

The Role of an Institutional Environment in Building Creative and Innovative Spatial Capacity

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SUMMARY

Spatial Information can play a major enabling role in building the capacity to deal with the challenges society is facing, such as climate change, good land governance and emergency management. There are also increasing calls to make information more accessible to encourage the creativity and innovation needed to develop solutions to these challenges.

In Victoria, a range of initiatives, engaging all sectors of the spatial information community, are delivering practical outcomes that build such capacity and make information more accessible. They are aimed at increasing information sharing and availability, fostering collaboration and participation, and encouraging the adoption of new technology. Three case studies demonstrate the ways these aims are being achieved: development of protocols for the sharing of information; collaborative and partnership based approaches to develop spatial services and products; and encouraging the use of web 2.0 to improve the quality of data.

For initiatives such as these to be successful, and if future creativity is to be fostered, they need to be supported by a robust institutional environment. In Victoria, such an environment is being created, incorporating an information management framework and collaborative decision making on behalf of and involving the whole spatial information community. This environment has been instrumental in encouraging a best practice approach to the management of spatial information and stimulating initiatives designed to enhance its contribution to planning and decision making.

The paper outlines the characteristics of Victoria's institutional environment and the policy and technical environments in which it is being developed, and uses the three case studies to demonstrate how it is supporting a range of initiatives. It concludes that spatial information can play a major role in developing solutions to the challenges we are all currently facing, but to do that it needs a robust institutional environment that provides a holistic approach incorporating frameworks for spatial information management and facilitating its use; encouraging the use of new technology; and adopting collaboration and partnerships to support the growth of the whole spatial information community.

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1. INTRODUCTION

Spatial Information can play a major enabling role in building the capacity to deal with the challenges society is facing, such as climate change, good land governance and emergency management. This has been recognised in the growing number of calls to make information and spatial information more accessible as a means of encouraging the creativity and innovation needed to develop responses to these challenges.

In Victoria, a range of initiatives engaging all sectors of the spatial information community are delivering practical outcomes that build such capacity and open up access to ‘public sector information’, including spatial information. They are aimed at increasing information sharing and availability, fostering collaboration and participation, and encouraging the adoption of new technology.

For initiatives such as these to be successful however, and if future creativity is to be fostered, they need to be supported by a robust and comprehensive institutional environment. In Victoria, such an environment is being created and has already been instrumental in encouraging a best practice approach to the management of spatial information and stimulating initiatives designed to enhance its contribution to planning and decision making.

The Victorian Spatial Council has recognised the close links between frameworks and technologies for achieving its goal of a ‘spatially enabled Victoria’, and that without an appropriate framework, or institutional environment, ‘the promises of [the new and emerging] technologies will not be realised’ (VSC, 2008, p.5). This environment must incorporate frameworks for spatial information management and facilitating its use, encouraging the use of new technology, and adopting collaboration and partnerships to support the growth of the whole spatial information community.

A comprehensive and robust institutional environment will ensure that spatial information can play the role envisaged above by being accessible and able to be used. It will do this by creating the conditions for ensuring that: users know the information exists, are able to find (‘discover’) it and can assess its fitness for their purposes; the information is appropriately managed by custodians; the information can be shared and exchanged; there are multiple ways of accessing and distributing it; and that technology is appropriately used to make the information available.

To demonstrate the value of such an institutional environment, the following pages will

- Outline the current policy and technical environment in which spatial information is being developed to illustrate the demands being placed on information providers that the institutional environment needs to support and respond to;
- Demonstrate what an institutional environment should provide through an outline of the characteristics of Victoria’s approach; and
- Describe how Victoria’s environment is delivering those requirements through three case studies: development of protocols for the sharing of information by government; collaborative and partnership-based approaches to developing spatial services and products, such as Victoria’s positioning network and published maps; and encouraging the use of new technology, especially the use of web 2.0, in the design of a Notification and Editing Service for improving the quality of key spatial data.

2. THE CURRENT POLICY ENVIRONMENT

The development of spatial information is occurring in an environment of significant technical and policy change. In particular, information sharing, open access to public sector information and the call to be more innovative, are all requiring members of the spatial information community to think about how they are managing, delivering and enhancing their data and information.

Advances in technology have increased the availability and accessibility of spatial information. Recent developments such as ‘geobrowsers’, cloud computing, ‘crowd sourcing’ (also described as Volunteered Geographic Information, and ‘neogeography’), social networking, and Web 2.0 are making spatial information available to more and more people, including non-specialists.

