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Victorian State-based Reform Inquiry
Victorian Competition and Efficiency Commission
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Dear Commissioners

**INQUIRY INTO A STATE BASED REFORM AGENDA**

I write on behalf of the Victorian Spatial Council (VSC) in response to the invitation to make a submission to the Victorian Competition and Efficiency Commission's Inquiry into a State Based Reform Agenda.

The VSC is Victoria's peak body for spatial (or location) information policy and management; it also facilitates opportunities for a strategic focus on its development through greater partnership building, collaboration, cooperation and education.

Its members come from all sectors of government, the private sector, the professions and academia.

The Council has a particular interest in providing an environment in which spatial information is available and able to be used, and that development and accessibility of that information is supported by the latest technologies.

Through its current 2008-2010 Strategy, the Council is seeking to support the creation of the conditions in which the right frameworks, standards and technical developments are in place to ensure both these goals are met.

In relation to the Inquiry's Terms of Reference, the Council would like to submit that information – and in particular spatial or location information, including high accuracy positioning services – has the potential to be a significant contributor to improving productivity and overall competitiveness in Victoria.

This is particularly evident in the growing application of smart technologies, such as smart phones and smart energy meters, and the incorporation of location related information (such as features of interest and positioning) as part of their core functionality.

The additional information these technologies are capable of providing is resulting in consumers and producers who are more informed about events specifically related to their location. This is enabling them to make more informed decisions about the services they produce and use, and has already been demonstrated to have a direct bearing on productivity and competitiveness.

In relation to the matters raised in the Issues Paper, the Council believes that policy frameworks governing positioning and information management could contribute to the package of reforms to be considered as part of the scope of the Inquiry.

The comments in the following pages set out proposed approaches for taking advantage of location related information and positioning services, to improve their quality and usefulness, and the factors that may be considered as contributing to productivity and competitiveness.

The Council would welcome the opportunity to discuss its submission further should the opportunity arise.

In the meantime, further information about the Council and its activities is available via our website: www.victorianspatialcouncil.org.

Yours faithfully

**Olaf Hedberg, AM**
**Independent Chair**

# Victorian Spatial Council submission to the Victorian Competition and Efficiency Commission Issues Paper – *Inquiry into a State Based Reform Agenda*

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***Introductory Remarks***

The Victorian Competition and Efficiency's State Based Reform Agenda Inquiry Issues Paper sets out a number of opportunities for and challenges to improving productivity and competitiveness, while also setting policy in the face of longer term trends in the exchange rate, energy pricing, demographic changes, and State-Federal government relations.

In turn, the capacity to respond to these challenges will be influenced by the characteristics of the economy, policy developments at the national level, and Victorian government policies (taxation, infrastructure development, regulation and service delivery).

A key question for the Inquiry is *what role the Victorian Government can, and should, play in each area under consideration.*

In particular, the Issues Paper refers to the 'Government's influence on productivity [being] through the effect of its institutional frameworks and policies on business decisions…' (p.12), and that '…the Commission intends to focus on areas in which the Victorian Government has a direct role, as well as areas in which it can play a useful advocacy role…' (p.13)

The Victorian Spatial Council's (VSC) role is to support the creation of an environment in which spatial information is available and able to be used, and development and accessibility of that information is supported by the latest technologies. Through its current Strategy, the Council is seeking to support the creation of the conditions in which the right frameworks, standards and technical developments are in place to ensure both these goals are met.

**Spatial Information**
Spatial (or location related) information in particular is a critical resource for government and business.
From its beginnings in defining and mapping land and land ownership at the time of white settlement, spatial information is now being applied across a wide range of government and business activity, such as environmental management, emergency management, resource development, infrastructure planning and delivery, and product and service delivery.
Today it is estimated that 80% of government information has a geographic/location component.

The VSC believes that information generally, and spatial (location related) information specifically, can make a significant contribution to improving productivity and efficiency. Government is a significant creator and provider of information, and therefore can influence its availability through the policies it applies for its management, provision and re-use.

