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Submission title: Australian Spatial Data Infrastructure

Author(s): ASIBA

No. of pages: 15

Date: 15 October 2008

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☒ Issues Paper 1 — Australia's Future Infrastructure Requirements

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AUSTRALIAN SPATIAL INFORMATION ASSOCIATION

Australian spatial data infrastructure

A submission to Infrastructure Australia

15/10/2008

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Key points

Spatial data infrastructure is an amalgam of physical, digital and collaborative infrastructure. It is the foundation upon which the Australian Spatial Information Industry is built.

Its use has been expanding rapidly from specialists, such as surveyors and cartographers, to mainstream business and government users and to developers of new consumer products. However it has many gaps and weaknesses.

Considerable investment in developing the hardware, standards and access arrangements will be required to establish a truly national Australian Spatial Data Infrastructure (ASDI).

Policy priorities include:

- The Commonwealth Government should play a leadership role in the development of an Australian Spatial Data Infrastructure. A Commonwealth Minister should take carriage of policy reform and implementation of the national ASDI.
- A Ministerial Council of Commonwealth and State Ministers should be responsible for coordination between jurisdictions.
- The Australian Government should establish a phase 1 program to develop an Australian Government or 'low resolution' ASDI drawing on the fundamental data contained in its Departments and agencies over the next 5 years. The Government should commit $200 million to implement its establishment and maintain it going forward.
- An audit of the current state of the state of the ASDI in Australia should be included in the audit of infrastructure being undertaken by Infrastructure Australia.
- The audit would provide the foundation for integrating the State Government SDIs into a national ASDI in the longer term.
- The Productivity Commission should be commissioned to review the pricing policies of government business activities in relation to the provision of fundamental data in concert with a review of competitive neutrality policies applied in the provision of value added data by Governments.
- The Commonwealth Government should re-establish a positive government industry relationship that provides the environment for the development of an Australian Spatial Data Infrastructure.

Introduction

The Australian Spatial Information Business Association represents the spatial information industry's interests on issues specific to spatial businesses. The members are significant producers, managers and users of spatial data infrastructure and provide value- added services to government and industry. However the industry and its productive relationship with the Australian community, face some serious constraints in the development and use of spatial data infrastructure that should be addressed urgently.

This submission addresses discussion paper 1. Comments in the submission are also relevant to discussion paper 2.

Spatial Data Infrastructure

Spatial data infrastructure is infrastructure for sharing and use of geospatial information (UN Geospatial Information Working Group, 2007). Drawing on a European Union report it is defined as– ***a coordinated framework of technologies, standards and data, supported by policies and institutional arrangements that enable sharing and effective usage of geospatial information.*** (EU, 2006)

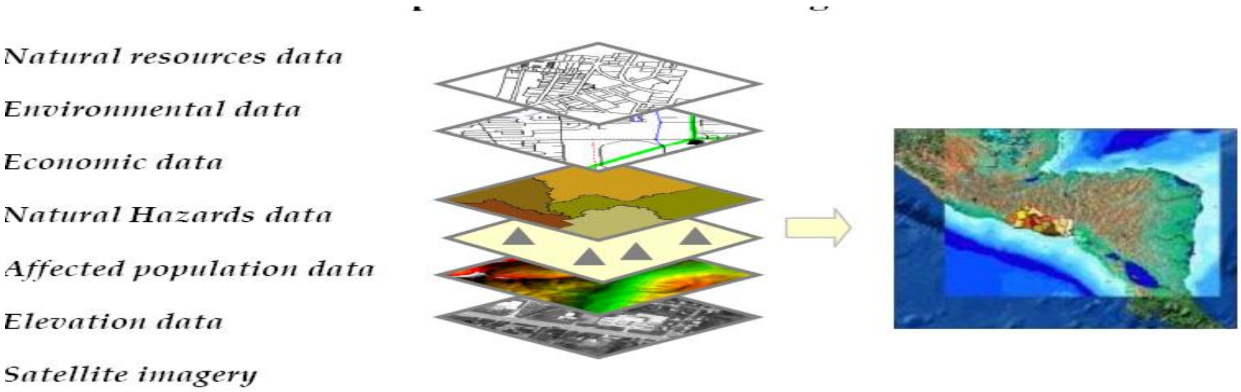
Spatial data infrastructure has characteristics of **physical, digital and collaborative infrastructure** referred to in Discussion Paper No.1 (Infrastructure Australia, 2008). It is used by business and governments and is integral in the provision and operation of other infrastructures such as roads, rail, ports and pipelines. The components of spatial data infrastructure are discussed below.

Geospatial data

Geospatial data is any data that is related to its location with respect to the earth. It can include statutory registers such as topographic maps, cadastral data, addresses and buildings or thematic data relevant to various industry and government sectors, such as location of infrastructure, land use, biodiversity, natural resources and social or economic statistics (see

Figure 1).

Figure 1 Geospatial data



Source: (UN Geospatial Information Working Group, 2007)

Geospatial data is gathered from ground surveys, aerial photographs and other airborne sensors and satellite imagery. This information is used to produce three dimensional data and images and a wide range of other products and services.

Lands Departments within each of the State jurisdictions have traditionally been responsible for the production of cartographic and topographic map series. These map series were, in their day, an analogue form of a spatial data infrastructure. Geospatial data has now been dramatically extended through digital mapping, global satellite positioning systems (GNSS) and information and communications technologies (ICT). The newer digital and positioning technologies have massively increased the potential applications in the broader community, business and government.