A consequence of these technical changes is the growing call for government information (or Public Sector Information – PSI) to be made more openly accessible to facilitate its creative and innovative re-use and increase national prosperity, and a more explicit recognition of the role of information in responding to major social, environment and economic challenges. For spatial information specifically, these can be further encapsulated into a goal of ‘spatial enablement’.

The following pages highlight current policy and technical developments to illustrate the consequences for the spatial information community, before describing Victoria’s institutional environment and its response to the issues they raise.

2.1 Spatial enablement

The primary strategic document setting the direction for the Victorian spatial information community is the Victorian Spatial Information Strategy 2008-2010 (VSC, 2008), which is aimed at achieving a ‘spatially enabled Victoria’.

This goal acknowledges that ‘location’ or ‘place’ are increasingly recognised as the main factors in delivering social, economic and environmental benefits to people. And because we

define spatial information as *enabling* infrastructure for modern society, ‘spatial *enablement*’ is the outcome of applying spatial information to the delivery of services or the development of solutions to problems.

The creation of spatial enablement will require appropriate frameworks and an environment for engagement. When this engagement is in place, all sectors will work together to implement the required frameworks and standards, and devise solutions or develop new products or services; clusters will be created to build the critical integrating technologies; and modern and relevant policies and legal and regulatory frameworks will be created.

Having an environment of engagement with appropriate plans and standards will ensure that we avoid the risk ‘that the benefits of spatial information will be available to only a few’ (VSC, 2008).

2.2 Open access

Since the Victorian Spatial Information Strategy was released in May 2008, the calls to open up access to information, particularly that created and used by government, have gathered momentum. This is because access to information can lead to innovation and the development of new products and services, and an increase in national wealth. For example the Australian Government’s Government 2.0 Taskforce has argued (and similar arguments have also been made in Cutler, 2008 p.81 and EDIC, 2008 p.13):

‘When information is released it creates new and powerful dynamics which can drive innovative use and re-use, allowing the commercial, research and community sectors to add value to it. ... Allowing unfettered use and reuse of government data and information more generally can add to Australia’s innovative capacity and economic prosperity’ (DFD, 2009, p.4, 54).

Open access to information can also improve the democratic process: ‘the benefits to society as a whole through increased transparency will not occur through every citizen accessing and re-using PSI, but through individual citizens using and analysing PSI and making their analyses public, either as a public service or as entrepreneurs’ (EDIC, 2008 p.17).

‘Open access’ is generally defined to mean access to information ‘...available at zero price and on terms and formats that allow users to copy, use, transmit, reuse and transform the PSI from its original form’ (DFD 2009 p.41; see also EDIC, 2008 p.85 and 103).

Such access is needed to take advantage of the collaborative opportunities provided by Web 2.0, which ‘enable communities of interest to develop rapidly to find people with local knowledge or technical expertise to build understanding of issues and solve problems as they emerge’ (DFD, 2009 p.xi), and ‘enable people to transform data by “mashing it up”, combining it with other data so that it can become useful in new ways’ (DFD, 2009 p.xi).

The term ‘Government 2.0’ has been coined to describe the application of this approach by Government (DFD, 2009 p.x). It represents ‘a fundamental shift in the implementation of government – toward an open, collaborative, cooperative arrangement [between citizens and public servants] where there is (wherever possible) open consultation, open data, shared knowledge, mutual acknowledgment of expertise, mutual respect for shared values and an understanding of how to agree to disagree’ (DFD, 2009 p.2).

A condition of this new approach to collaboration is greater accessibility of government information: ‘Increasing citizen participation pre-supposes access to information’ and ‘rights to freely re-use, republish, repurpose and otherwise add value to’ it (DFD 2009 p.4).

This will necessarily require a cultural shift among information managers towards making their information more widely available and allowing it to be ‘re-used’ by others outside government to create new products and services.

2.3 Information Sharing

Realising the benefits of information sharing among government agencies to improve decision making will also require cultural changes.

The Australian Government’s *National Government Information Sharing Strategy* describes information as ‘the engine room of government’, and sharing it as a way to ‘improve the delivery of services to the Australian community’ (DFD, 2009b, p.5). The Strategy ‘aims to ensure the right service is delivered to the right citizen at the right time, by applying evidence-based policy, decision-making and service delivery based on the best available information’ (DFD, 2009b, p.5).