One of the key characteristics of recent developments in information and technology, in particular as a result of digitisation and the internet, is that individual datasets held by many agencies and collected for a particular purpose can be brought together from these various sources and readily combined to support planning and decision making in other subject areas.

Given appropriate planning and coordination, this can happen with significant saving of costs. To take full advantage of this principle, the data must be consistent, it must be of an acceptable standard, its existence must be widely known, it must be accessible, and there must be an easily identified, authoritative source for the data.

However, these opportunities also bring challenges. The VSC has a particular interest in the underlying institutional environment and the management arrangements that ensure information is available and able to be used.

For *information management*, the Council has developed a comprehensive foundation for spatial information management that will ensure the data is being managed and made available in a way that facilitates and encourages its use, and is clearly understood by users. However, it also recognises there are challenges, such as opening up access to that information and coordination between all creators of information and the technologies that can make it more accessible.

The Council has also taken a keen interest in the delivery of positioning technologies and their application to transport, agriculture, and other economic activities.

The Council notes the Issues Paper remark that a 'potential determinant of future trends in productivity, competitiveness and participation is how Victoria's cities function. The ability of people, goods and ideas to move depends partly on how cities operate — that is, the efficiency of transport networks' (p.13).

The Council has been considering a number of such issues, which are also relevant to the Issues Paper, including the accuracy of positioning through technology for transport and other activities, whether users can be confident that the resulting measurements are fit for their purpose, whether the use of positioning information in legal and commercial environments can be supported, meeting the differing requirements and expectations of an increasing range of users, and the policies and standards needed to deliver appropriate positioning services to users.

The remainder of this submission will outline the Council's current thinking on spatial information as an important infrastructure for Victoria, the issues associated with positioning services and technologies, and the responses it is pursuing.

The Council's goal in doing so is to illustrate how spatial information and positioning can contribute to addressing the questions set out in the Issues Paper and to the range of considerations that could be further explored with the aim of improving Victoria's productivity and competitiveness.

## 1. *Information as Infrastructure*

*In this section, the Council is addressing the following Issues Paper questions:*

- *What should be the main elements of a state-based reform agenda that is directed at raising productivity, competitiveness and participation? (p.17)*
- *What are the major considerations and prospective developments that should influence the priorities for reform? (p.17)*
- *On which aspects of Victorian infrastructure should the Commission focus in this inquiry? Why? (p.26)*
- *Which areas of infrastructure are most important to the way in which Victoria's cities function and connect? (p.26)*

Victoria has a significant resource in fundamental, or 'framework' spatial information.

While the data that users of spatial information require can vary greatly in geographic area, purpose, and content, they almost always include a few basic themes, which may be categorised as 'framework' or 'fundamental' spatial information.

In Victoria they are described as *Framework Information*. Framework Information therefore has a coordinating and defining role; it is information considered fundamental to the development and operation of Victoria's spatial information infrastructure, in that other (business) information relies on it for accurate and efficient use.

In 2003, the *Review of the Regulatory and Administrative Framework for Survey and Spatial Information in Victoria* (Hedberg, 2003) argued that

- framework data are the foundation or basis for other important, thematic and value added datasets,
- responsibility for funding, creating and maintaining these datasets is accepted as a government role 'in that they have a strong bearing on jurisdictional social, economic and environmental interests' (p.50), and that
- 'the framework datasets are the building blocks upon which value adding can occur' (p.50).

In Victoria, Framework Information comprises eleven datasets collectively known as Vicmap: Position, Property, Transport, Address, Administrative Boundaries, Hydrography, Elevation, Imagery, Vegetation, Planning, and Features of Interest.

The Council also believes that this Framework Information can be categorised as a form of infrastructure.

Framework Information, indeed all spatial information, is part of society's infrastructure, in the same way that roads, electricity, and communications are. Most areas of our economy and society rely either directly or indirectly on spatial information for planning, maintaining or rationalising the delivery of services or products.

