



**Victorian Spatial Information Strategy**  
*2008–2010*



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## Chairman's foreword



**Spatial Information** is at a critical turning point in its development.

- More people are using it for a wider range of purposes, including social networking.
- Technology is changing the way we communicate with each other.
- There are new ways of thinking about 'location'.
- Big corporate players are entering the market, and are starting to drive standards.

At the same time, all levels of government, business and the community face significant challenges in producing and using products and services in environmentally and socially sustainable ways.

Spatial information has an integral part to play in developing solutions to these challenges.

But this cannot be achieved without a framework that harnesses everyone's skills and expertise.

The Victorian Spatial Information Strategy 2008-2010 charts some of the changes occurring in spatial information and technology, and sets out the key challenges they pose.

For the first time, the spatial information community as a whole, led by the Victorian Spatial Council, has played an integral role in developing the Strategy, and we all have a part to play in its delivery.

It presents a challenging agenda, but the Council believes that the strategic framework set out in its pages lays the foundation for fulfilling the promises that are held out by the developments it describes.

On behalf of the Victorian Spatial Council, I commend the Victorian Spatial Information Strategy 2008-2010 to you, and look forward to working with all our stakeholders to realise its goals.

A handwritten signature in black ink that reads "Olaf Hedberg".

**Olaf Hedberg**  
**Independent Chair**

# Introduction

**We are living** in an increasingly complex and rapidly changing world; it has been estimated that, at today's rate of progress, we will experience the equivalent of 20,000 years of progress in the next 100 years.

Significant challenges exist in continuing to deliver services in an equitable way, so that everyone benefits, and within the capacity of the environment to support the demands being placed on it.

Responses to these issues require multi-disciplinary approaches — drawing on science, economics, politics, history, and technology. Spatial Information can be a unifying medium – linking solutions to location.

This Victorian Spatial Information Strategy 2008-2010 is responding to two sets of influences/drivers:

- The need for environmental, economic and social responses to create and maintain a sustainable and safe way of life — our 'footprint'.
- The changes in the availability and use of spatial information, information more generally, and Information Technology that can support the delivery of these responses.

## Purpose of the Strategy

Through this Strategy, the Victorian Spatial Council paints the emerging landscape for spatial information in Victoria and sets the broad themes for facilitating the whole spatial information community's<sup>1</sup> participation in that landscape.

These themes will be the focus for engagement in 2008-2010.

This document does not set targets. The Council expects that all sectors will develop appropriate responses during the life of the Strategy that address prevailing circumstances, and adapt them as required.

The VSC will therefore be looking to its stakeholders and partners to develop fuller responses to the challenges and Strategic Directions set out in this document.

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<sup>1</sup> In this Strategy, the term 'spatial information community' is used to refer to all sectors involved in spatial information – ie the three levels of government, the private sector, utilities, academia and the professions, while 'spatial information industry' refers to the private sector members of the community.

Traditionally the spatial information community has been associated with data collection, maintenance and GIS development. The increase in technology development during the past decade has meant that, while there are still opportunities to improve practice, many of the issues associated with data now have viable solutions. As such, user demand has shifted to seeking improved services and delivery tools.

This will be achieved by creating an environment so that we can:

- **Locate** people, places, services, businesses and points of interest
- **Connect** systems, services, businesses, partnerships and link with other industries
- **Deliver** quality services, standards, frameworks and what users want.

## Audience

The strategy is aimed at anyone currently using and developing spatial information, or with an interest in it, whether in the traditional spatial information community, or others throughout all levels of government, the private sector, utilities, academia, the professions and the community.

## Why this Strategy will be different to its predecessors

**VSIS 2008-2010 is the first of Victoria's spatial information strategies to be developed by the Victorian Spatial Council for the industry as a whole.**

Victoria's earlier spatial information strategies focused on articulating and putting in place the framework for spatial data.<sup>2</sup> This Strategy uses that framework as the foundation for Victoria's approach to managing spatial data and turns the attention to the drivers and impacts of changes in the way spatial information is being delivered and used, whether as products and/or services, and the strategic and policy requirements for addressing them.

We are in effect moving away from a focus on data to information — from producers to users and the creation of a spatial information infrastructure.

At the same time, this Strategy considers that spatial information should be seen as part of the wider information resource created by and available to society. Another way of putting this is that we are seeking to promote the potential of 'organising information spatially'.

By seeking to add 'spatial capacity' to ordinary information, we will have a significant opportunity to expand its reach to non-traditional users.

## What do we mean by 'spatial information'?

In this Strategy, the terms 'spatial data', and 'spatial information' are used in particular contexts.

'Data' has been used to refer to the basic symbols that represent geographic location, whether on, above or below the surface of the earth, eg property, address or road centreline.

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<sup>2</sup> The elements of the Framework can be read in the Victorian Spatial Information Strategy 2004-2007. A new Framework document and manual is in preparation and will be available on [www.land.vic.gov.au](http://www.land.vic.gov.au) by mid 2008.

‘Information’ is used to refer to the results of combining these units of data to give meaning through the relationships between them – in the way that topographic maps are comprised of multiple layers of separate units of data.

In all cases, they comprise both the terrestrial and marine environments.



## 'Spatially Enabled Victoria' – A scenario for the future



*Docklands 3D visualisation*

**Our relationships with** our physical world and the way we use our social networks are changing as we deploy technology in new ways to create new ways of interacting with each other.

Spatial information and technologies are key tools in this transformation because we define our relationships by place.

The 'spatial enablement' that these tools create can reshape our lives.

But how it does that will be up to us. It can happen by design or by accident; we can be the agents of change, or find the changes imposed on us by others.

Until only a decade ago, spatial information was focused on mapping and the cadastre, and within a specialist community that valued standards, verification and authenticity.

However, bandwidth, computer power, and information creation are growing exponentially and are becoming pervasive, with little regard for such traditions.

Many of the advances in spatial products and services are coming from non traditional players. Consequently, if the thinking about the spatial future of Victoria and the frameworks created to facilitate it are confined to the specialist spatial community in both the public and private sectors, it is more likely that the our future will be defined by these non-traditional players.

Big industry players can drive the creation of global standards as they source inputs for new spatial products. Alternatively, in the push to put their new products on the market, they can choose to use 'what is good enough', and let the resulting take up by consumers stimulate improvements to quality.



On the other side of the coin, communities of interest are setting up their own development projects using open source approaches, and are stimulating new uses of spatial information while at the same time setting their own quality requirements.