Geospatial data can be broadly divided into fundamental data and value added data.

Fundamental data is that which cannot be derived from another dataset. It is collected by governments from a range of sources. For example when surveyors lodge cadastral surveys they add to the fundamental cadastral data set held by Government. Examples of fundamental data sets in Australia include:

- geodetic control networks
- aerial photography
- satellite imagery
- cadastre and tenure
- property street addresses
- administrative boundaries
- transportation corridors and centerlines
- coastline and hydrographic data
- topography
- geological formations

Value- added data is data that has been improved, enhanced or combined with other data to create a product that has value over and above that of fundamental data. The market for value added data is growing rapidly as spatial information becomes increasingly integrated into business and social networking. Examples of value- added data include:

- demographic and economic trends by region
- infrastructure locations and status
- vehicle, ship and aircraft movements in digital maps
- maintenance records and operational data for pipelines and transmission lines
- wildlife and natural resource management status
- vegetation mapping and canopy mapping for forests
- status of water catchments
- spatially located emissions data
- in car navigation, speed limit and congestion data
- social networking data

Technologies

The technologies that support spatial data include:

- geographic information systems (GIS)
- global navigational satellite systems (GNSS such as GPS devices)
- augmented GNSS
- information, computer and telecommunications systems (ICT)
- modelling and simulation software.

These technologies provide access to this data by a wide range of users through web portals and personal data devices of many kinds. The Netherlands Geospatial Council refers to the principle **“record once, use many times”**. Embedded in this principle is the potential to avoid duplicated effort, reduce administrative costs and to harmonise the conditions for delivery and use of geographic information and data for re-use by third parties (GI Council, 2008). There has been significant innovation and advances in the capabilities of these technologies over the past ten years which is delivering unprecedented growth in new applications of spatial data by government, industry and society generally.

Geographic information systems (GIS) are based on digital mapping systems. These have been evolving rapidly, most noticeably in the in-car navigation systems. GIS systems are widely used in Government and industry to monitor natural resources, support search and rescue, manage bio-security and incursions of pests and diseases, provide navigation services, plan and manage the security of critical infrastructure and record and report on a wide range of economic, social and environmental issues.

GNSS systems are the navigational satellite systems supported by the US (Global Positioning System), Europe (Galileo) and the Federation of Russian States (Glonass). These systems offer free to air basic positioning accurate to between 6 and 20 metres. However it is possible to augment the accuracy with differential reference to ground stations. In some circumstances augmentation is provided for a fee by the GNSS itself (Galileo) or by private and public providers **(augmented GNSS)**. In Australia several companies provide commercial augmentation services and some government agencies such as Airservices Australia, AMSA and the Victorian Government provide free to air augmentation services. These services typically improve accuracy to between 1 cm and 10 cm.

Under the National Research Collaborative Infrastructure program (NCRIS) a program is being implemented to install research related ground stations across Australia to provide millimetre accuracy for research purposes by 2015 (AusCope, 2007).

ICT systems provide the enabling platforms on which geographic data can be recorded, stored and made available through web portals and other internet resources. The use of resources such as Google Earth and Google Maps is an example of how ICT systems have provided wide access to spatial data.

An important aspect of geospatial data systems is the ability to add **modelling and simulation software** that greatly enhances their capabilities. One example of this is the digital mapping system used by the Australian Maritime Safety Authority, which incorporates ocean current modelling to assist search and rescue strategies (ASIBA, 2007).

Standards

Adopting common standards for storage and publishing of spatial data to the broader community is critical to ensuring maximum access to fundamental and value added data whilst allowing the authors of the data freedom of choice when it comes to in-house systems and tools for capturing and maintaining the data.

It is also important that the broader community can discover what is available from data held in spatial data infrastructure. The establishment of interoperable registries and catalogues that contain metadata (data about data) that has been standardised is an extremely important property of an effective Spatial Data Infrastructure (SDI).

Institutional arrangements

There are a large number of institutions at the Commonwealth and State levels involved in maintaining spatial data infrastructure. Geoscience Australia, the Bureau of Meteorology, the Defence Imagery and Geospatial Organisation are prominent examples at the Commonwealth Level.

State Government agencies also provide spatial data infrastructure. Examples include the Western Australian Shared Land Information System, the Queensland Land Information Infrastructure Strategy, the Land Information Exchange in Victoria and the Community Access to Natural Resource Information in NSW.

The Australian and New Zealand Land Information Council (ANZLIC) plays a coordinating role between government land information agencies. The Office of Spatial Data Management (OSDM), located in Geoscience Australia, facilitates and co-ordinates spatial data management across Australian Government agencies.

The importance of spatial data infrastructure

The Spatial Information Industry is growing rapidly driven by rapid innovation and growing demand for more efficient application of spatial data in industry and government services. Spatial data infrastructure is the foundation upon which the spatial information industry is built.

ACIL Tasman estimated that the spatial information industry contributed to a cumulative gain of between $6.4 billion and $12.6 billion in Gross Domestic Product in 2006-07 (see Attachment 2). This arises as a result of increased productivity and development of resources across a wide range of industries and government services.

Increasing productivity

ACIL Tasman found that the spatial information industry increased productivity in a large number of important industry sectors (ACIL Tasman, 2008). Key sectors and the productivity increase attributable to spatial information industry are shown in Table 1 and Attachment 3.