Among the barriers to sharing that it identifies are lack of leadership, information management practices that restrict sharing capability, and cultures that are resistant to it.

The principles that will overcome these barriers and encourage information sharing include (DFD, 2009b, p.19-24):

- Governance – establish accountabilities, responsibilities, policy, standards, coordination and integration of information, conditions for the use of information
- Custodianship – appoint custodians who understand their roles and responsibilities
- Use standards-based information – comply with relevant standards to give assurance to providers and users
- Build for interoperability – give custodians the ability to transfer and use information across agencies and technologies
- Promote information re-use – create trusted sources of information that users have confidence in. This can be achieved by applying the governance and custodian rules outline above, and clearly defining the requirement for re-use.

At a State level, the Victorian Public Service *Innovation Action Plan* (DPC, 2009) is a further example of efforts to increase information sharing. Under the Plan, the need to share

information is one of four action areas designed to ‘stimulate the VPS capacity to innovate’ and ‘embed innovation across the public service’ (the others are ‘creating connections between people, ideas and opportunities’, ‘building innovation capability’, and ‘generating ideas and rewarding good practice’).

Similarly the Victorian Parliamentary *Inquiry into Improving Access to Victorian Public Sector Information and Data* (EDIC, 2009) noted that ‘better sharing of information and data within the public services would facilitate the development of policy, and reduce the potential for duplication of resources and labour in the delivery of services and policy advice’ (EDIC 2009, p.12).

Both open access and information sharing have implications for those responsible for managing information. For example, the Government 2.0 Taskforce notes that open access ‘invites “intermediation”: that is external bodies using PSI to add value or deliver services to individuals’, which may lead to a shift in accountability for its quality, reliability and currency (DFD, 2009, p.50). The same can be said for the sharing of information between agencies.

It believes that data should be released ‘subject to clearly expressed caveats about its quality and possibly with the intention of subsequently revising and improving it – including by ‘crowdsourcing’ the identification of problems with the data and/or the fixing of them’. Poor quality should not be used as a reason not to release data: ‘Often release is a prelude to the data being improved as corrections, or at least the identification of problems is “crowdsourced”...’ (DFD, 2009, p.50).

This will require major changes in attitude on the part of information managers, and an environment that gives them confidence to release their data to wider use and re-use.

2.4 The application of information and knowledge management

In Victoria, the importance of information and knowledge management has been explicitly recognised in two recently announced major government policy initiatives.

In June 2009, the Government’s *Climate Change Green Paper* identified access to reliable, current, accurate and relevant information, investment in information, sharing of information, improving government decision making, providing the information staff will need (DPC 2009a) as key elements in developing strategies to respond and adapt to climate change.

In 2008 and 2009, its Land and Biodiversity Green and White Papers respectively (DSE, 2008; DSE, 2009) consider information and knowledge management in terms of capacity to make informed policy decisions, utilisation of community networks, the role of knowledge management systems and networks, use of data across agencies, sharing of knowledge, frameworks for data collection and management, and improving access to data (for example through web based tools).

These initiatives will require structures and institutions that are capable of improving Government's capacity to meet the demand for data and information, assess the fitness for purpose of the data and information needed, and improve resource allocation, as well as improving discoverability, timeliness and ease of access to data and information for its use.

The Victorian spatial information community, through the institutional environment it is creating, is directly addressing these issues.

3. DESCRIBING AN INSTITUTIONAL ENVIRONMENT

To create a culture of openness and sharing of information, a strong underpinning framework is needed to give custodians confidence in releasing their data. A relevant institutional environment can balance the needs of information managers and providers with those who want data for mashing up and creating new products and services. As a result of the environment, it should be easier to make information available, to collaborate between the sectors and to foster innovative use of information, including new technology.

It should also provide an appropriate framework to support rigorous information management, while also giving custodians the flexibility and confidence to release their data. The environment should be one that:

- Gives custodians tools to manage their information and meet growing demands for easily accessible data that is fit for purpose
- Enables information to be made available (an increasing complaint is that information is not being made available/accessible)
- Defines roles so that all sectors have confidence
- Provides for standardisation so that duplication is reduced and authoritative sources can be created
- Improves data management practices
- Makes information sharing possible – giving confidence to data managers that sharing their data has benefits to them as well as users

3.1 Victoria's institutional environment

In Victoria an institutional environment that will enable the spatial information community to respond to the environment described in the preceding pages is being created. It incorporates a comprehensive information management framework, collaborative decision making on behalf of and involving the whole spatial information community, collaboration and partnerships in the development of new products and services, and adoption of new technologies to support the delivery of and access to spatial information.

