 2009, Fiat crowd-sourced the design of its concept car, the Fiat Mio. Potential customers and car enthusiasts were asked for ideas about features and design, with submissions reviewed by a team of Fiat staff.

There are good reasons for governments to involve users in the design and improvement of services. It is a way to access a range of perspectives and skills in the community, and it creates a partnership that is likely to result in a higher level of adoption and satisfaction.

## 6.5 Proposed engagement actions

### Victoria will:

Item zero on this list should be to **establish the core pan-government and agency level arrangements for governance of ICT**. These are essential to establishing the next level of policy that should guide the engagement regime, and to assigning responsibility for both the engagement activities and the actions arising from engagement.

#### 1. Develop and implement a channel strategy that:

- makes it easier to transact with the Victorian Government;
- takes advantage of new channels and service capabilities;
- takes advantage of mobile capabilities that are location-aware;
- provides more opportunities for self-service; and
- is cost-effective.

#### 2. Improve the online experience for Victorians by:

- updating Victoria's web portal to provide search-driven access to government information, services, directory information and mobile applications;
- reducing the Victorian Government's website portfolio to avoid complexity and waste, better targeting citizen and business needs;
- continuing to provide guidance on how to optimise the Victorian Government's online presence, including websites and mobile applications; and
- improving identity management so that Victorians can simply and securely gain access to the government services they need.

#### 3. Develop an enterprise architecture and interoperability framework.

To properly facilitate the business redesign that will arise from effective use of ICT, through pan-government cooperation and rationalisation, and through community and non-government business engagement, the "enterprise architecture and interoperability" framework must address all facets of the actual business design (a meaningful synonym for the concept of "enterprise architecture"), and not be limited to the ICT elements. Further, the framework must enable a meaningful reflection of the current and proposed future designs of government business, as well as the theoretical underpinnings of that business.

#### 4. Make better use of government data by:

- releasing machine-readable data under the *DataVic Access Policy*;
- coordinating public access to data through the *data.vic.gov.au* website;
- continuing to issue data and information management standards to promote data sharing and integrated services;
- building on the existing spatial data program to promote greater government and community use of location-related information;
- giving Victorians more options and allowing informed consent to share personal data between government agencies; and
- maintaining and building on cross-government information security and identity management programs to ensure citizen and government data is protected.

## 7. Investment

### Improving how government invests and works with the ICT industry

Government will improve the ways it invests in ICT. We will improve ICT-enabled project delivery, engagement with the ICT industry and continue to refine the delivery of common ICT services across government.

Shortcomings in Victoria's ICT-enabled project performance have been well documented by the Auditor-General and Ombudsman. To counter this, projects will now be staged and project assurance is being strengthened. Governance and capability initiatives will also support a significant strengthening of project definition, procurement and delivery.

It is important to emphasise that these are not the only aspects, and indeed are not even the major aspects of an effective system for governance of ICT. It is insufficient to strengthen definition, procurement and delivery of projects when the projects being undertaken are themselves the wrong projects. The governance and capability initiatives must address the entire spectrum of contemporary ICT use, beginning with formulation of government and agency business strategy which defines the intended use of ICT and tracking through to the ongoing business use of ICT.

Proper formulation of strategy will lead to clearly articulated objectives and outcomes that are more likely to be agreed and supported by stakeholders, followed by comprehensive plans that address all aspects of change required to deliver the intended outcome, and not just the ICT developments.

The importance of governance oversight through the entire ICT lifecycle, most of which spans the "production phase", was highlighted by the October 3 failure of Citylink tunnel safety systems. It is clear that, in the eyes of the community and of the government, failure of key operational ICT systems is not acceptable.

We need to identify the things we will resource internally and the things that should be done by commercial providers. We want to take full advantage of the expertise on our doorstep, as well as the economies of scale of our major suppliers.

### Investment – Victoria's Direction

FROM	TO
Large, complex ICT projects resulting in highly customised, expensive systems that do not always realise benefits.	A focus on clearly identified business outcomes, risk minimisation, early industry engagement, staged projects and adapting processes to make the best use of existing market offerings.
Uncoordinated investment which does not leverage or build on existing solutions.	Reusing and sharing solutions across government where possible.

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Procurement activities with a limited focus that do not take into account market capabilities.