The Council believes that Framework Information easily fits into the characteristics of infrastructure identified by the House of Representatives Standing Committee on Transport, Communications and Infrastructure in 1987: it

- exists to support other economic or social [and in the case of spatial information, environmental] activities, not as an end in itself,
- incurs a relatively high initial capital cost,
- has a relatively long life, and
- should be managed and paid for on a long term basis.

The availability and accessibility of this information can make significant differences to Victoria's participation, competitiveness and productivity as considered by the Issues Paper (p.26).

**Legislation**

The Council considers this information of such importance to Victoria that in 2010 it commissioned a review to determine the need and feasibility of a legislative approach (vis a vis alternative approaches) to simplify and streamline the provision and management of spatial information to ensure it is accessible and useable.

The investigation concluded that, while there had been significant advances in the management and delivery of spatial information over the past 15 years in Victoria, there are numerous emerging reasons for change.

The following key issues and concerns were identified in the review:

- increasing importance of spatial information, and growing need for data quality and consistency
- current lack of standardisation and consistency of data (particularly address data (*'standardised address data is the most pressing spatial information issue in Victoria at the present time'*)
- insufficient cooperation and data sharing
- unclear roles, leading to institutional relationship problems
- duplication of effort
- lost opportunities to add value to information
- an out-of-date and inconsistent legislative framework
- the lack of an explicit legislative basis for some current activities
- multiple and inconsistent definitions of terms

As a consequence of these shortcomings, there is at present no consistent, up-to-date, overarching management framework for the supply, management and delivery of spatial information in Victoria.

Importantly, there is currently no formal basis for achieving consistency in digital spatial information datasets.

The review further found that with the right rules framework for spatial information several types of benefit will be generated:

- improved data quality, including at the local council level. Councils are rightly custodians of certain datasets, but the state-wide importance of those datasets means that consistency in data quality and metadata is essential
- improved data access, as organisations would be able to obtain the full benefit of access to spatial information products and services produced by others
- reduced compliance costs, eg. by reducing repetition of data requests for standard information in forms
- reduced data search costs from reduced duplication and data inconsistencies, and improved metadata (search costs are a large component of data-related costs)
- operational cost savings from greater coordination of spatial information management, and clearer organisational roles and responsibilities
- scope to expand commercialisation activities
- transparency benefits from improved data quality
- government can add value to spatial datasets by 'standing behind them'

The consultation undertaken during the review found that:

- there was near-universal agreement on the need to address shortcomings in the current framework of rules for managing spatial information
- a key issue was the need to increase consistency in spatial information, and cooperation among the various participants and stakeholders
- significant cost savings and regulatory burden reductions could be realised by improving the institutional and regulatory framework
- important matters are at stake, including land administration, and
- joint action is crucial.

On the basis of the analysis, the review concluded that a new authorising environment and framework of rules is needed to formalise roles and responsibilities for managing spatial information, to define a set of fundamental or core information, and to set out requirements for exchanging and making that information available.

The new framework of rules should:

- clarify the principles governing spatial information in Victoria
- clarify institutional arrangements for spatial information in Victoria, including organisational roles
- clarify and simplify the obligations of organisations and individuals relating to spatial information
- provide better guidance to key participants about how to carry out their obligations
- clarify the means to improve data management both inside and outside the public sector
- clarify commercialisation arrangements and associated powers and functions, and

- establish up-to-date arrangements that are internally consistent and that are consistent with other instruments and wider rules relating to the management of information.

The review concluded that the new framework of rules should include new legislation that would:

- play an 'enabling' role for the creation and management of spatial information
- promote the sharing of spatial information
- set a framework for spatial information standards, guidelines, and for consistency and inter-operability between datasets
- clarify and standardise terminology in order to reduce the presently large role for interpretation due to the lack of clear and common definitions
- clarify roles and responsibilities, and reduce overlap

It also concluded that legislative reform should involve a new Act rather than solely seek to amend a series of existing Acts that are interdependent in complex ways, and in some cases are inconsistent.

The legislation would be primarily concerned with the collection, management and distribution of the 'data' associated with spatial information, and in particular would relate to State and Local Government bodies, with limited impact on private industry – but will result in significant benefit to industry by ensuring access to the information produced by those bodies: if government is delivering its services more efficiently, and if information is more widely available, business is more efficient.