Table 1 Direct productivity effects of spatial information

Sector	Nature	Productivity improvement
Agriculture (grains and cattle)	Controlled traffic farming and variable rate fertiliser Up to 20% productivity improvement where applied. Around 10% adoption in 2007	0.93% - 1.5%
Forestry	Inventory reporting and supervision	1.93%
Fisheries	Fisheries and habitat mapping	4% -5.14%
Property and business services	Development approvals and production of land, improved route and site selection.	0.5%-0.7%
Construction	Surveying and site mapping	0.25%-0.5%
Transport	Intelligent transport systems route planning and improved air navigation systems	0.45% -1.58%
Electricity gas and water	Infrastructure mapping and management, hazard	0.73%-1.25%

Sector	Nature	Productivity improvement
	monitoring and management	
Mining and resources	Robotic mining, maintenance, offshore production	0.15%-0.36%
Resource exploration	3 dimensional seismic	3%-14% increase in resource availability
Communications	Network planning, asset management and address management	0.98%-1.32%
Government	Administration, development approvals processes, bio-security, emergency services, compliance, regulation, security	0.34%-1.05%

Source: (ACIL Tasman, 2008)

More detail on the nature of these productivity impacts and their drivers is included a report released by ASIBA in 2007. (ASIBA, 2007).

Diversifying Australia's economic capabilities

The most recent data from the Australian Bureau of Statistics indicates that the Australian spatial information industry comprised around **3,234 businesses generating estimated total revenue of around $2.5 billion in revenue in 2007** (ACIL Tasman, 2008). According to a recent ASIBA census of the industry in Victoria, it is growing rapidly (Fivenines Consulting, 2008).

The use of spatial data has expanded beyond specialist users, such as cartographers, surveyors and hydrogrophers, to a rapidly growing class of applications in business and government. Spatial analysis and business demographics are increasing their penetration in many industry sectors led by the planning and construction industries. The GIS systems manager for Theiss Services recently referred to the productivity benefits of the spatially enabled project management system used to plan and construct the Melbourne's Eastlink roadway project as "Google on steroids" (Australian Financial Review, 26 August 2008). While this is a colourful metaphor it reflects the views of many in spatial information industry on the power and value of spatial information systems in construction and management of infrastructure projects.

Consumer applications of spatial information are also increasing rapidly in areas such as social networking and web based location applications growing strongly. This is illustrated by the growth in products and services such as Google maps and with applications such as Loopt being developed by Apple to support social networking.

There are many examples of innovative Australian companies developing new applications in mapping and monitoring technologies that are at the leading edge of global development of spatial data applications. As these companies grow they also diversify the Australian industrial base.

Increase Australia's international competitiveness

Spatial information is important to international competitiveness. This has been acknowledged by countries such as Canada, the United States as well as by the European Union (EU, 2006).

Australia's commodity industries - minerals and petroleum resources and agriculture- and Australian infrastructure providers are significant users of spatial information. In a report released in 2007, ASIBA documented many innovative applications that are improving the competitiveness of these industries (ASIBA, 2007).

The energy and resource industries draw on a wide range of spatially enabled technologies to locate, develop and market their products. This includes 3 dimensional seismic, infrastructure planning, operations management, mine facilities, pipeline construction and maintenance and operations management. This has significantly increased resource discovery and improved mining efficiency and supply chain management (see Table 1).

Recent studies have suggested that Australian agriculture will need to increase its productivity by around 1.8 times by 2020 if it is to maintain its international competitiveness and meet the challenges of adapting to climate change (Glyde, 2008). Precision agriculture based on spatial data systems is contributing significantly to improved yield management and broad acre cropping which is increasing productivity.

Australia is a vast continent with long transport distances. Intelligent transport systems, improved navigation systems for aircraft and vehicle and shipment tracking systems offer the potential to significantly increase the efficiency and effectiveness of the transport task. This is critical to the competitiveness of our mining and agricultural sectors and to manufacturing and services in areas ranging from and supply chain management to tourism.

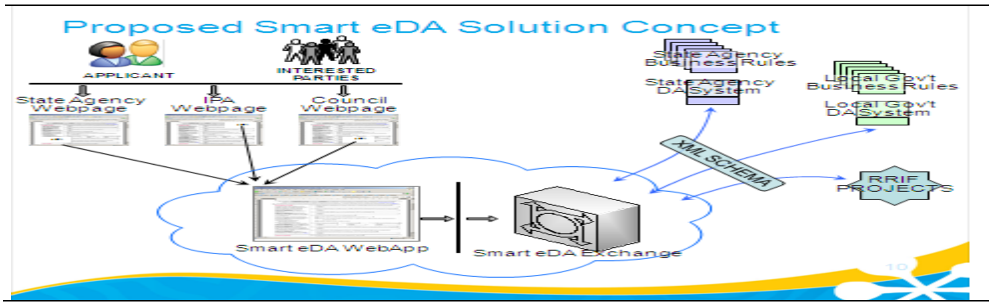
The penetration of spatial information systems into these industries, into transport systems and service delivery is expected to continue at an accelerating pace as global competition intensifies.

Develop our infrastructure and cities

The most intensive users of spatial information systems are the property and construction sectors followed closely by infrastructure. Spatial information systems provide the potential to significantly **reduce the regulatory burden in the development approval process for land and for critical infrastructure**.