Enabling and harnessing competition and market capabilities to deliver innovation, efficiency and productivity.

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## 7.1 Stronger projects

Government will become more successful at managing business change through ICT-enabled projects. Government will proactively inform, promote, and adopt best practice in this key discipline. There will be a focus on clear business sponsorship and accountability and greater focus on needs identification and business process change before starting projects. Government will further strengthen the way it specifies, funds and implements projects through clearer processes and by taking advantage of industry expertise.

The paragraph above contains profound messages about change to be made in Victoria. Government will become **more successful at managing business change** through ICT-enabled projects. Government will **proactively inform, promote, and adopt best practice in this key discipline**. There will be a **focus on clear business sponsorship and accountability** and greater focus on **needs identification and business process change before starting projects**. Government will further strengthen the way it specifies, funds and implements projects through clearer processes and by taking advantage of industry expertise.

The capabilities referenced above are not ICT technical skills. Rather they are skills in the business use of ICT and are therefore principally business change skills. New governance arrangements must ensure that, when they plan and embark on major ICT-enabled change, they have the requisite skills to properly plan and deliver the business change.

Successful ICT projects can deliver large benefits. However, they also have a high failure rate as acknowledged worldwide. They are complex, with multiple goals and stakeholders. Expertise is expensive, hard to find and hard to keep. In reality, most are not just ICT projects at all. They are business change projects with a critical ICT component.

While there is limited rigorous research published to date, there is an increasing body of anecdotal evidence that ICT project failure rates are lowest in organizations where there is a high degree of engagement from senior business leadership, including business accountability for outcomes. There is also very interesting doctoral research recently completed at RMIT University, demonstrating that behaviour of key people is a much more fundamental driver of success than conformance to rigorous process models.

Government will continue to build on the High Value High Risk (HVHR) assurance process incorporating Gateway Review and project approval requirements, and extensive Investment Lifecycle guidance to improve project management and delivery outcomes.

These processes should be revised to ensure that the essential conditions for success exist from the outset, especially sound business driven (not just aligned) strategic intent, clear achievable outcomes and benefits, deep and sustainable engagement of all key stakeholders, an effective ongoing governance regime for the initiative, and rigorous accountability arrangements that ensure an unrelenting “eye on the ball” from the primary stakeholders.

To minimise risk, the Victorian Government will move to smaller, staged projects which form

part of a larger program. Delivery will be incremental and focused on producing measurable business benefits.

Project success is jeopardised without a sound business case and planning phase. Projects should make better use of industry and government experience to establish budget projections, realistic schedules and an achievable scope. Funding projects in stages will allow us to progressively refine estimates and track progress. Project scope must match the available funding to avoid the pitfalls of the past where project budgets were reduced without an equivalent reduction in scope.

Through their life, projects need strong oversight, accurate reporting and a willingness to close down underperforming projects rather than allow them to become money-pits. A staged approach to project delivery will provide us with more opportunities to review progress and take corrective action quickly.

Project teams must look to what is already working elsewhere. Rather than over-specifying detailed technical requirements, we will engage earlier with industry to identify less risky market-based solutions to deliver business outcomes. Where possible, projects need to move away from building new systems. To achieve this we must be willing to review and change our processes to better match the available solutions.

The emphasis here must be on business outcomes. Further, it must be remembered that in traditional projects, those who specify the “requirements” are frequently somewhat junior, and are neither aware of the potential cost and complexity consequences of what they specify, nor accountable for the workability and cost of the resulting system. New ways of structuring the specification phase of projects must be introduced, to ensure that specification is done by those who are often “too busy” and who have the span of control and knowledge of business which enables them to be accountable for what they specify.

Specification of “requirements” or business outcomes must include a clear understanding, from the outset, of the ICT **AND** non-ICT work required to realise the plan.

#### **Case study: VicRoads agile project delivery**

VicRoads used an agile project delivery methodology supported by business led governance arrangements to deliver the Road Closures and Traffic Alerts system in December 2011. This system provides information about road conditions using a simple map interface in near real time during emergencies such as floods, fires and major traffic incidents. The public and emergency services are able to determine which roads are closed, why they are closed and whether detours are available. The system is available 24/7 and is accessible via the web or on mobile devices. Since its launch, public support for the site has been overwhelming. The website has attracted more than 600 000 hits in the first six months of operation, including over 60 000 hits received in one day during a major flooding event in March 2012.