These shifts are so profound that it will require us to rethink our ideas about where ‘authoritativeness’ resides. More broadly, they will drive a rethink and reengineering of many public and private goods and services

These developments are not likely to slow down, but without the tools to properly organise the resulting information explosion, there will be greater information management costs — with systems that don’t talk to each other, this growth is becoming detrimental to service delivery.

In response, an ‘information management class’ has been created, but with the consequence that the quantity and quality of information available to those with the responsibility for delivering these services can be controlled and even limited.

Therefore, until appropriate integrating frameworks and technologies are put in place, the promises of these technologies will not be realised.

As spatial enablement reshapes our lives there is an urgent need for leaders to elevate their understanding. This will require a substantial investment in digital literacy.

## The possibilities provided by spatial enablement

The range of activities in both the public and private sectors that are creating spatial enablement is growing. Spatial enablement can also contribute to dealing with the challenges we face as a society. At the same time, however, it brings its own challenges.

### Expanding government services — ‘consultation & participation’

Spatial enablement has a significant role in the development of online mechanisms for delivering services and engaging with the community, such as e-Government.

This includes the use of location based information and unambiguous identifiers such as Address to assess the demand for government services, as well as the nature and delivery of such services.

On the other hand, the increased volume of remote transactions breaks the traditional link with local knowledge, some of which can be replaced through ‘virtual local knowledge’, with technologies like ‘sticky shadows’ that can be accessed by mobile and navigation devices.

### Policy & Administration

Spatial enablement can radically reduce costs of information distribution, oversight and compliance. Consistent use of spatial technologies could see the cost of delivering government services decline.

But the challenges in doing so should not be underestimated: inconsistencies in policy frameworks, within and between organisations, between levels of government, and between public and private, are creating a divide between what is needed and what can be possible from using spatial technologies.

## Public Safety

Significant advances have been made in using spatial information in responding to emergency and security incidents, and that show that integrated approaches to using spatial information and technologies enable more efficient emergency services.

But these advances have been piecemeal.

Prompt and appropriate responses to emergencies, and planning and decision making associated with the recovery afterwards, depend on spatial information, such as:

- the geographic extent and features (residences, roads, watercourses, and topography) of the impact zone
- the characteristics of populations affected (which can be documented in real time with remote GPS-capable PDAs)
- the nature and use or potential use of facilities in affected areas for emergency response

In the aftermath of the 2002-03 Victorian Bushfires, the critical nature of spatial information for all aspects of emergency management — preparedness, response, mitigation and prevention — was singled out in the subsequent Inquiry by the Emergency Services Commissioner.

## Utilities

Utility companies have been early adopters of spatial technologies, and have played a major role in developing key spatial infrastructures, such as the positioning network.

On the other hand, they don't always work together to realise their potential.

A closer dialogue between utilities, and between utilities and all levels of government, to design new initiatives, such as smart metering, will be essential.

## Health

The use of spatial technologies to reduce administration costs and effort, and redirect resources to delivering services such as health and education is now possible.

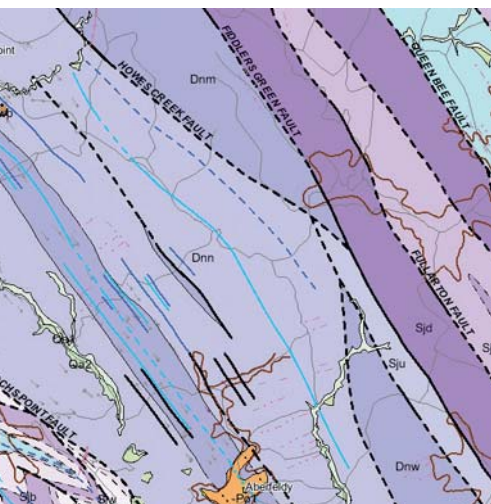
As the population ages and we live longer, our health and our access to health services is becoming critically important.

Spatial information technology is increasingly being applied to the management of health care, with 'location' as a key element. It enables remote monitoring and remote specialist intervention. It helps prevent errors in the prescription of drugs; the tracking of patient movements within and between medical facilities; and the location or monitoring of the movement of assets and equipment.

At a public health level, spatial information helps us to understand the relationships between disease and location; the effect of the environment on health; the location of health services; the take up of those services; and investigations about the incidence of disease.

## Sustainability and our environmental footprint

Environmental issues form a critical backdrop to other decisions about the economy and society. Spatial enablement is already beginning to play a key role in confronting climate change, water security, energy, air quality, food security and soil resilience, excess and waste, population, and contagions.



Spatial data as a tool for analysis

Spatial technologies and information will play a vital role in detection, quantification, decision making support and monitoring.

The potential for these spatial technologies can be seen in new approaches being adopted in the way we manage and value land and the impact of our activities on that land. Such potential includes:

- Improving crop yields and reducing soil erosion and water losses through use of GPS and wireless technologies to manage farming inputs and yields at very precise intervals
- Applying economic methodologies in valuing the services provided by ecosystems. For example, the Victorian Government is working with the Australian Bureau of Statistics to develop environmental accounts that report how much water, energy and materials are used to produce the goods and services we consume<sup>3</sup>
- Economic approaches are also being used to better understand the relationship between environmental resources and land use by creating markets that give land owners incentive to invest in environmentally sound practices. These markets are in part based on spatial information that facilitates the modeling and visualization of the effects of land use change in geographic regions.  
Opportunities are likely to emerge for these techniques to be applied in the development of water rights, and carbon and emissions markets
- The emergence of sensor networks such as those of the CSIRO's 'Farming 2020', which aims to create wireless networks capable of monitoring land quality and the tracking of livestock.

## Our place

People identify with a 'place' — where they were born, where they live and work, and the community they share with others.

Spatial information is a key resource in describing the characteristics of 'place', or defining 'service catchment areas'. It can be used to support the planning and delivery of services by providing a clear picture of where changes are occurring.

Spatial enablement can also reinforce technology's contribution in shifting power from the provider to the user at a time and place of their choice. People have greater choice in determining how goods and services are delivered to them and how to access many of the specialist services they require.

## Land Administration

Land administration is the longest established use of spatial information, with the fundamental tools being property registration, land surveying, and cadastral mapping. It is integral to the smooth operation of the economy through the guarantees it can provide to security of tenure and exchange of land via the property market.

Land information is evolving from the traditional concept of owner/parcel/property to dealing with highly active variables such as time, interest, value, price, purpose, use, taxation, and rights and restrictions on land, to the development of new registers such as those managing water rights.