The Council would welcome the consideration of these issues and the recommended solution as part of the Inquiry's investigation. With information assuming an increasingly critical part of business and government activity, its ready availability and the appropriate management of it is of growing importance to improving their productivity and efficiency.

**Release of Government information**

In recent years an increasing number of reports, reviews and inquiries have called for government information to be made more accessible.

The rationale is that access to information can lead to innovation and the development of new products and services, and an increase in national wealth. For example in 2009 the Australian Government's Government 2.0 Taskforce 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).

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).

At the same time, the Cutler review of the national innovation system (Cutler, 2008), argued that

*good information is crucial to the efficiency of markets and to the ability of discerning consumers to drive innovation by providers. Governments can promote good information flows both by finessing the 'rules of the game' in markets and by ensuring that the information and other content that they fund is widely and freely available to be used by consumers, and to be re-used and transformed into new value-added products by firms further down the production chain* (p.81).

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.

Government can play a role in providing the necessary frameworks to facilitate making information more available, and support the objective of achieving a flow of information that will support innovation and development of new products and services by the private sector.

**'Big Data'**

The Council would also like to draw the Inquiry's attention to a recent report published by the McKinsey Global Institute in May 2011 entitled *Big Data: The next frontier for innovation, competition and productivity*. Many of the concerns set out in the report mirror those of this Inquiry.

**Big data** is defined as 'datasets whose size is beyond the ability of typical database software tools to capture, store, manage and analyze'. 'In a digitised world consumers going about their day – communicating, browsing, buying, sharing, searching – create their own enormous trails of data' (p.1).

That report demonstrates 'that data can create significant value for the world economy, enhancing the productivity and competitiveness of companies and the public sector and creating substantial economic surplus for consumers' (p.1-2). It has become a key factor of production (p.3): 'like other essential factors of production such as hard assets and human capital, much of modern economic activity simply couldn't take place without it' (p.4).

In addition, 'the means to extract insight from data are also markedly improving as software available to apply increasingly sophisticated techniques combines with growing computing horsepower. Further, the ability to generate, communicate, share and access data has been revolutionised by the increasing number of people, devices, and sensors that are now connected by digital networks' (p.2).

While 'the global economy is on the cusp of a new wave of productivity growth enabled by big data' (p.15), there are a number of considerable challenges that businesses and policy makers will need to address if they are to capture its full potential (p.3), in particular:

- Shortage of skilled workers
- Having the right infrastructure and incentives
- Economic benefits being understood
- Safeguards being in place

Its key findings include the existence of a range of barriers that will need to be overcome to realise the full value of big data:

- Policy related – privacy, security, intellectual property, liability

- Capacity to integrate data from different sources – overcoming legacy systems and incompatible standards and formats
- Organisation change – having the skills available to make the most of the data
- Access to data from multiple sources – 'in many cases, efficient markets are yet to be set up for trading or sharing data', and 'incentives are misaligned so that stakeholders want to keep the information to themselves'
- Industry structure – the ease or difficulty of capturing value could depend on the structure of a particular sector or industry

The report argues that policy can play a role in:

- Building human capital – putting in place education initiatives (p.117)
- Aligning incentives to ensure access to data – 'creating the conditions for the functioning of effective markets… and apply the lever of regulation to ensure that data are shared' (p.118)
- Addressing privacy and security – effective design and enforcement of privacy laws (p.119)
- Establishing IP frameworks – to ensure innovation (p.120)
- Addressing technology barriers – encouraging R&D in critical areas, standards, promoting basic research, providing incentives (p.120)
- Promoting the underlying ICT infrastructure – 'the basic infrastructure needs to be in place from electricity grids that power information technology to communication networks that enable data to travel' (p.121)

The full report is available from the McKinsey Global Institute web site (see list of references).