Local governments in Queensland are implementing a spatially enabled development approval system. This provides the online capability for small business to lodge development applications across the internet and also to track the status of their application on a 24 hour by 7 day basis. The structure of the system is illustrated in Figure 2.

Figure 2 Spatially enabled development approvals in Queensland



Data source: Local Government Association of Queensland

A survey by the Local Government Association of Queensland, and information from other participating Queensland councils, indicates savings of around 10% from improved business processes.

Intelligent transport systems (ITS) integrate transport data, computer, communications and vehicle-sensing technologies into transport infrastructure and vehicles in order to monitor and improve the safety, efficiency, management and operations of vehicles and transport systems. There is considerable evidence collected from within Australia and abroad that ITS can reduce accident rates and improvements in transport efficiencies.

A recent example is the Vehicle Safety and Speed Monitoring System (VSSMS) developed by WestNet Energy to continually track the location of all vehicles working on the Dampier to Bunbury Natural Gas pipeline. The data is transmitted to a central control room at 30-minute intervals, where the location, date, time and speed data can be viewed in table format and graphically superimposed on Google Earth Pro. The introduction of the VSSMS has reduced vehicle incidents by 50 percent and has reduced fatalities to zero (APIA, 2008).

Reduce greenhouse gas emissions

Spatial information systems are a key resource used in monitoring and managing Australia’s response to climate change. The Department of Climate Change already depends upon spatial information systems to monitor emissions of greenhouse gases and to support the National Carbon Accounting System.

The Department of Climate Change has commissioned work to develop a digital elevation model of the Australian coast line to monitor sea level rise. This will be important to effectively planning for and managing the impact of sea level rise on Australia’s coastal communities. It is illustrative of an application of the higher level accuracy of augmented GNSS and the digital mapping capability of GIS systems used in policy planning and implementation.

Improvements to the efficiency of transport can also yield environmental benefits. For example, it is estimated that ITS will produce fuel savings of between 2% and 13% and reduce emissions by between 5% and 15% (Standing Commitee on Transport and Regional Services, 2002). It has been estimated that a reduction of road transport related emissions could reduce Australia’s total greenhouse gas emissions by between 0.5% and 1.5% (ASIBA, 2007).

The Council of Australian Governments has called for a national framework approach from for the National Climate Change Framework and multi-jurisdictional bodies such as the National Spatial Information Management (NSIM) Committee in its Spatial Strategic Plan 2007-2010 for counter-terrorism and emergency management needs (ISCM, 2008)

Managing water resources

Spatial information systems are used extensively to monitor water resources. The National Water Audit is based on a GIS system. Airborne magnetic surveys combined with digital mapping techniques have been used to map groundwater salinity characteristics. The Murray Darling Basin uses a GIS system to record and monitor over 4000 km of irrigation channels of varying sizes. Water trading markets will draw on on GIS systems to help monitor and record trading in water access entitlements and to record water movements between catchments.

GIS combined with augmented GNSS is likely to find increasing applications in the monitoring and management of Australia's water resources. Its increased accuracy combined with the potential to layer a wide range of water quality characteristics within the mapping framework will significantly improve the effectiveness of water policy and planning and management.

Natural resources management

Spatial information systems are helping improve the management of natural resources generally. The ongoing need to record and monitor habitat, biodiversity, vegetation and soil quality indicators and store the resultant data in GIS systems is huge. GIS is already used in research and mapping of soils, forests, vegetation and wildlife. It is a mainstream resource for the control of locust plagues and pests and diseases in agriculture.

Terrestrial laser scanning combined with GIS and augmented GNSS is being used for new applications mapping forest resources, monitoring clearing and recording land use. The Bureau of Rural Resource Sciences in the Department of Agriculture Fisheries and Forestry employs GIS systems for its research into a range of natural resource management issues.

This is reflective of the increasing use of spatial information systems in planning, policy formulation and implementation in natural resource management.

Improve quality of life and safety and security

Spatial information systems are becoming integrated into products that assist people in their daily lives. In car navigation systems are now commonly used by motorists to locate addresses and reduce travel times. Spatial systems such as electronic maps linked to search engines provide faster and more accessible address information. Meteorological data is now being provided to the general public through spatial data infrastructure.

Spatial information also provides the means by which governments interact with citizens on planned projects, programs and policies enabling better presentation of plans and direct feedback (Lake, 2008). The potential for the use of spatial information in areas such social and economic research and in fields such as epidemiology is yet to be fully tapped.

Security and safety and hazard management are also now heavily dependent on spatial information systems. The Australian Emergency Management Committee (AEMC) established the National Information Management Advisory Group to develop strategies to use of spatial information systems protect Australians against terrorism and national emergencies. The Defence Imagery and Geospatial Organisation is a significant user of spatial information.

The Problems

Spatial data infrastructure is the foundation of the spatial information industry. A robust, well coordinated system that captures relevant fundamental data is essential if the Australian spatial information industry is to fully realize its potential and deliver the potential benefits outlined above.

A number of countries have now moved to legislate for the introduction of national spatial data infrastructure. This includes the European Union, Japan, Korea, Singapore, the United States and the Netherlands.

However a fully co-ordinated effort is lacking in Australia. There are four broad issues of concern that need to be addressed as a matter of some urgency.