## 7.2 Engaging with the ICT market

The Victorian Government will engage with the ICT market early in the procurement lifecycle. We will avoid being locked into single suppliers by favouring open standards and will be open to any qualified ICT provider regardless of size. Procurement of ICT services will be made more efficient.

Government should be fully aware of what can be readily sourced from the market. Before entering into a procurement process, the Victorian Government will analyse the market's capability to deliver value for money and innovative solutions that improve government services delivery.



When setting themselves up, new businesses carefully consider what areas to outsource, and what to keep close. Similarly we must continually explore what can be outsourced with the potential to wholly outsource some services.

Our procurement practices must continue to focus on achieving value for money. We must maintain competitive tension in our procurements to ensure downward pressure on prices and upward pressure on service levels and innovation. Non-financial aspects of value for money should be considered early in the procurement process, including;

- enhancing market competition;
- job creation; and
- encouraging innovation and productivity.

Early analysis should also identify where locally based, small and medium enterprises can be engaged either directly or through the supply chain.

Government procurement outcomes need to be considered at an agency level but also across government.

Procurement processes also need to be more efficient – both for the Victorian Government and for suppliers. The Government will make improvements to the eServices Panel. Alternative procurement models and contract mechanism such as public private partnerships will be explored.

Traditional ICT delivery models need to be challenged. For example, in the Department of Business and Innovation (DBI) a new approach to managing customer relations was needed. Rather than building another large, costly, purpose-built system, DBI adopted a cloud-based solution.

#### **Case study: Department of Business and Innovation and Salesforce**

DBI manages business development and international investment and trade. It relies heavily on stakeholder engagement and uses a wide range of systems and processes to manage contacts, record investment opportunities and capture program information.

In 2009, DBI decided to use Salesforce, an externally hosted cloud service, as its department wide customer relationship management (CRM) solution. By June 2011, Salesforce was being used by over 450 staff throughout the department.

DBI knew the system would be used to store personal and commercially sensitive information so they took a considered and proactive approach to managing risk. A formal security risk assessment was conducted. Resulting mitigation strategies included negotiating specific contract terms and conditions, local replication of data, local disaster recovery and implementing new information management processes and controls within the department.

DBI's Salesforce implementation is on track to deliver a 40 per cent cost saving over five years compared to the estimated costs of a custom built option.

### **7.3 Common infrastructure, reuse and sharing**

Government will not develop new systems when similar systems already exist.

By adopting ICT portfolio management, we will be better able to avoid unnecessary investment and free up resources for innovation. Where practical, agencies will reuse and share ICT systems and contracts rather than developing new solutions. Government will establish a register of its ICT business systems. This register will help agencies identify sharing opportunities as an alternative to new system developments.

Typically, the areas of greatest commonality are at the infrastructure level. Government has already aggregated common ICT services to gain economies of scale through CenITex. We will



continue to refine the delivery of common ICT services. We want to determine the mix of insourced, managed and outsourced service delivery which is most cost effective, most responsive to business needs and which best leverages the expertise and opportunities available in the market.

Government will procure a common data and communications platform. A common platform does not mean a single provider. Future service delivery, collaboration and operating requirements require a faster, more integrated government data network. The next generation of the telecommunications purchasing and management strategy (TPAMS) will create a common, high-speed, integrated platform for government communications.

## 7.4 Proposed investment actions

### Victoria will:

1. Strengthen the execution of ICT-enabled projects by:
    - implementing a clearer project funding and management model building on the existing HVHR framework;
    - using alternative funding and operating models for ICT services including usage based services such as cloud computing and business process outsourcing;
    - changing agency business practices to better align with available commercial-off-the-shelf applications and outsourced services;
    - peer reviewing new projects with agency CIOs for alignment with government requirements and to identify sharing and reuse opportunities;
- It is no longer appropriate to regard review and coordination of projects as being a purely CIO responsibility – specifically because ICT investment delivers business change and CIOs are not, and should not be, solely accountable for business change.