<sup>3</sup> Action 4: 'healthy and productive land', *Our Environment Our Future Sustainability Action Statement*, 2006

### The economics of production

The use of robotics, RFIDs, GPS and the like facilitate a level of tracking of people and goods at previously unthinkable levels of precision. It could enable ‘whole of life management’ in ways that were never possible before, but will also bring challenges in dealing with the privacy and security of individuals.

As more information is incorporated into ‘dumb things’, the standards that enable them to network and be verified become increasingly important.

### Consumption and choice

More and more people are buying houses, finding jobs, and making investments, as well as buying day to day items, through the use of information devices (computers, PDAs, mobile phones).

Spatial enablement will enable them to go further, by allowing them to understand where they are, where they want to be and who they want to be with — creating virtual communities.

## Possible futures

The examples described above are an illustration of the many possibilities of spatial enablement.

They will be realisable if the public and private sectors understand the critical nature of their involvement and take the actions required to achieve them.

To be able to harness the amount of information being created and use it innovatively, we need a systems or network based approach that allows us to make the connections necessary to capitalise on the skills and ideas of the whole spatial community.

The critical questions will be:

- Who will invest in creating these frameworks and integrating services?
- Whose world view will be the ‘town plan’ for our future Victoria?
- Who will take a leadership role — government or the private sector?

What might spatial enablement in 2010 look like?

Four scenarios of the effects of different levels of private and public sector engagement, based on our response to these three questions, are sketched below.

### High public sector–low private sector engagement

In 2010, the public sector is dominant and engages the private sector only in limited ways. Government focuses on a narrow range of concerns — security, environment, land management — creating a patchwork of activity, and entering into partnerships with only a few private sector companies.

There is no uniformity of approach.

The private sector goes its own way and creates its own standards; enablers such as bandwidth and wireless access stay proprietary.

Government fails to create the legal and regulatory environment that will enable the private sector to become involved; as a result, development of new products and services will be difficult.

The overall cost of State and local government services remains high.

### Low public sector–low private sector engagement

By 2010, there has been no investment in the frameworks and integrating services necessary to manage the creation and availability of information. The continually expanding volumes of information drown established systems and administrative costs keep on growing as we try to manage them.

The information needed to reduce the environmental footprint cannot be harnessed in a timely manner.

Development of information resources and systems to manage them remains fragmented (agencies only trust what they have created themselves) and government isn't able to provide a useful authenticity and verification role.

Competitiveness and productivity decline — affecting quality of life.

We are not a knowledge community.

### Low public sector–high private sector engagement

Under this scenario, in 2010 the government's investment in spatial technologies has not advanced. It fails to understand and resists the deployment of new technologies (which challenge current interests). It has lost its leadership in developing spatial products and services because the private sector can move at a greater scale and speed to deliver new offerings.

The private sector cherry picks what is most profitable and can deliver services at a lower cost than the public sector — most of which they keep as profits.

As the larger corporations play a greater role, they create the landscape for the rest of the spatial community — which, over time, will become increasingly homogenous.

### High public sector–high private sector

In 2010, the public and private sectors are working together to implement frameworks, standards and methods of verification; and they have created clusters to build the critical integrating technologies.

Policies, legal and regulatory frameworks have been brought into the 21st century.

State and Local Government are putting programs in place to use the technologies and facilitate a shift in cost from administration to delivery.

Innovation is based on 'systems' or 'network' based designs.

This should be our target scenario.

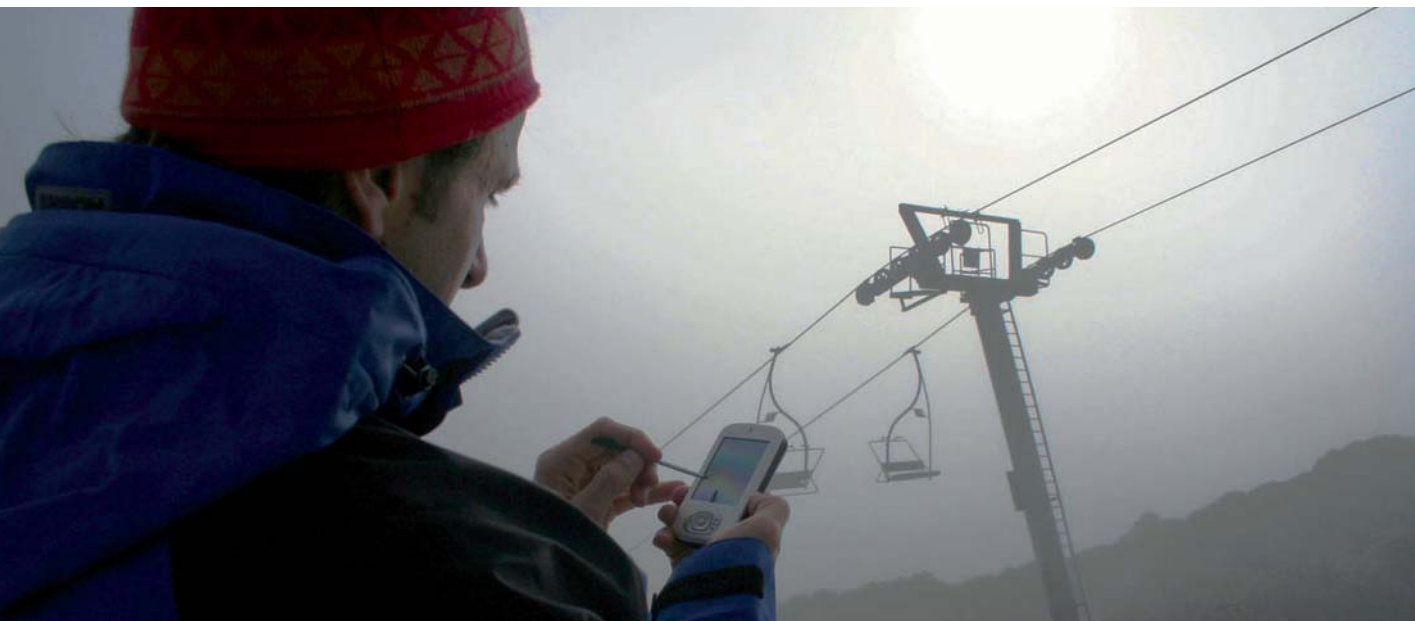
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**So what future** will we create, and how much influence will we have in shaping it? This Strategy sets out the approach required to achieve the target of all sectors being highly engaged and working together.