Development of a national ASDI

In broad terms, there is no comprehensive national policy for the development of an ASDI in Australia. Each jurisdiction – federal, state and territory or local – is responsible for its own policies and for funding the collection and custodianship (i.e. the management) of its spatial data holdings.

Under current arrangements, ANZLIC is responsible for co-ordination of guidelines and standards, while the key stakeholders independently build the ASDI components. ANZLIC's strength is its inclusive structure. The problem however is that it has no direct jurisdiction over mapping and spatial information. There is no structured approach to development of a national registry and nodes that complement and add to the emerging state infrastructure and nodes.

The recent history of the development of an ASDI for Australia has also been characterized by a lack of integration with the business outcome sought. In addition, development of the ASDI has yet to engage fully with the broader community, who have a range of needs and uses to be met by access to spatial data.

While ANZLIC sets basic standards such as those relating to meta-standards, the depth and breadth of application varies significantly at the state government level. The effort and expense of creating data, storage and access infrastructure and establishing frameworks for data sharing is in some cases duplicated. The interaction between the traditionally strong land and property sector with the organisations concerned managing natural resources, scientific information and socio-economic information remains weak.

In 2006, the Council of Australian Governments (COAG) identified as a priority:

"Develop a national digital elevation model (DEM) for the whole of Australia, with vulnerable regions being mapped using very high resolution images. This would involve linked topographic and bathymetric information at a resolution relevant to decision- making." (COAG, 2006)

In May 2008, ASIBA put forward a proposal to the Commonwealth Government for a public private partnership to develop a national DEM. ASIBA received no definitive response to its proposal. However, In August 2008, the Inter-governmental Committee on Surveying and Mapping (IGCSS) developed guidelines for digital elevation data. The guidelines indicated that ANZLIC, with the support of the Australian Department of Climate Change (DCC), Geoscience Australia (GA) and the Cooperative Research Centre for Spatial Information (CRCSI) would co-ordinate the development of a National Elevation Data Framework (NEDF). The Bureau of Meteorology has announced that it will be developing a national digital elevation model as part of the Australian Water Resources Information System in the short term.

While these developments are welcome, they do not represent a comprehensive program for the development of a national ASDI.

Access

ANZLIC developed a set of draft principles concerning access to data (see Attachment 3 for full details). Key elements of this policy include the following points:

- All sectors of the community should have easy, efficient and equitable access to fundamental spatial data where technology, data formats, institutional arrangements, location, costs and conditions do not inhibit its use.
- The fundamental spatial data needed by all sectors of the community should be available to support economic, environmental and social needs.
- Governments should seek to maximise the net benefits to the community when developing their spatial data access policies and pricing regimes.
- Fundamental spatial data should be made available online through customer-focussed portals, as one of a number of ways to meet community needs for equity of access.
- Access arrangements should be geared to maximise the use of spatial data resources in both public and private sectors and to encourage the development of an innovative and competitive value-adding industry.

There are three current areas concerning access to spatial information requiring immediate policy attention.

- **Simple and effective access arrangements**

In the past, many government agencies have exhibited a narrow focus regarding the provision of access to spatial data. Access has often been focussed on specialist users such as mapping/GIS staff and, to a lesser extent, spatial analysts. New techniques and applications are now enabling access to spatial information to be provided to a much broader set of non-technical users.

While significant progress is being made in some states, many agencies have yet to embrace the opportunities afforded by these technologies. Many jurisdictions lack integrated distribution systems (e.g. web mapping services, etc), and their absence acts to effectively restrict access.

- **Fitness for purpose**

In 2003 ANZLIC nominated the topic of ‘data quality’ as being one of five core issues still needing to be addressed as part of the ASDI development.

Spatial information quality has progressed considerably in recent years with the introduction of international geographic data quality-related standards and the widespread adoption of metadata entry tools for the production of metadata for entry in searchable, web-based directories.

Metadata (data about data) is the starting point for access as it provides the means for ‘discovery’ of spatial information. For example, in the Australian Spatial Data Directory (ASDD), hosted by Geoscience Australia on behalf of ANZLIC, it is possible to search approximately 39,000 ANZLIC metadata records on 25 ASDD nodes located around Australia

However what is missing in Australia more generally are searchable registries that link the end user with the resource. At the present time the resources are not fully in place in Australia. There is no point in having the registries if the resources are not in place. This should be one of the important policy priorities for Australian Governments.

An equally important aspect of concern is the continued absence in many custodians of a systematic data maintenance program. Fundamental or framework spatial data needs to be actively maintained to ensure that it remains authoritative and reliable.

- ### National licencing framework

Digital rights management (DRM) is an area of pressing interest, as the internet has become the primary means of access and the distribution for digital data of all sorts, including spatial information. In the spatial information area the Open Geospatial Consortium (OGC) is one of a number of organisations developing digital rights management architectures for spatial information.

An important development that is gaining widespread support is the development of a Government Information Licensing Framework (GILF). The GILF offers the prospect of a legal environment of standardised terms and conditions within which all government information transactions would occur.

One avenue of facilitating information sharing across jurisdictions that is being developed is the Creative Commons licensing regime. Creative Commons defines a spectrum of licensing possibilities between full copyright — *all rights reserved* — and the public domain — *no rights reserved*. This regime potentially provides another legally effective information licensing framework to facilitate the sharing of information. The Queensland Government has developed such a Creative Commons licence template for potential adoption across Australia. This may provide direction for a national approach.