The Victorian Spatial Council is the peak body for spatial information in Victoria. It was set up in 2004 'to support the advancement of Victoria's social, economic and environmental goals through the provision and application of spatial information. It does this by providing a coordinated approach to policy, development and information management, and facilitating opportunities for partnership building, collaboration, cooperation and education' (VSC, 2009).

It operates under a participatory governance model defined by the *Spatial Information Management Framework* (VSC, 2009, p.6) and incorporating representation of all sectors of the spatial information community through the peak bodies for business, government, academia and the professions, as well as key interest groups, to ensure all interests can be addressed.

It has also defined the roles of each of these sectors to realise the opportunities for increased co-operation, collaboration and coordination that are provided through the Council (VSC, 2008, p.22).

In summary, the primary roles of the main sectors are defined as:

- *Government*: establish policies, standards, and the management framework and principles, manage and provide fundamental data, and support development of new products by the private sector
- *Private sector*: develop value added products and services and markets, promote new products, undertake R&D, and manage its data according to the spatial information management framework
- *Academia*: provide education and undertake R&D

The other elements of Victoria's institutional environment are (VSC, 2008, p.20-26):

- a framework for the use of spatial information – focusing on accessibility of spatial information, supporting participation, promulgating appropriate standards and establishing mechanisms for delivering and sharing spatial information
- an inclusive approach to management of information – encouraging 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
- collaboration and partnerships – recognising that growth in the spatial information community will result from the combination of individual strengths through partnerships and the adoption of open source approaches to collaboration, and release of government spatial data and information to enable others to develop new products and services
- foundations for spatial information management – ensuring that spatial data is being managed and made available in a way that facilitates and encourages its use, and is clearly understood by users. The fundamental requirements for this to happen are:
 - Ensuring data is fit for purpose
 - Adopting licensing models that facilitate access and opportunities for new development
 - Developing technical solutions that encourage accessibility
 - Raising awareness – among existing, new and potential users, and traditional and non-traditional users
 - Ensuring data can be discovered – through catalogues and other means
 - Determining priorities for data acquisition
 - Ensuring data is available
 - Ensuring that privacy considerations are taken into account

They are underpinned by the following principles: all spatial information being managed by an identifiable ‘custodian’; a consistent approach to managing spatial information; networks that support custodians performing their roles; and for government, a Whole of Victorian Government approach for access to and sharing of data.

Victoria’s Spatial Information Management Framework is the cornerstone of this foundation (VSC, 2009). It is the mechanism to make information accessible by making it easy to identify who has it, whether it is fit for the purpose at hand, how it can be accessed and whether it can be integrated with other information.

It incorporates four components (VSC, 2009):

- institutional arrangements for developing spatial information (governance, custodianship)
- requirements for creating and maintaining spatial information (defining framework and business information, and data quality)
- mechanisms for making spatial information accessible and available (metadata, awareness, access, pricing and licensing, and privacy)
- strategic development of technology and applications

The critical principle is that of *custodianship*, under which all spatial datasets will have identifiable custodians who will maintain them according to the information management principles of data quality, metadata, awareness, access, pricing and licensing, and privacy.

Specifically, custodians will

- develop *data quality* statements in consultation with users, and publish them in the product specifications and metadata for the respective datasets
- collect, as a minimum, core *metadata* elements, as defined by International Standards translated for use in Australia; include metadata with data distributed to users; and publish metadata for their dataset(s) in the appropriate spatial data directories
- raise *awareness* of their spatial data by publishing metadata and product specifications, and making their metadata available through the Victorian Spatial Data Directory (VSDD)
- use the VSDD as the central *access* point for spatial information
- *price* their spatial information according to a consistent pricing policy, and adopt standard *licence* conditions
- recognise *privacy* requirements in the management of their spatial information

They will also ensure that their data is capable of being made available through multiple access and distribution mechanisms through strategic development of technology and applications.