If we do not create such an environment, and there is no plan and no standards, the risks are that the value and benefits of spatial information will continue to be visible to and taken up by only a few; there will continue to be rapid development and deployment of new services and products but they will not be capable of being integrated, with the result that information and administrative costs will continue to grow; and our capacity to create a spatially enabled society will be reduced.

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## Technology and information drivers



### Mobile technology in use

The way in which spatial information is being delivered and presented is rapidly developing and is changing people's perceptions and expectations about what it can do.

Achieving our chosen scenario will therefore also be influenced by the developments in technology and application of spatial information.

Three technology 'convergences' are creating new uses and markets for spatial data:

1. Creation of new products and services based on personal information appliance connectivity (eg mobile phones, GPS units), digital knowledge management and electronic commerce through the associations between content, telecommunications, information technology, and consumer electronics
2. The synergistic combination of nanoscience and nanotechnology; biotechnology and biomedicine; information technology; and cognitive science
3. The convergence of GIS, GPS, remote sensing technologies, mapping, and other capabilities to create 'location-based services'.

They are being driven by five forces:

- The digitising and instant availability of content
- The demand for, and emerging establishment of, dominant global interfaces providing the ability to build interconnection and interoperation between information industry products and systems
- The race between commercial corporations to dominate standards

- Delivery of dramatically increased functionality into ever smaller devices
- The driving down of price arising from new communications technology and rapid deregulation of the global telecommunications industry and the consequent growth of digital bandwidth.

Spatial Information is being applied in an increasingly diverse range of activities, and new challenges to increase the range of spatial information available via the internet are emerging from the entry of major companies into the market.

At the same time, it can increasingly be incorporated into the business environment by utilising web services to link to authoritative sources of data and make it available to anyone who has access to a PC and the internet.

Radio Frequency IDs, sensor networks, commoditisation, the novel uses of spatial information, the ‘participatory web’, and the Semantic web are just some of the developments occurring that will impact on the development of Victoria’s spatial information community in the next three years.

Eight examples, out of many potential possibilities, are provided below.

*The advent of Radio Frequency IDs, sensor networks, intelligent objects and WiFi is changing the way in which we think about ‘location’.*

RFIDs, sensors and other ‘intelligent’ devices, and WiFi provide the capacity to manage by location by identifying who or what the object is, where it is (location), when it is (time) and what its circumstances are (condition). It will eventually be possible to uniquely identify every non-trivial asset or object in the environment and have them create, disseminate, receive and act upon information; as well as being able to map them in real-time.

*As the spatial information industry matures we can expect to see greater commoditisation and standardisation.*

Commoditisation and standardisation of the key spatial information inputs mean that opportunities for innovation will come from differentiation and developing new services.

There is also a rapidly growing interest in using open standards to break the dependence on vendors’ product development cycles and licensing arrangements.

*Open source approaches to product development are widening the opportunities for innovation through collaboration.*

Open source approaches are giving effect to notions of collaboration, cooperation, sharing, and increasing the diversity of ideas and perspectives available to developing innovations or solving problems.

However, they will be most effective if some form of management function is incorporated in them (perhaps provided by the participants themselves) to undertake the role of verifying contributions and providing quality control.

*Spatial information is being used in many different, and sometimes novel, ways.*

The advent of internet sites such as Google Earth, Google Maps, Microsoft Virtual Earth, GeoCommons, and social networking sites, are popularising spatial information and extending the uses to which it is being put. Such open and participatory approaches illustrate the potential for dramatically altering



*Technology is enabling the use and capture of spatial information on location*

.....

the way traditional providers acquire, manage, maintain and disseminate spatial data and information.

*The advent of the 'participatory web' means that all levels of government, utilities, the community and the private sector can become co-producers of spatial information.*

As the demand for quality drives the cost of delivering spatial information, there will be challenges for providers to keep pace with users' requirements as reliance on spatial data grows as its use becomes more widespread. Web 2.0, 'collective intelligence' and 'neogeography' may provide new opportunities to bridge the resourcing gap.

*The Semantic Web will facilitate the discovery and use of vast amounts of data.*

The Semantic Web is the development of rules and systems that enable computers to search for data from a range of disparate sources and defined in different languages, read it, query it, classify it and extract it for use.

*Technological developments are providing the capacity to deliver greater volumes of data and facilitate greater processing capacity. This is putting it closer to users, wherever they are.*

With advances in technical power and information management practices that provide the potential for storing, integrating, analysing and delivering larger amounts of data, a greater range of users are now finding spatial information within their reach. As a result, we can expect the demand for immediately available and accurate spatial information to continue to increase.

*There are greater demands being placed on data content — its availability, its accuracy, its quality — as more people are able to access it.*

Because people are increasingly acquiring the technology that can deliver data directly to them, the pressure is on custodians to maintain quality and supply the content for new applications. The gap between the existing quality of spatial data and that required by users has the potential to widen as reliance on it grows, and as it becomes increasingly applied in automated systems (such as emergency response).





## Spatial information in Victoria – where we are today

### Victoria’s Spatial Information Management Framework

Spatial Information Strategies have been developed in Victoria since 1993. In the 15 years since then, an information management framework has evolved based on a key set of principles to ensure spatial data is available, accessible and useable.

Today that framework has matured to the extent that it is now possible to define a set of core principles for spatial information management.

<b>1993</b>	Core spatial information identified. Government-wide planning methodology introduced.
<b>1997–2000</b>	Core data improved. Spatial management framework put in place – policy, infrastructure, awareness, distribution, business systems. Core principles for managing spatial information introduced – metadata, quality management, privacy, liability, licensing, pricing, custodianship. Coordinating and cooperative arrangements between key stakeholders established.
<b>2000–2003</b>	Spatial information management principles further codified. Introduction of the concepts of ‘framework’ and ‘business’ information. Role of custodians defined. Framework datasets identified and custodians assigned.
<b>2004–2007</b>	Best practice principles for spatial information management extended to custodians of all spatial datasets. Custodianship formally identified as the basis for spatial information management. Holistic spatial information management framework defined. Victorian Spatial Council established.

*Evolution of Victoria’s spatial information management framework*

The framework is critical to the successful application of spatial information in mainstream business activities – all such development should be underpinned by a sound management approach that guarantees that spatial information is available and can be used.

Victoria’s Spatial Information Management Framework provides an enduring set of requirements for establishing and retaining a consistent approach to managing spatial information across the entire spatial information community.