There is a need for national leadership to develop a fully national licencing framework to achieve a seamless national economy as envisioned by COAG (COAG, 2 October 2008).

Pricing

ANZLIC has established a broad pricing policy setting a framework for access to spatial data (see Attachment 3). However pricing is not uniform between jurisdictions.

From 2002, following a report of the Productivity Commission, the Commonwealth Government implemented a policy whereby fundamental data would be made available free over the internet and that other packaged products would be charged at a price not exceeding the marginal cost of transfer (Productivity Commission, 2001). Whilst this policy has been successfully implemented at the national level (Geoscience Australia and the ABS represent good examples), many different pricing regimes for spatial data continue to operate in state government agencies. In many instances, pricing for spatial information is based on a "user pays" cost recovery model.

It is ASIBA's view that fundamental spatial data - that is a public good – should be priced at the marginal cost of supply which is free on the internet. Pricing policies that charged for fundamental data on the basis of full or partial cost recovery will lead to sub-optimal outcomes for the economy as a whole and for the community in general.

Private sector involvement

There remains a varied approach between governments to the involvement of the private sector in development of an ASDI. Many state governments have in the past undertaken aerial photography capture programs and made these available to the public through their outlets. Some State Governments have dropped (or significantly reduced) their aerial photography and photogrammetric programs and outsourced this service to the private sector. However, in some cases state governments continue to run programs. ASIBA members are concerned that in some cases this may not be done in a manner that is consistent with competitive neutrality principles. ASIBA argues that if the private sector is prepared to invest in these areas they should be encouraged to do so without unfair competition from the public sector.

Lack of a national policy focus

There is a lack of a national policy focus with respect to the development and operation of an ASDI. ANZLIC can address technical policy matters; however wider policy questions including pricing and access arrangements, application of competitive neutrality, funding for development of an ASDI and policies for the involvement of the private sector are largely beyond the purview of ANZLIC.

There is also no natural home for the broader policy consideration at the Commonwealth level. The above mentioned issues of the NEDF illustrated this point. The Office of Spatial Data Management within Geoscience Australia is not mandated to address the broader policy questions Australia wide.

Policy formulation with respect to the development and funding of an ASDI, involves all jurisdictions in Australia, yet there is no natural portfolio focus and no easy path for consideration within the Australian Council of Governments. This has led to problems in policy leadership in Australia with respect to the development of a national ASDI.

What are the impacts of these problems

The problems listed above, if not addressed, will reduce productive and economic growth, reduce the potential contribution that the spatial information industry can make in future to the international competitiveness of Australia and reduce the development of the emerging spatial industry in Australia.

Lower economic growth

ACIL Tasman estimated that the impact on the contribution to GDP of inefficient access to data was to reduce the contribution made by spatial information industry by around 7 per cent. The impacts will be particularly strong in property and business services, government services, transport, electricity and water and communications (see Attachment 4).

Lack of competitiveness with other countries

Most developed countries around the world recognise the importance of geo-technologies and spatial data infrastructure to the economic and social wellbeing of their countries. In 2004, the United States Bureau of Labor put geo-technology alongside nanotechnology and biotechnology as likely to be the three most important employment growth sectors in the 21st century. The Netherlands government has stated that government and industry have a joint responsibility to create the most favourable climate possible for innovation and economic development of the geo-sector (GI Council, 2008).

The European Union has proposed establishing and infrastructure for spatial information in Europe (INSPIRE), Canada has developed the federally based Geospatial Data Infrastructure (CGDI and GeoConnections), the United States has developed the National Spatial Data Infrastructure (NSDI) and New Zealand is now developing a policy for a similar infrastructure arrangement.

If Australia falls behind these countries it will have a consequence for the international competitiveness of the economy.

Less competitive Australian Spatial Information Industry

With less than optimal government policies the highly innovative Australian spatial information industry will be at a disadvantage compared with its competitors in other countries. This would squander the significant advances that the Australian industry has made in developing and internationally competitive industry and lose many opportunities in global markets.

Less effective natural resources management

The management of Australia's water resources, adaptation to the impacts of climate change and the management of Australia's natural resources depends on an efficient and effective national ASDI. While progress is being made in some areas such as the water audit and the NEDF for coastal areas, the ability of the industry to contribute to a wider array of regional challenges will be reduced.

How did these problems come about

The pace of development of an ASDI was following a more leisurely path prior to September 11, 2001. This event propelled the emergency services and security agencies to look for geospatial solutions for a dramatically increased range of security and critical infrastructure protection tasks. The fires in the ACT in 2003 highlighted the weaknesses in mapping information and spatial data infrastructure more generally. The need for a broader policy agenda on a national ASDI has become more apparent since these events.

ANZLIC is not in a position to commit governments to a comprehensive policy agenda. There have been many attempts to promote the policy agenda through actions of the CRC SI, and industry and Government demonstration projects and alliances. These are no substitute for a high level Ministerial focus at the inter-government level. COAG has given some consideration to geospatial matters but full consideration of the policies, principle, governance and funding of a fully functional national spatial data infrastructure (the ASDI) has not been realised.

How might the problems be addressed?

The highest priority for the development of an ASDI is to achieve a Ministerial focus at the Commonwealth level and a Ministerial Council that is in a position to advance the policy agenda for a national ASDI. This will probably require the overarching endorsement of COAG in order to give policy priority, policy guidance and goals to the Ministerial Council in the same way that the energy and water Ministers have benefited from leadership from COAG.