A new vehicle is required through which proposed and ongoing investment in ICT enabled change is reviewed for alignment and opportunity, as well as achievability, performance and conformance.
- using industry and government experience to estimate project costs, schedules , scope and contingencies;
  - approving projects with sufficient funding, realistic timelines and scope, or rejecting them; and
  - establishing a public facing ICT projects status dashboard to increase accountability and transparency.
2. Make better use of the expertise, capability and market exposure of the ICT industry by:
    - providing guidance to agencies to move away from customised major ICT developments and use existing market offerings with little or no customisation instead;
    - pursuing service-based offerings from the market;
    - involving the ICT industry earlier in the design of systems to take into account what the market is able to provide; and
    - changing the way the Victorian Government procures ICT services by retiring the existing eServices Panel and implementing a register of pre-qualified ICT suppliers.
  3. Develop a cross-government register of existing services and applications, and investigate all possibilities in the register before going to market.
  4. Assess options for the delivery of shared ICT infrastructure services to determine the mix of insourced, managed and outsourced service delivery which is most cost effective, most responsive to business needs and which best leverages the expertise and opportunities available in the market.
  5. Review TPAMS approach and transition to new arrangements.

## 8. Capability

### Improving ICT governance and planning, building internal capability and encouraging innovation

ICT needs to be managed holistically, the government workforce needs to be appropriately skilled and we need to build on the capabilities we have in place.

ICT is fundamental to improving government processes and service delivery. Government ICT expenditure is in the vicinity of \$1.5 billion per year. We need to ensure we have the capabilities in place to understand and manage this expenditure in a strategic, holistic way.

Capability – Victoria’s direction	
FROM	TO
Some cross-government coordination of strategic ICT capability.	Clear cross-government ICT strategy, governance and accountabilities.
A focus on technical expertise.	Building skills in project management, commercial engagement, business engagement, architectural design, information management, customer focus and problem solving.
A risk-averse approach that stifles innovation.	An innovative culture that delivers productivity and better services.

## 8.1 Stronger governance

The Victorian Government will implement stronger ICT leadership. This will include internal agency governance and cross-government coordination. We will continue to seek industry guidance from VICTAC.

Government should also seek guidance from a broad range of local, national and international experts. In respect of governance arrangements, government should recognise that the international standard for governance of ICT was written in Melbourne, and that the Melbourne is the world's centre of excellence in the AS/ISO/IEC 38500 standard (noting that VICTAC has not consulted any of the local experts in this field to date). In addition to the expertise of CIOs who make up the current VICTAC, it is essential that the government's future decision making on ICT benefit from the good counsel of government and non-government business leaders who are "ICT Savvy" and who have solid experience of successfully directing ICT-enabled business change on a major scale.

Agencies understand the strategic importance of ICT to their business and are implementing ICT governance accordingly. Agencies will adopt best practice governance standards such as the international standard for corporate government of information technology (ISO 38500).

The paragraph above incorrectly names the ISO 38500 standard. Its correct name is "The international standard for corporate governance of information technology (AS/NZS/ISO/IEC 38500).

The paragraph might be read by some as indicating that there are alternative best practice guides to governance of ICT. In reality, there are no other formal, peer developed and reviewed guides or frameworks that address the GOVERNANCE of ICT. Numerous frameworks and methodologies exist to provide guidance on MANAGEMENT of ICT, including many currently in use in Victoria. It is because of an absence of effective governance, and an lack of balance in focus on the technical aspects of projects, rather than overall business outcomes, that the management frameworks, while useful in theory, have not protected Victoria from investing in the wrong projects and from failure of projects that are appropriate.

In designing and implementing an appropriate governance regime for ICT, it is essential that the Victorian Government introduce clear policy in respect of the six principles for good governance of ICT presented in the standard, and referenced in section 2 of this commentary. This must include a clear, unequivocal framework of accountability for outcomes that assures ongoing business leadership and executive engagement in every ICT initiative.

The improved governance arrangements must include arrangements for strong and persistent oversight of actions to implement this strategy.

Much of the direction provided in this strategy requires strong cross-agency collaboration. This will be achieved by:

- clearly assigning accountability for delivery of this strategy;
- providing central facilitation and advice in key areas such as ICT project management;
- improving the sharing of agency ICT plans to identify opportunities for collaboration and reuse;
- the CIO Council taking a collaborative role in delivering this strategy; and

- providing regular progress reports to Government.