4. HOW AN INSTITUTIONAL ENVIRONMENT CAN WORK - CASE STUDIES

The institutional environment described above has been instrumental in fostering a best practice approach to the management of spatial information and stimulating initiatives designed to enhance its contribution to planning and decision making. The following pages present three case studies outlining how different aspects of this institutional environment have contributed to the management and development of spatial information in Victoria.

4.1 Case Study 1 - Protocols for information sharing by Government agencies

Appropriate protocols are being developed to give effect to the provisions of the Spatial Information Management Framework described on page 9, that is, turn policy into practice. They address the requirements for data management (that all data should be managed by custodians with identifiable roles, rights and responsibilities), all information being provided under a use licence, and a minimum set of metadata to accompany all data for the purposes of discovery of that data and assessing its fitness for purpose.

For licensing, all spatial information is provided under a use licence, which protects the interests of the Victorian government generally and the supplying agency specifically, and a Schedule is attached to the licence that specifies any use restrictions or requirements.

Coordinating and sharing information at whole of Victorian Government level will also require a minimum standard set of metadata to be provided. This minimum standard represents the basic information required for management and discovery of the data, and a point of contact to obtain further information if needed. The main metadata elements required will include the title and custodian of the dataset, a description, search word, geographic extent, format, access constraints, and currency.

In relation to information sharing agreements, bilateral arrangements between parties for information sharing result in duplicated effort, multiple data sources and provide the potential for widely differing and conflicting use conditions. Under the protocol, agreements for information sharing must be in place at whole-of-Victorian-government level, and will be applicable for use with third parties such as local government, utilities and private sector organisations where necessary.

Such agreements are referred to as custodianship agreements and provide the technical, legal and commercial clarity necessary for information to be properly managed, shared and exchanged. However, it is also part of the agreement that the custodian controls who may access the information, and under what conditions.

Finally, all participants should access a common source of information.

To enable this to happen, the protocol will require that access transactions should be documented and ensure that at least the three requirements described above are met, that is: a standard Victorian a custodianship agreement is in place; a Government licence accompanies

the information, with a Schedule appropriately documenting access and use requirements; and minimum required metadata is provided.

4.2 Case Study 2 – Collaboration to build spatial infrastructure

The second case study demonstrates the value of collaboration to develop spatial information products and services. It is divided into two parts, illustrating the opportunities that can be created when all sectors of the spatial information community and other stakeholders have an environment in which they can articulate their concerns, and be partners in delivering critical infrastructure.

4.2.1 The positioning network

As described on page 8, Victoria's institutional environment includes the specific definition of roles and responsibilities for government, the private sector and academia.

The development of Victoria's positioning network illustrates how this model can work in practice.

Vicmap Position is one of Victoria's framework or core datasets and has two components: (1) the *infrastructure* - 'GPSnet' (this is the State-wide network of 39 Continuously Operating Reference Stations that operate throughout Victoria, which will grow to 102 by the end of 2011); and (2) the satellite positioning *services* that provide correction data to users (over Melbourne, this happens in real time at +/- 2 cm accuracy, with the objective being to provide the same +/- 2cm real time positioning across the whole State by the end of 2011).

Since its inception in 1996, the development of Vicmap Position has been a cooperative venture. Government manages the network and the services it provides, and enters into agreements with a range of organisations such as local government, private companies, and utilities, to act as site hosts for the network's reference stations. In return these hosts receive free access to the data correction services provided by the network.

Other users are serviced by private sector Value Added Resellers who are able to offer a range of products and services to target markets such as farmers, mining companies and others.

And finally, Government and the academic and research sectors collaborate closely to develop the science around the network, such as real time quality control.

At the time of writing, a major investment is underway by the Victorian Government to expand Vicmap Position throughout regional Victoria. As a result of the success of the collaborative approach, it has also been adopted for this initiative.

4.2.2 Published Topographic Maps and Books

An institutional environment that gives stakeholders an opportunity to make their views known can lead to innovative solutions to longstanding problems. This has been demonstrated by an initiative to update Victoria's series of published topographic maps and develop new products using the latest technology.

Victoria has had formal relationships between the government, private and academic sectors to develop spatial information since the mid 1990s. The predecessor to the Victorian Spatial Council – the Geospatial Information Reference Group – was instrumental in the initiation of a program to update the entire series of 1:50,000 scale maps – a program that has also created a number of new products and that has led the way in Australia and internationally.