ASIBA considers that the Canadian approach to developing an ASDI is the most consistent with the Australian model. In its 2007 report ASIBA suggested that a $200 million program to develop a fully operational and consistent national ASDI would be needed. Since that time ASIBA has put forward a proposal for public private partnerships to fund parts of the ASDI. This proposal should be given consideration by the Australian Government.

As a first step, the Australian Government should establish a program to develop a Federal Government level or 'low resolution' ASDI drawing on the fundamental data contained in its Departments and agencies. This would involve development of a set of critical data to be published by Agencies as established nodes with access arrangements for end users. These 'point-of-truth' data resources should also be promoted via an online catalogue or registry of metadata. Such a program could take up to 5 years to implement and should engage the private sector to help realise early benefits. This framework, once established, would provide the foundation of an operational model that could easily be extended to include the more detailed data held by State jurisdictions. The ultimate aim would be for a national ASDI with established nodes and registry to provide all Australians with access to the national data base of fundamental spatial information.

Access policies should be developed in consultation with industry. ASIBA was established to undertake this role on behalf of industry but the level of consultation appears to have declined in recent years. This trend should be reversed.

Pricing policies might best be addressed by commissioning the Productivity Commission to review the pricing approaches of all governments from the perspective of the pricing of fundamental data and the competitive neutrality of government business in the provision of value added services.

The proposed infrastructure audit should include an audit of the spatial data infrastructure in all jurisdictions around Australia.

Priorities for government and infrastructure Australia

The Commonwealth Government should play a leadership role in the development of an Australian Spatial Data Infrastructure. A Commonwealth Minister should take carriage of policy reform and implementation of the national ASDI.

A Ministerial Council of Commonwealth and State Ministers should be responsible for coordination between jurisdictions.

The Australian Government should establish a phase 1 program to develop an Australian Government or 'low resolution' ASDI drawing on the fundamental data contained in its Departments and agencies over the next 5 years. The Government should commit $200 million to implement its establishment and maintain it going forward.

An audit of the current state of the state of the ASDI in Australia should be included in the audit of infrastructure being undertaken by Infrastructure Australia.

The audit would provide the foundation for developing the State Government SDIs into a national ASDI in the longer term.

The Productivity Commission should be commissioned to review the pricing policies of government business activities in relation to the provision of fundamental data in concert with a review of competitive neutrality policies applied in the provision of value added data by Governments.

The Commonwealth Government should re-establish a positive government industry relationship that provides the environment for the development of an Australian Spatial Data Infrastructure.

Attachment 1 – Glossary

ANZLIC	Australian and New Zealand Land Information Council
ASDD	Australian Spatial Directory
ASDI	Australian Spatial Data Infrastructure - a coordinated framework of technologies, standards and data, supported by policies and institutional arrangements that enable sharing and effective usage of geospatial information.
ASIBA	Australian Spatial Information Business Association
Augmented GNSS	GNSS positioning whose accuracy has been increased through augmentation by reference to ground stations
Differential GPS	GPS positioning made more accurate by the transmission of differential corrections – similar to Differential GPS
GILF	Government Information Licencing Framework
GNSS	Global Navigational Satellite System – a generic term for satellite navigation systems which includes the US GPS, the European Union Galileo system and the Federation of Russian States Glonass satellite systems.
GPS	Global Positioning System – usually referring to the Navstar navigation satellite system maintained and operated but the US Department of Defense
ITS	Intelligent transport systems
Meta data	Data about data
OSDM	Office of Spatial Data Management
SDI	Spatial data infrastructure
Spatial information industry	The modern spatial information industry acquires, integrates, manages, analyses, maps, distributes,

	and uses geographic, temporal and spatial information and knowledge. The industry includes basic and applied research, technology development, education, and applications to address the planning, decision-making, and operational needs of people and organizations of all types.
Spatial information systems	A combination of digital mapping, GNSS and ICT systems.
VSSMS	Vehicle Safety and Speed Monitoring System

Attachment 2 - Economic and productivity impacts

Table 2 Aggregate impact of spatial information in 2006-07

	Scenario 1				Scenario 2			
	Productivity only		Productivity plus resources		Productivity only		Productivity plus resources	
	%	$ billion	%	$ billion	%	$ billion	%	$ billion
GDP	0.51%	5.31	0.61%	6.43	0.99%	10.31	1.20%	12.57
Household consumption	0.50%	2.89	0.61%	3.57	0.93%	5.39	1.16%	6.78
Investment	0.51%	1.43	0.61%	1.73	0.98%	2.78	1.20%	3.39
Capital stock	0.56%	-	0.72%	-	1.05%	-	1.38%	-
Exports	0.45%	0.98	0.58%	1.26	0.80%	1.73	1.07%	2.30
Imports	0.39%	0.89	0.52%	1.18	0.72%	1.64	1.98%	2.23
Wages	0.50%	-	0.60%	-	0.92%	-	1.12%	-

Note: Scenario 1 is a 'lower bound' scenario which reflects the impacts ACIL Tasman has been able to confidently and verifiably quantify through the use of reliable statistics, existing literature, expert opinion and through case studies

Scenario 2 is considered a 'realistic' estimated scenario which is considered to be closer to the situation in 2006-07.