They represent a ‘best practice’ approach for Victoria.

### Components of the Framework

The Framework provides a holistic approach to managing spatial information in Victoria, encompassing the:

1. institutional arrangements for developing spatial information;
2. requirements for creating and maintaining spatial information;
3. mechanisms for making spatial information accessible and available; and
4. strategic development of technology and applications.

It allows for the management of these elements in an integrated way to provide an environment for the effective use of spatial information.

The Framework is based on 11 core elements:

- governance
- custodianship
- framework information
- business information
- data quality
- metadata
- awareness
- access
- pricing and licensing
- privacy
- strategic development of technology and applications

The focus for implementation of the Framework is the custodian of spatial information — a distributed network of custodians who retain full control of their respective datasets and commit to managing them and making them available according to the principles set out in the Framework.

### A Spatial Data Infrastructure for Victoria

Together, the elements of the Framework create a Spatial Data Infrastructure for Victoria.

SDI elements (as defined by VSIS 2004-07)	Victoria’s Framework components
Institutional arrangements for developing spatial information	Governance, Custodianship
Requirements for creating and maintaining spatial information	Framework and Business Information, Data Quality
Mechanisms for making spatial information accessible and available	Metadata, Awareness, Access, Pricing and Licensing, Privacy
Strategic development of technology and applications	Technology and applications

## Collaborative arrangements

Since 2004, strategic and policy development for Victoria’s spatial information community has been based on a truly collaborative approach between all three levels of government, utilities, the private sector, academia and professional bodies.

This collaboration takes a number of forms:

- a governance model that embodies cooperation and collaboration between all sectors
- each sector having a particular role to play in contributing to the development of spatial information
- commitment to a consistent information management approach by data custodians in all sectors.

These efforts are led by the Victorian Spatial Council, which facilitates opportunities for a greater strategic focus on spatial information development through partnership building, collaboration, cooperation and education.

## The Victorian Spatial Information Industry

Victoria’s private sector spatial information industry has the following characteristics:

<b>Total number of SI businesses</b>	223
<b>Total Revenue</b>	\$410 million
<b>Total Full Time Equivalent Staff</b>	5,570
<b>Total value of work outside Victoria</b>	\$143 million
<b>Types of services provided</b>	<ul style="list-style-type: none"> <li>• data collection and measurement including surveying and remote sensing</li> <li>• data management including data storage, curation and distribution</li> <li>• sale and supply of specialised hardware and software</li> <li>• systems development and application including information analysis</li> <li>• sales of specialist data and information</li> <li>• consulting services including planning, specialist analysis, project management, specialist recruitment and technical services</li> <li>• data information and presentation development of maps both hardcopy, digital and online</li> </ul>

*Victoria’s Spatial Information Industry – 2005<sup>4</sup>*

<sup>4</sup> Victorian Spatial Information Industry Census, October 2005, [www.asiba.com.au](http://www.asiba.com.au). These figures do not include Government.



*Real-time capture of spatial information*

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Businesses vary in size from single person operations, to companies with over 200 employees. Companies whose sole activity is spatial information are generally those classified as Small to Medium Enterprises (SMEs); the larger businesses incorporate other activities into their overall operations, with spatial information being just one part.

Government — both State and Local, the utilities (eg power, gas, water) and academia are also major players in the wider Victorian spatial information community. State and Local Government and utilities in particular have spent many millions of dollars in the last 20 years creating spatial data and systems and investing in hardware and software; and they continue to do so.

Government is also a key player in the setting of standards, frameworks and policies for spatial information, while academia is a driver for research.

### Victoria's ICT industry

Victoria is a major player in the Australian Information and Communications Technology (ICT) industry. In 2005, it made up one-third of the national industry, had revenue in excess of \$20 billion and annual exports worth \$1 billion, and employed 71,000 people.

### Development of IT and spatial information

Victoria's spatial information industry is being stimulated by developments in ICT more generally.

The diagram on page 17 illustrates some of the key milestones in the past two decades that are bringing spatial information and ICT ever closer together.

### The national spatial information environment

Many of the challenges and opportunities outlined in this Strategy have no borders — they are equally faced by our counterparts in the States and Territories and nationally.

Through the forums provided by national bodies such as ANZLIC, NSIM, ASIBA, PSMA Australia, ICSM, the SSI, the CRC-SI and others, we have the opportunity to develop national solutions to the challenges we face, and create national initiatives that serve the entire population and nurture a national spatial information community.

One of the objectives of this Strategy therefore must be to work within the framework provided by these national activities.

<b>Spatial</b>	GIS becomes commercially viable  Little compatability between products  High competition between major vendors  Mapping the domain of surveyors, predominantly land users	Widespread use of CAD systems  Begin automation of surveying techniques  GPS becomes a tool for common use  Mapping starts to be used for policy and business decision making	GPS used for survey accurate measurements	Google Earth, Microsoft Virtual Earth  Push for non-proprietary software	???
			Increased demand by consumers for mapping information and location based services via the internet	High demand by consumers for mapping information and location based services via the Internet  Distributed custodianship models	<b>2010–</b>  ???
<b>Information Technology</b>	Strategic development of technology and applications	Metadata, Awareness, Access, Pricing and Licensing, Privacy  Technology and applications	Navigation Software and public GPS usage	<b>2005</b>	
			OCG	Web 2.0  June 2007 — 1.133 billion people use the internet	
	<b>1980s</b>		<b>2000</b>	Web 1.0 Wikipedia (2001) Google Search Uptake of online shopping, communication, entertainment, banking etc Rise of Open Source and Open Standards Remote Access Peering Streaming Media Broadband Wireless Blogging	Peering Facebook 3G Mash-ups

*Evolution of Information Technology and Spatial Information*

# 4

## Strategic challenges – what do we have to do?



*'Victoria 2010' faces many Spatial challenges*

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**In the next** three years, the Victorian Spatial Council and its partners and stakeholders will need to meet six key challenges.

### 1. Continue to strive to get the foundations right

Maintaining and developing the underpinning land administration system (land registry, cadastre, surveying), while integrating other fundamental data to support land management and decisions about land use for sustainable development (economic, social, environmental, governance).

Managing address information to support service delivery — because this is where people are. Digital systems rely on unambiguous identifiers such as address.

Raising awareness about and understanding of the role of spatial information as an enabler.

Maintaining a consistent approach to the management of spatial information to support its use and exchange.