By early 2003, many of Victoria's topographic maps were anywhere between 10 and 30 years out of date. In that year, the *Review of the Regulatory and Administrative Framework for Survey and Spatial Information in Victoria* (DSE, 2003) recommended that 'the State-wide mapping program should be reconstituted due to the prevalence of out-of-date maps and emerging Government liabilities' (DSE, 2003, p.56).

The Geospatial Information Reference Group followed up that recommendation with a public forum that reiterated the need for up to date topographic maps. Its Chairman wrote to Victoria's mapping agency, the Department of Sustainability and Environment, which responded by introducing a new mapping program.

As a result of the program, by the end of 2009 automated processes using digital data had been adopted, a range of new mapping products had been created and made available, such as A4 and A3 size maps in PDF format available for on-line purchase, and the capability to produce up to date maps on demand had been created.

A further outcome of the forum was the release of an Expression of Interest seeking innovative proposals from the private sector to partner with the Government in providing new published mapping products. As a result of this initiative, a new series of Vicmap books has been created. This State-wide series comprises 5 books, which are updated every two years, and include standard topographic information themes using the latest Vicmap data.

Users of the Vicmap books contribute significantly to the partnership by providing feedback on the currency of data through a formal notification process. The updates are reflected both in the digital datasets – immediately – and in each new edition of the books. The benefits of this approach are already being felt as many hundreds of improvements to the data have been made as a result of the ongoing feedback received.

4.3 Case Study 3 – Adopting a collaborative approach to maintaining core spatial data

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 and State governments are critical to property/cadastral data; purchase partners support the development of imagery; and 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 fire fighting volunteers.

Opening the data maintenance cycle in this way 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 of the data or have the up to date 'on the ground knowledge' of changes occurring at the local level.

One of the ways in which this challenge is being responded to is through the use of Web 2.0. These technologies may provide new opportunities to bridge the resourcing gap for providers of spatial information by making government, the community and the private sector 'co-producers' of it.

In Victoria this form of co-production has been developed through an initiative called the Notification and Editing Service (NES). It incorporates the principle of 'managed crowd sourcing' to identify potential improvements to data, and also demonstrates the principle of custodianship as described on page 9 in action.

The NES is a portal site and an 'Easy Editor' that enables a notifier to notify the custodian of required data changes. (An Advanced Editor that enables the direct editing of a dataset is being investigated for potential adoption in the longer term.)

An on-line workflow process has been developed, incorporating the following four roles:

- **Notifier** – a registered person who can report errors in data via a 'Change Request'.
- **Custodian** – the Organisation responsible for the quality and completeness of their data. The Custodian can create work orders for editing by a Maintainer (see below), or directly edit their data themselves.
- **Maintainer** – the Organisation or person responsible for editing the data on behalf of the Custodian.
- **Administrator** – in this case, the Department of Sustainability and Environment, who is responsible for user access, allocation of data permissions, workflow, validation rules and generally running the service.

The NES uses a dashboard approach to facilitate tracking a Change Request through the entire process, which incorporates the following steps (workflow):

- notifier makes a change request
- custodian reviews the change request
- custodian makes the change or rejects request and advises the notifier
- custodian refers the change to another authority for review
- authority verifies the changes,
- authority refers the change to the dataset maintainer for updating of the dataset,
- change is finally accepted into the authoritative dataset (Vicmap).

In the long term the vision for the service is that custodians will edit their data directly; the time from edit to availability of updated data will be less than 24 hours; and general users, that is, the community, can lodge notifications which will be passed directly to the Custodian.

Current participants are Victoria's 79 Local Councils; the two Vicmap maintenance contractors; the Emergency Services and utilities (in particular water and telecommunications); a range of State Government agencies; and the private company that produces the Vicmap books (described in Case Study 2 above).

5. CONCLUSION

Spatial information can play a major role in developing solutions to the challenges we are all currently facing, but to do that it needs a robust institutional environment. In Victoria it has been agreed that this is best provided by a holistic approach incorporating frameworks for spatial information management and facilitating its use, encouraging the use of new technology, and adopting collaboration and partnerships to support the growth of the whole spatial information community. Together these are providing a sound basis for responding to developments such as open access and information sharing, as well as enabling spatial information's contribution to significant policy issues such as responding to climate change; fostering new initiatives that make spatial information more accessible and useful; and establish consistent information management practices for custodians that deliver more and higher quality information to users.

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BIOGRAPHICAL NOTES

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