VICTAC was created with representation from industry and the Victorian Government. The committee will continue to help us focus on making better use of ICT, and take advantage of the lessons learned in other large enterprises and the ICT industry.

## 8.2 Improved reporting and business intelligence

The Victorian Government will enhance real time reporting and business intelligence capabilities. Government is largely an information based enterprise and the value of data and analytics in developing evidenced-based policy and improving service delivery cannot be underestimated.

Some agencies have already put in place data and analytics programs but skills and practice can be further enhanced. The introduction of business intelligence software is only one part of the process. Agencies need to be sure of the quality and availability of underlying data, key reports and metrics need to be agreed and staff skills are needed to draw insights from analytics reports.

## 8.3 Improved capability

The Victorian Government will develop a capability plan that addresses skills shortages and looks at ways to improve our ability to attract and retain skilled ICT professionals.

Government will invest in the capabilities needed for public servants to manage ICT strategically, including skills such as:

- project and program management;
- procurement, vendor management and commercial engagement;
- business analysis and engagement;
- architectural design;
- information management;
- customer service channels; and
- problem solving, including problem identification.

Recruiting high performing staff is a challenge, particularly in emerging or specialist roles. Demand for skilled labour continues to exceed supply in most areas of the ICT workforce. Where delivery of applications and infrastructure are outsourced there will be more focus on strategy, architecture and business engagement.

## 8.4 Service innovation

Government will create an ICT innovation fund to promote citizen-focused service innovation and productivity within the public service. Government will empower staff to innovate, take measured risks and try new approaches for the benefit of Victorians. We will create an environment where staff look for innovations that will make services more effective and efficient for the taxpayer.

The size and structural complexity of government makes major reform to services a huge challenge. Smaller scale demonstration programs can remove significant risks and seed broader change. Piloting new technology can generate rich, real-world data about costs and benefits, implementation options, sustainability and other maintenance issues to inform decision making.

There are examples of successful innovation approaches to service delivery already used by the Victorian Government but these tend to be the exception rather than the rule. In particular,

the Broadband Enabled Innovation Program (BEIP) and the Market Validation Program (MVP) have provided seed funding for projects that improve existing or create entirely new services.

### **Broadband Enabled Innovation Program (BEIP)**

BEIP is a competitive grants program aimed at accelerating the innovative use of next generation ICT by the Victorian Government, industry and community organisations. The BEIP funds collaborative projects that use next generation ICT to innovate, develop new ways of working and solving problems in key areas such as environment, health, education, local government, emergency services, community services and industry.

BEIP round two, approximately \$4 million, focuses on productivity using high-capacity broadband and will support the development of applications that are dependent on characteristics of high-capacity broadband such as its high speed, low latency and its increasing ubiquitous nature.

Projects could also consider addressing the unique challenges and opportunities faced in regional Victoria, the convergence between radio communications, telecommunications, broadcasting, the internet and mobility enabling devices.

Innovation need not be limited to products and services. A rich field for innovation is “know-how” and technique.

For example, Melbourne is already the global centre for expertise in AS/NZS/ISO/IEC 38500 approach to governance of ICT, but growth of this expertise is hampered by lack of funding and engagement. With funding, and appropriate government engagement, this expertise could gain far more prominence, and Victoria could become a destination for the world’s government and business leaders who want to know how to be successful with ICT. Melbourne’s skilled AS/NZS/ISO/IEC 38500 advisers, backed by a solid and highly successful government adoption of the standard (with the clear business outcome of high rates of successful ICT-enabled change being the goal from the outset), would be in global demand as many organisations seek to emulate what will become Victoria’s outstanding success in governance of ICT.