### 2. Continue to ensure accessible and maintained data

Having a robust information management framework, ensuring data is fit for purpose (including quality and accuracy), discoverable, accessible, and available; that people are aware of it; and that it can be integrated from various sources (whether within and between organisations, states and nations).

Meeting and keeping pace with users' requirements for quality in spatial data.



*Using spatial information in collaboration and planning*

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Participatory models such as those offered by Web 2.0 technology are being considered as a way to address such issues and to encourage greater engagement with data users.

### 3. Being adaptable in the face of rapid change and able to respond to new developments

The range of uses to which spatial information is being put and the ways in which it is accessible are increasing. Are we in a position to respond to and take advantage of such developments?

Meeting the challenges posed by competition from large corporations by maximising our strengths and encouraging strategic collaboration.

### 4. Building a culture of sharing

The ongoing search for ways to encourage data managers to release their data to wider audiences.

Creating an environment that encourages opportunities for partnerships between all levels of government, utilities, business, academia, the professions and community groups.

Having an open source infrastructure that can form the basis for developing new products and services.

Being able to deal with copyright and liability issues in a way that encourages the release of data for use.

### 5. Addressing the skills shortage

Who is going to be the next generation of the spatial industry?

What skills will they need to have? Do we need people who are multi-disciplinary and to be able to think strategically, and develop appropriate solutions?

How specialised will spatial information be in the future?

Can we harness the potential of partnerships, both inside and outside traditional spatial information organisations, to widen the pool of skills available?

### 6. Retaining relevant institutional arrangements

What is the appropriate governance model for spatial information in Victoria?

How will cooperation and collaboration take place?

Establishing the right 'frameworks' for a flourishing spatial community – with members who have an incentive to participate, supported by enabling principles and operational rules that underpin the spatial information, facilitate sharing it, and support innovative developments based on that information.

# 5

## Responding to the challenges — our strategic direction



Collecting spatial information

**In responding** to the drivers and challenges described in the preceding chapters, this Strategy establishes four strategic directions that need to be pursued to establish a ‘spatially enabled Victoria’:

1. **Creating a framework in which the use of spatial information can flourish**
2. **Adopting an inclusive approach to the management of spatial information**
3. **Developing the spatial information community through collaboration and partnerships**
4. **Maintaining the foundations for Spatial Information Management.**

The first focuses on the accessibility of spatial information, the development of applications and services based on it, and its use.

The second encourages new approaches to maintaining the quality and currency of spatial information by harnessing the skills and expertise of users and communities of interest to share in the updating and maintenance cycle.

The third recognises that growth in the spatial information community will come through the combination of individual strengths through collaboration and partnerships.

The fourth ensures that the key input, ie spatial data, is being managed and made available in a way that facilitates and encourages use.

Each of these four strategic directions is integrated with all of the others. The success of the Strategy as a whole is based on the delivery of each of these directions, together and separately.

As a result, participation of all sectors of the spatial information community, through partnerships and other relationships, will be critical.

### Creating a framework in which the development and use of spatial information can flourish

Victoria has a valuable resource in its spatial data and infrastructures. This value lies in users’ ability to access it, and as a key input into value added products and services. The key principles for access are that it should be simple and effective.

Access is underpinned by ‘discoverability’ (being able to find it), standards, and availability of data.

It will be guaranteed by a framework (a set of rules, principles and structures) that supports the participation of all members of the spatial information community, promulgates appropriate standards for data and technology, and establishes mechanisms for delivering and sharing spatial data.



Through such a framework, this Strategy will create an environment in which all participants in the spatial information community (as well as users of spatial data) will be able to benefit from the opportunities provided by spatial information.

Victoria's framework will incorporate:

- Standards
- A clear articulation of the roles of all sectors
- A Whole of Victorian Government approach to data management, delivery, sharing and access
- Legislation that will stipulate requirements and establish best practice for delivering spatial data

### *Standards*

Standards exist in two contexts. They give certainty to users and to custodians who are releasing their data by reinforcing quality in data and technology. (This will be supported by *Strategic Direction 4 — Maintaining the foundations for Spatial Information Management*.)

And they provide the means for developing interoperability between data repositories, access services, integrative services (such as web mapping) and user interfaces or presentation layers (eg browsers). A range of standards now exist that support such connections — XML, SOAP, GML, WMS, etc.

Standards are also drivers for innovation.

Under this Strategy the use and development of standards should support users by being

- based on open sources and independent of technology vendors
- consistent with those developed nationally and internationally
- developed in consultation with users (as part of the responsibilities of custodians)

Government is the appropriate sector to lead development of standards. In the short term, it should identify and endorse or ratify appropriate existing standards for application in Victoria.

Where standards do not exist, or there are gaps in existing standards, the State Government should engage with the rest of the spatial information community and lead the development or improvement of standards or lobby the appropriate standards bodies to have them developed.

### *Sectoral roles*

Under the participatory model established for the spatial information community in Victoria, each sector has a role to play.

- Government's primary role is to establish policies, standards, the management framework and principles, manage and provide fundamental data, and support development of new products by the private sector
- The Private Sector develops value added products and services, develops markets, promotes new products, undertakes R&D, and manages its data according to the spatial information management framework
- Academia's key role is to provide education, and undertake R&D.

Under this Strategy Government (including State and Local, where appropriate), the private sector (including utilities) and academia will have the following roles.