## *2. Positioning Infrastructure and Technology*

*In this section, the Council addresses the following Issues Paper questions and remarks:*

- *Another potential determinant of future trends in productivity, competitiveness and participation is how Victoria's cities function. The ability of people, goods and ideas to move depends partly on how cities operate — that is, the efficiency of transport networks (p.13)*
- *What are the important trends and future developments that should be considered in framing a state-based reform agenda for Victoria? (p.14)*

The Council believes that positioning technologies are also significant contributors to improving productivity and competitiveness. They are also becoming more widely accessible and used, bringing its own challenges, some of which are highlighted in the following pages.

(The Council notes that the term GPS is widely used and recognised, however a growing number of other satellite constellations, under the collective title of Global Navigation Satellite Systems (GNSS), from the Europeans, Russians, Chinese and others, are becoming available. As they do, their availability will improve the performance of the traditional positioning devices and accelerate take up of positioning technologies.)

The Victorian Government is already a leader in the development and management of positioning infrastructure and services. It is the first jurisdiction in Australia to have delivered a State-wide network providing high accuracy positioning services.

It manages and develops the Vicmap Position-GPSnet network of Continuously Operating Reference Stations (CORS) that provides positioning information for location based services applications, including Intelligent Transport Systems, agriculture, construction and mining.

Vicmap Position-GPSnet provides state-wide GNSS satellite position correction data to users in real time and for post-processing.

The development of the network has been coordinated and facilitated by the Department of Sustainability and Environment since 1996 in cooperation with industry, academia and the general community.

The GPSnet infrastructure generates a range of satellite position correction services including a Networked-RTK (NRTK) service with ±2cm horizontal accuracy across Melbourne and environs, and a state-wide Networked-Differential GNSS service with sub-metre positional accuracy. Since October 2010, the NRTK service has been available throughout Victoria as a result of the Positioning Regional Victoria initiative (for further information, refer to the DSE web site:

http://www.dse.vic.gov.au/property-titles-and-maps/maps,-imagery-and-data/data/gpsnet).

**Current and future uses of positioning services in Victoria**

Vicmap Position-GPSnet has already contributed to the completion of some Intelligent Transport related objectives in Victoria, such as the conduct of precise real time field surveys of crossings throughout the State as part of rail crossing upgrades; and use of real time positioning services to support precise 'as constructed surveys' as part of the Monash-CityLink-Westgate upgrades.

It is also providing high accuracy real time satellite guidance services for low speed dynamic platforms in the form of tractors for precision agriculture at +/- 2cm accuracy and was also used in the Channel Deepening project.

In the future Vicmap Position-GPSnet real time and post processing services will be suitable for application in a range of areas such as assisted vehicle steering for 'car platooning' (reducing congestion and increasing safety on the roads), high accuracy road lane mapping, 'virtual' anywhere real time road tolling, 'Smarter' Bus solutions for lane keeping in mass transit only lanes, etc.

The requirement for legally traceable positions under Regulation 13 of the *National Measurement Act* also provides the opportunity to use Vicmap Position-GPSnet on applications that require legal status. For example, Point to Point cameras have and are increasingly being deployed to monitor vehicle speeds, while road legislation requires a legally traceable, curvilinear distance to be determined between the cameras. Vicmap Position-GPSnet can be used for this and similar applications.

In 2007, a benefits study identified that access to high accuracy positioning through Vicmap Position-GPSnet would provide a gross economic benefit of $36 million annually for precision farming in Victoria's cropping districts alone (ACG, 2007).

Other benefits to agriculture possible as a result of the targeted development of Victoria's CORS network include:

- Farmers being able to use the technology to plot courses for their tractors and harvesters, which will enable far more accurate dispersal of seed and fertiliser and more efficient harvesting – resulting in yield improvements of 10 to 20%.
- Contribution to the reduction of input costs such as seed, fuel, labour, machinery investment, and chemical applications such as insecticide by up to 50%, providing economic as well as environmental benefits.

These translate to an estimated saving to Victorian agriculture of more than $400 million over the next 20 years from a State-wide CORS network.