## Proposed capability actions

### Victoria will:

1. Strengthen cross-government ICT strategic management by:
  - assigning clear accountability for delivering this ICT strategy at the executive level;
  - providing cross-government ICT coordination from one department;
  - The mandate of this department must be carefully considered and controlled, to ensure that it does not take inappropriate control of the agenda.
  - improving sharing of agency ICT plans to identify opportunities for collaboration and reuse;
  - continuing to seek guidance from VICTAC;
  - the CIO Council taking a collaborative role in delivering this strategy; and
  - The CIO council cannot be the only, and perhaps cannot even be the lead body involved in delivery of this strategy. The strategy is, and must be regarded as a strategy for successful government BUSINESS use of ICT, and while the CIO Council should enthusiastically and vigorously support it, a government-wide business leadership team must own and deliver it. Consideration should also be given to formal oversight at a ministerial level, perhaps through a cabinet subcommittee constituted of key ministers and independent advisors.
  - providing regular progress reports to Government.
2. Improve performance reporting and strengthen business intelligence and analytics.
3. Strengthen government ICT staff capability by:
  - improving skills in key areas including project management and analysis, business and commercial engagement, and architectural design;
  - introducing measures to attract and retain skilled ICT professionals; and
  - fostering service experimentation.
4. Create an ICT innovation fund within Government to promote citizen-focused service innovation.

## 9. Acknowledgments

**Thanks go to the VICTAC Members for their leadership and input.**

### **Chair**

Grantly Mailes – Ernst & Young

### **Industry members**

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Martin Stewart-Weeks – Senior Director, Public Sector, Cisco Systems

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### **Secretariat**

Ben Thomas – Acting Assistant Director, Department of Treasury & Finance

**VICTAC would like to acknowledge the valuable feedback provided to-date from the following organisations. While the current version of the document may not reflect all of their input further changes will incorporated following public consultation.**

Deloitte

Price Waterhouse Coopers

Ernst and Young

Australian Information Industry Association

Ovum

Australian Computer Society



### Key trends data used in infographic in the context section

- 81 per cent of Australians use the internet<sup>7</sup>
- The NBN will provide high-speed internet at 100Mbps to more than 93 per cent of Victorian premises<sup>8</sup>
- Average smartphone usage increased 272 per cent in 2011<sup>9</sup> and the average connection speed of smartphones is expected to quadruple by 2016<sup>10</sup>
- In 2011, 86 per cent of online Australians purchased products and services online, 85 per cent did their banking or paid a bill and 83 per cent researched products and services<sup>11</sup>
- In 2011, 61 per cent of online Australians had an active Facebook account and social networking remains the preferred method of online communication for 16 to 24 year olds
- Globally CIOs are focusing on simplifying IT infrastructure, reducing running costs and refocusing ICT resources on core business outcomes. Organisations are investing in business analytics, cloud computing and mobile technology, as they try to grow their businesses in a tough economic environment<sup>12</sup>
- Demand for skilled labour has continued to exceed supply in most areas of the ICT workforce and this is projected to continue.<sup>13</sup>

### REFERENCES

<sup>1</sup> *The Australian Online Consumer Report 2012*, Nielsen, February 2012, p 186.

<sup>2</sup> Nielsen, p 268.

<sup>3</sup> Nielsen, p 69.

<sup>4</sup> *WoVG analytics account for the month of May 2012*, Victorian Government, accessed 31 May 2012. Over the past year (1 June 2011 – 31 May 2012) mobile devices comprised 9.4% of all website traffic and increase of 290% from the previous year).

<sup>5</sup> *Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2011 – 2016*, Cisco, February 2012, p 3.

<sup>6</sup> *2011 ICT Skills Snapshot: The state of ICT skills in Victoria*, Victorian Government, Department of Business and Innovation, January 2012, p 2.

<sup>7</sup> Nielsen, p 20. Online Australians are Australians aged 16 years and over who used the internet in January 2012 based on Neilson Online Ratings and ABS population figures.

<sup>8</sup> *Deloitte Access Economics: Telecommunications spend and demand in Victoria*, Victorian Government, August 2012, p 2.

<sup>9</sup> Cisco, p 2.

<sup>10</sup> Cisco, p 14. As Cisco notes, 'There is anecdotal evidence to support the idea that usage increases when speed increases ...' (Cisco, p 14). Smartphone figures are highlighted as they are the device most likely to be used for accessing online resources, representing over 82% of total global handset traffic (Cisco, p 2).

<sup>11</sup> Nielsen, p 186.

<sup>12</sup> Gartner fellow Dave Aron, quoted in *Computer Weekly* <http://www.computerweekly.com/news/2240114141/Gartner-CIO-spending-2012>, accessed 3 Septmeber, 2012.

<sup>13</sup> *2011 ICT Skills Snapshot*, p 2.