	<b>Government</b>	<b>Private sector</b>	<b>Academia</b>
<b>Research and Development</b>	Direct R&D with the objective of increasing benefits to end users; encourage private sector and client R&D, particularly in partnership with research being undertaken by academia; engage academia for research, and seek advice from the private sector and academia to guide R&D directions.	Undertake R&D. Develop new products and services based on R&D.	Provide fundamental and applied research.
<b>Policy development</b>	Lead policy development.	Input directly to government policy.	Input to government policy.
<b>Capacity building</b>	Play important roles in training and building capacity of spatial information professionals and users.	Play important roles in training and building capacity of spatial information professionals and users.	Play the central role in education, research, training and building the capacity of spatial information professionals.
<b>Data capture and maintenance</b>	Develop, maintain and be custodians of framework information and business information.	Seek data capture and maintenance opportunities from government where appropriate. Develop, maintain and be custodians of business information.	Contribute to setting the direction for data capture and maintenance through fundamental and applied research.
<b>Access</b>	Provide access to spatial information and services, subject to privacy, confidentiality, licensing and pricing policies.	Access government spatial information and services, subject to its privacy, confidentiality, licensing and pricing policies. Provide access to spatial information, subject to privacy, confidentiality, licensing and pricing policies	Access government spatial information, subject to its privacy, confidentiality, licensing and pricing policies.
<b>Pricing</b>	Set policy for the pricing of its spatial information and services.	Price spatial information products and services it produces.	Contribute to the setting of price through fundamental and applied research, and through education.
<b>Distribution</b>	Perform the role of 'wholesale' distributor to private sector, only undertaking other types of distribution where the private sector is unable or unwilling to distribute. Seed new distribution content or models, prior to take-up by the private sector.  Associated with distribution provide base level discovery capability via the VSDD <sup>5</sup> ; maintain competitive neutrality and discourage monopolies; and implement privacy and intellectual property policy.	Act as DSPs by linking government 'wholesale' outlets with a range of other sources, assembling comprehensive clearinghouses, and providing data provision services. DSP clearinghouses may be accessed from the VSDD.  Act as VARs, complementing the DSP network by providing additional new and derived products (VARs may only distribute their own products, not government data). VARs may use DSP clearinghouses to maximise product visibility.	Academia is not considered a distributor of spatial information.
<b>Value adding</b>	Provide opportunities for value-adding to the private sector.	As DSPs, add value to government framework and business information through data provision services for licensed end users, actively seek new licensed users, brand products and processes (Government IP rights to the base data are unchanged by DSP processes) and act for VARs.  As VARs, add value to government framework and business information by enhancing, integrating, and developing new/derived products and services.	Contribute to setting the direction for value adding and product and service development through research.

### *Whole of Victorian Government approach to data sharing and access*

Government is a critical player in achieving this Strategy's directions as it is a key source for spatial data. However, its agencies tend to operate autonomously and develop significant datasets and solutions independently of their counterparts in other agencies, often resulting in duplication and the potential for incompatibility.

VSIS 2004-07 was based on commitment to a series of information management and custodianship principles; development of programs within the framework; and integration of spatial information into business systems.

This Strategy will take that commitment a step further by seeking to enshrine the notion of Government acting as a single entity and establishing standardised approaches and principles that encourage the availability and release of its data, while at the same time supporting agencies' own needs for spatial information. The new technologies for disseminating data via the internet should make such an approach more feasible.

This approach should incorporate:

- distributed custodianship of data
- adoption of core standards
- a standard architecture
- interoperability
- arrangements for making data accessible, including a standard approach to licensing, while recognizing appropriate restrictions on availability
- cooperation
- a coordinating mechanism to drive the strategic direction and support participants
- pooling resources where possible to maximise development potential

These activities should be undertaken in conjunction with the implementation of *Strategic Direction 4 — Maintaining the foundations for Spatial Information Management*.

### *Legislation*

Requirements for creating, notifying and managing information are set out in a range of separate pieces of legislation. Many of these requirements were established long before the introduction of computers and the widespread use of digital technology.

There is now a need to address the coordination and integration of the whole spatial information environment, to simplify and streamline the provision and management of spatial information and ensure it is accessible and useable. This can be achieved by consolidating the relevant clauses in legislation into a single Act.

Under this Strategy, an Information Management Act should be developed to modernise the management regime for information, including assigning roles and responsibilities for the creation and notification of data, data exchange and supply.

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<sup>5</sup> (From page 22) VSDD – Victorian Spatial Data Directory; DSP – Data Service Provider; VAR – Value Added Reseller. There are two categories of Data Service Providers. 'Resellers': DSPs who are licensed to on-sell Vicmap and other available government spatial data in its raw or basically unchanged state. 'Value Added Resellers': DSPs with specialist applications that have Vicmap and other government spatial data integrated within products and services.

## Adopting an inclusive approach to the management of spatial information

The management of Victoria's core spatial information already relies on a range of partnerships and relationships between agencies across all three levels of government, the private sector and utilities. For example, local government and Land Victoria are critical to property/cadastral data; purchase partners support the development of imagery; there are multiple custodians of the various layers of the topographic products.

At the same time, the technology that is making it easier to deliver data is also enabling contributions to the updating and maintaining of that data to be extended to 'volunteers' – interested parties in the community such as walking and driving clubs, and CFA volunteers.

Opening the data maintenance cycle could provide a means for filling the gaps left by government — the demands on data content providers mean that they are not always in a position to keep up with users' expectations or have the up to date 'on the ground knowledge' of changes occurring at the local level.

Such data delivery methods are already being investigated. During 2006, the Victorian Government, in partnership with the private sector, piloted an online notification environment to test the potential for managing changes to Vicmap data in a real time environment, and to trial enabling technologies and custodian roles and responsibilities.

Under this Strategy, such efforts should be expanded to consider standard editing environments, online tools for metadata creation and management, and tools for notifying spatial or attribute changes.

A number of preconditions will need to be met to make such a model viable:

- Mechanisms for managing and verifying the contributions made by volunteers for quality, accuracy and appropriateness
- Standards against which such contributions can be measured
- Roles must be clearly defined, including what will be expected of data custodians — it will therefore also need the willingness of custodians to participate.

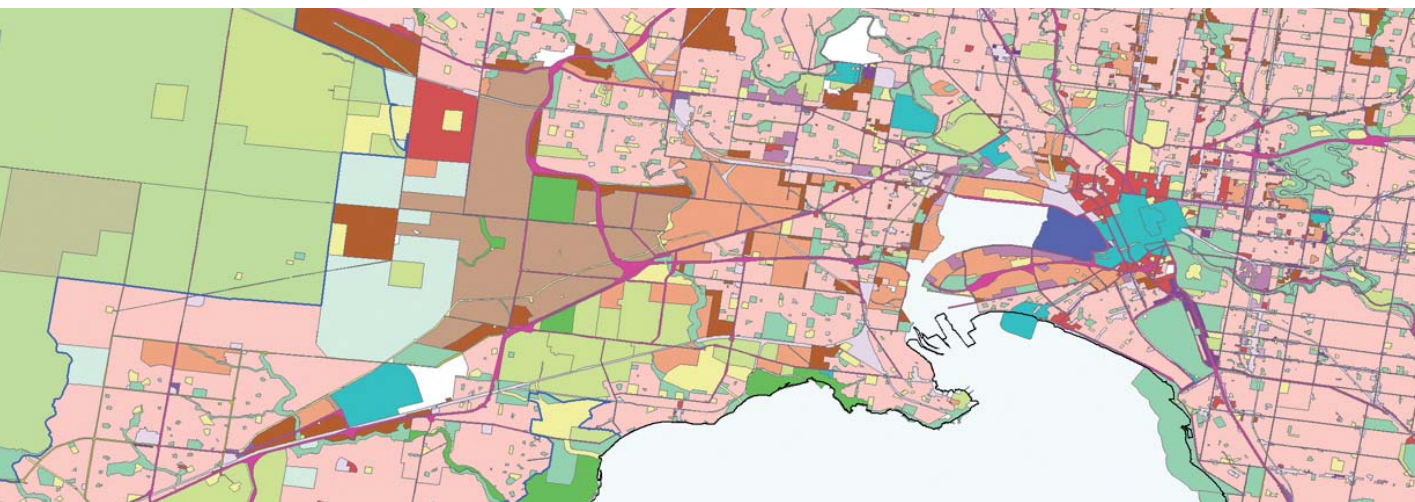
These activities should be undertaken in conjunction with the implementation of *Strategic Direction 1 — Creating a Framework* and *Strategic Direction 4 — Maintaining the Foundations for Spatial Information Management*.