Data source: ACIL Tasman

Table 3 Direct impact of spatial information on productivity and resource availability

	Type of shock applied	Quantifiable scenario 1	Estimated scenario 2
Productivity shocks			
Grains (specialist growers)	Total productivity	0.93%	1.08%
Mixed (grain & sheep/cattle)	Total productivity	1.35%	1.50%
Sugar cane	Total productivity	0.11%	0.26%
Cotton	Total productivity	0.07%	0.22%
Other agriculture	Total productivity	0.00%	0.15%
Forestry	Total productivity	1.93%	1.93%
Fisheries	Total factor productivity	4.00%	5.14%
Construction	Total productivity	0.25%	0.50%
Business services	Labour productivity	0.50%	0.70%
Coal	Total factor productivity	0.21%	0.36%
Metal ores	Total factor productivity	0.16%	0.31%
Oil & Gas	Total factor productivity	0.15%	0.27%
Government	Labour productivity	0.34%	1.05%
Road Transport	Total productivity	1.40%	1.58%
Rail Transport	Total productivity	0.00%	0.45%
Air Transport	Total productivity	0.55%	1.04%
Other transport	Total productivity	0.00%	0.30%
Electricity/gas/water	Total productivity	0.73%	1.25%
Communications	Total productivity	0.98%	1.32%
Trade	Total productivity	0.00%	0.08%
Manufacturing	Total productivity	0.00%	0.02%
Other	Total productivity	0.00%	0.02%
Resource availability shocks			
Oil	Resource availability	3%	6%
Gas	Resource availability	5%	10%
Minerals nec	Resource availability	7%	14%

Data source: ACIL Tasman calculations and estimates

Attachment 3 – ANZLIC Pricing Policy

Scope

Recognising that the management and use of intra-government spatial data is the responsibility of the relevant jurisdiction, this policy applies to:

- All forms of fundamental spatial data;

- The use of fundamental spatial data in the national interest, whether application is at national, regional or local levels; and

- The use of fundamental spatial data by governments, industry and the community

Draft Principles

1. All sectors of the community should have easy, efficient and equitable access to fundamental spatial data where technology, data formats, institutional arrangements, location, costs and conditions do not inhibit its use.

2. The fundamental spatial data needed by all sectors of the community should be available to support economic, environmental and social needs.

3. Governments should seek to maximise the net benefits to the community when developing their spatial data access policies and pricing regimes.

4. Fundamental spatial data should be made available online through customer-focussed portals, as one of a number of ways to meet community needs for equity of access.

5. Access arrangements should be geared to maximise the use of spatial data resources in both public and private sectors and to encourage the development of an innovative and competitive value-adding industry.

6. Access arrangements should recognise confidentiality, privacy, security and intellectual property rights.

Implementation

1. The access principles will be made available on the ANZLIC website and comments sought.

2. ANZLIC will place a summary of current access arrangements within each jurisdiction on the website.

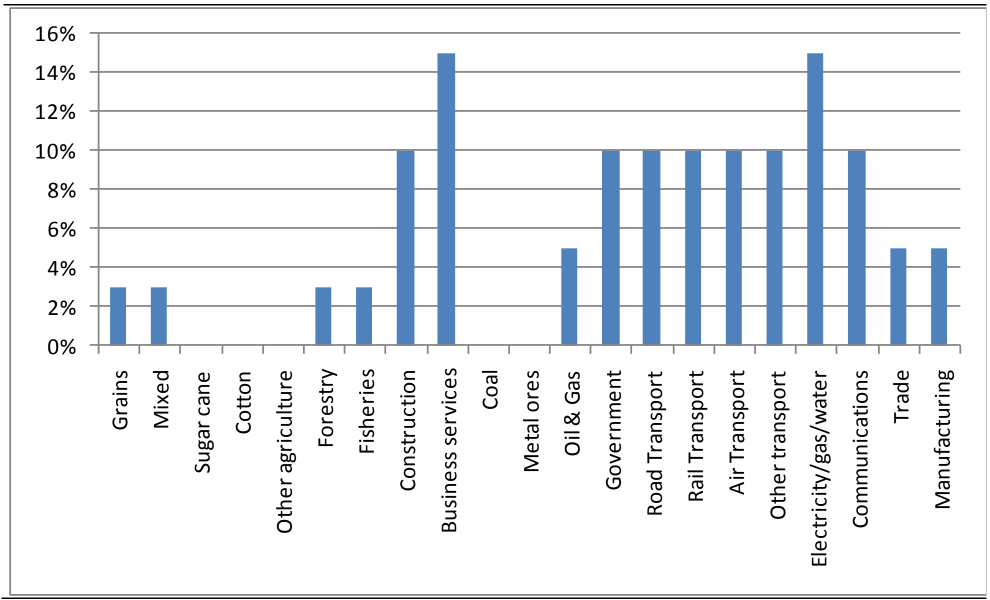
3. ANZLIC will develop a model spatial data access and pricing policy.

4. Jurisdictions will assess performance of their existing or draft policies against the model.

5. The policy will be used within the context of negotiations between government and the private sector under the Action Agenda.

Attachment 4. - Impact of inefficient access to data

Figure 3 Effect of constraints on productivity impacts



Note: These percentages represent the extent to which the direct impacts in 2006-07 might have been higher if the constraints on access to data had not existed.

Data source: ACIL Tasman

Attachment 5 - References

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