A further study conducted in 2008 (ACG, 2008) noted that the construction and civil engineering sectors also stand to benefit from lower costs and time savings as a result of the greater accuracy provided by precise positioning. Other benefits include reduction in the number of times dirt needs to be moved around a site, increased productivity of earth moving equipment such as bulldozers and graders, and increased safety for workers as fewer need to be in close proximity to the equipment.

**Positioning Policy**

While the positioning technology is either mature or maturing, as the examples above demonstrate, there is no policy framework to allow the best use of this information and address issues such as:

- the accuracy of positioning through technology and users' ability to be confident that the resulting measurements are fit for purpose
- the OHS, industrial relation and privacy implications of using position information to monitor people's movements
- whether the use of positioning information in legal and commercial environments can be supported
- meeting the differing requirements and expectations for quality and accuracy of an increasing range of users (for example transport, surveying, construction, engineering and precision agriculture require high precision, while recreational activities such as bushwalking may be far less demanding)

The VSC has developed a draft policy to provide a unified framework for the determination and use of positioning and location information to both support the development of Victoria's positioning network and the range of uses of the information derived from it, and address the implications of the increasing use of location technologies.

The key features of this policy are outlined below. In particular it

- provides for a range of positioning technologies,
- allows integration of complementary technologies,
- meets a range of user requirements and expectations, and
- provides for certainty (including legal traceability of both the measurements of position and the spatial datasets derived from them or used in conjunction with them)

Its principles are intended to be generic enough to be widely applicable, but supported by detailed policy and guidelines for relevant sectors, such as transport.

The use of positioning in intelligent transport, for example, will require consideration of the capacity of the positioning *infrastructure* used and the *fitness for purpose* of the locations derived from that infrastructure.

The draft policy addresses key principles under both these categories.

*Positioning Infrastructure*

This encompasses all of the components necessary for a positioning system to determine and make available the location of a target object, including

- the certified reference markers to which the position is related and that ensure a position is reliable and legally traceable
- contextual data and interfaces that make use of the location, such as maps and navigation instructions
- the communications and regulatory requirements necessary for the system's operation
- the technology – including the receivers to 'capture' the positioning signals

The policy defines the infrastructure's function as being to determine the position of target objects, and that it should be

- able to support positioning systems of varying technologies and qualities
- domestically and internationally interoperable and together support all forms of positioning
- implemented, monitored and maintained in such a way that different forms of positioning complement and are compatible with one another, and
- the responsibility of a nominated custodian

*Fitness for Purpose*

This category focuses on enabling a user to define a location's suitability for the purpose to which he/she intends to put it.

A position's quality is fundamental to its use, but 'quality' will have a different definition for each user: to some it will relate to accuracy, while to others it will relate to the continuity and integrity of the service.

The policy and principles for this category are

- positions should be able to be relied on with certainty (ie they should be authoritative, accurate, traceable)
- a user should be able to determine when and where he or she requires a position and it should be accessible to users of all abilities
- positions should be suitable for integration with other datasets, while positions generated from one positioning infrastructure should be compatible with those generated from another
- a calculated position should be close to its true position
- there should be consistency in repeated observations (under identical conditions)

- the positioning system's availability should be communicated, that is, it should provide warnings of errors/failures
- those responsible for determining positions must ensure that their use or re-use conforms to the relevant legal, including privacy, guidelines

The Council's Positioning Policy has been prepared with a number of requirements in mind:

- it needs to be sufficiently broad to accommodate the wide array of positioning systems now available, such as those outlined earlier, encompassing all possible positioning technologies as well as the many and varied uses of position information
- various positioning infrastructures and their components should be able to coexist without interference or degradation of individual services so that a wide variety of positioning uses can be supported
- regulatory requirements (e.g. allocation of radio frequency spectrum for the transmission of a positioning system's information) must be accommodated in a positioning infrastructure
- both existing and future positioning systems must be supported

The Policy seeks to signpost opportunities and challenges that stem from the use of position information and in doing so endeavours to identify key issues that will require more attention in the future.

It is intended to be a generic policy that can be applied broadly, and within which industry sectors can develop policies, procedures and/or best practice guidelines to realise its objectives for their own circumstances.

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