## Developing the spatial information community through collaboration and partnerships

Victoria's spatial information community is at a critical point in its development.

The entry of large corporations such as Google and Microsoft and their growing dominance; the trend towards acquisition of specialist information providers and developers by large corporations; the challenge to attract and retain skilled employees; and the rapid expansion of technology requiring ever larger investments, provide challenges for Victoria's industry to define its position in this expanding and global market.

Individual companies should seek to widen their scope through alliances and joint ventures within and between sectors, and outside the traditional spatial industry, for example the games industry. The next three years should be a time of greater collaboration, capitalising on strengths and sharing expertise.



### Sharing spatial information

The *Combined Advantage* study released by the Victorian Government in 2004 confirmed the positive impact of collaborative partnerships on the development of industry-specific skills, overcoming market barriers and maximising the outcomes of research and development.

More formal types of collaboration such as clusters can also stimulate innovation, exports, investment, high-quality jobs and new business opportunities.

Open source approaches to collaboration should also be considered. They can provide opportunities for widening the pool of resources that can be applied to new developments.

Government should support industry by providing access to its spatial data to enable it to develop new services delivering that data.

To facilitate commercialisation of new products and services, Government should also make a clear statement about the distribution of Intellectual Property for developments based on Government-held spatial data.

Achievement of this Strategic Direction will incorporate:

- Increased focus on partnerships based approaches
- Clear definition of the roles of industry sectors — as set out in *Strategic Direction 1 — Creating a Framework*
- Creating clusters and networks to provide capacity, building on individual strengths, knowledge sharing, and sharing of technologies.
- Building on the base infrastructure/platform developed by Government for the supply and delivery of spatial data to enable the industry to develop new services.
- Entering into alliances outside the traditional spatial information industry to bring in new skills and expand opportunities for spatial information to be used in new ways.

### Maintaining the foundations for Spatial Information Management

None of the developments described elsewhere in this Strategy will be possible without the fundamental ingredient — ie the spatial data.

All of the challenges and strategic directions for spatial information that we have identified must be underpinned by a robust approach to the management of that data, whether it be the popular and high profile imagery and vector data,

GNSS CORS data, or the emerging ‘grid cell data’, which is the preferred type of data for modelling in environmental and natural resource management.

That data needs to be available and accessible, but also clearly understood by users.

The fundamental requirements are:

- Ensuring data is fit for purpose
- Licensing models that facilitate access and opportunities for new development
- Development of technical solutions that encourage accessibility
- Raising awareness — among existing, new and potential users, and traditional and non-traditional users
- Discoverability of the data — through catalogues and other means
- Determining priorities for data acquisition
- Availability of the data
- Ensuring that privacy considerations are taken into account

These requirements will be supported by the Spatial Information Management Framework developed under Victoria’s earlier strategies. This Framework now needs to be promoted and data managers educated in its application.

The policies of the Framework are endorsed as best practice in Victoria for ensuring a coordinated approach to delivery of spatial information, namely: data being managed by custodians, standards-compliant metadata being published and maintained, a commitment to making spatial data accessible (while acknowledging appropriate variants to this standard), and adoption of pricing and licensing strategies that encourage the use of spatial information.

Under this Strategy, maintaining the foundations for spatial information management will incorporate the following principles:

- Custodianship — all spatial information managed by an identifiable ‘custodian’.
- Consistency — a consistent approach to managing spatial information by all custodians.
- Relationships — networks that support custodians in the creation and management of their spatial data and its provision to users.
- A Whole of Victorian Government approach for access to and sharing of data — as set out in *Strategic Direction 1 — Creating a Framework*

The following actions should be undertaken:

- Adopt the recommendations of the Custodianship Program to create a sustainable approach to custodianship of spatial data.
- Promote the Spatial Information Management Framework and educate and train data managers in its application.
- Bring the Positioning and Location Policy to fruition.
- Develop mechanisms that encourage custodians to release their spatial data for wider use. In particular, investigate the potential for digital rights management as a way to deal with liability issues and new licensing approaches to encourage development of new services and products by the private sector.

# 6

## Implementation



### Priorities

To achieve our preferred scenario, the following areas of action are of priority:

- Ensuring there is both attention and understanding about spatial issues and their potential at senior government and private sector levels
- Developing a vision and an underpinning architecture for what a spatially enabled Victoria might look like. For practical reasons this should be initiated by Government
- Creating new governance arrangements that reflect the importance of a spatially enabled Victoria to better understand and facilitate the introduction of spatial and location based technologies and the products and services they might enable
- Developing standards and authorising frameworks that will enable the market under a spatially enabled Victoria
- Establishing programs and processes that ensure the promise of what is possible through these new technologies
- Driving for consistency in key public and private sector agencies, such as common standards and expected performance levels.

## Roles

Implementation of this Strategy will be the role of all members of the spatial information community.

It provides the key signposts, but will need everyone's participation to make it successful.

Each sector has its role to play.

Each sector will be required to report back to the VSC by 30 June 2008 with their response to this document and how they will implement its Strategic Direction and the role they want the Council to play.

The VSC will undertake the following roles

- Communication and education
- 'Visualisation' — scenarios, supporting or sponsoring demonstrator initiatives that show off the potential for spatial enablement
- Advocacy — targeting the right 'influencers' — in all three levels of government, the private sector, utilities, academia, regulators
- Facilitation

It will begin by preparing a plan for communicating this Strategy and set out the activities it will undertake by 30 June 2008.



