



Working Group 3

**Permanent Committee on GIS Infrastructure for Asia and the Pacific
(PCGIAP)**

International Workshop
On

Integration of Built and Natural Environmental Data within National SDI Initiatives

21st September 2006

Part of the 17th UNRCC-AP
Bangkok, Thailand

REPORT

Workshop on Integration of Built and Natural Environmental Data within National SDI Initiatives

21st September, 2006
Bangkok, Thailand

1. Objectives of Workshop

As part of the PCGIAP Working Group 3 (WG3) workplan for 2004-076 a one-day international workshop (21st September 2006) was organised on the 'Integration of Built and Natural Environmental Datasets within National SDI Initiatives'. The workshop was conducted in Bangkok, Thailand as part of the 17th UNRCC-AP Conference with the support of the Centre for Spatial Data Infrastructures and Land Administration, the University of Melbourne. The Workshop was originally organised as a full day workshop to be run on the 20th September, but due to unforeseen circumstances in Bangkok at the time (Governmental Coup in Thailand), the UNRCC-AP did not convene on the 20th September and hence the Workshop was shortened to a half-day Workshop run on the 21st of September.

The objective of the workshop was to investigate data integration of natural and built environmental datasets in the context of establishing and maintaining national SDIs within countries in Asia and the Pacific region. This aimed to identify problems, issues, similarities and differences in: institutional arrangements; related SDI policies; data integration methods and technologies; and human resource and capacity building

The workshop aimed to facilitate and better understand and describe:

- *History and existing work related to the integration of built and natural environmental datasets and related National SDI initiatives.*
- *Capacity for and policies relating to data integration of cadastral and topographic datasets.*
- *Institutional support for and barriers against data integration of cadastral and topographic datasets.*
- *The technical, jurisdictional, institutional, legal and land policy perspective surrounding the integration of built and natural environmental datasets, in particular cadastral and topographic datasets, in a National SDI.*
- *Other countries experiences and initiatives in integrating data in order to identify best practice.*

2. Agenda of the Workshop

- a. Welcoming and Introduction (Aims and Objectives)
- b. PCGIAP Data Integration Project – Overview of Issues
- c. International Case Study Report
- d. Technical Paper – The development of a framework and associated tools for the integration of multi-sourced spatial datasets
- e. Invited Paper – The Integration of natural and built environmental data – the experience of Europe with a focus on Denmark
- f. Country Reports on Key Issues from Country Case Studies
- g. Open Forum and Discussion

- h. Agreement on Workshop Outcomes and Resolutions
- i. The Way Forward
- j. Closing Remarks

Workshop Chair: Prof Ian Williamson (Australia)

Workshop Vice-Chair: Mr Ahmad Fauzi Bin Nordin (Malaysia)

Workshop Coordinator: Dr Abbas Rajabifard (Australia)

3. Participants

Approximately 40 people from 18 countries and organisations attended the workshop. The list of countries represented is shown as Attachment 1.

4. The Workshop

Session 1

The workshop began with a keynote and welcome address by Prof Ian Williamson, the Chair of PCGIAP-WG3 (Cadastre) and the Chair of the workshop. Prof Williamson thanked the UNRCC and Working Group 3 for their efforts and significant contributions in organising the Workshop and also thanked all delegates from different countries who supported and participated in the event.

He then explained that the workshop was part of the PCGIAP-WG3 (2004-2006) workplan and was designed following recent Cadastral Template and Marine Administration Projects which were developed through the United Nations Regional Cartographic Conference for Asia-Pacific (UNRCC-AP). Prof Williamson then presented an overview of the workshop aims and objectives. The Chair explained the structure of the workshop, the matters that needed to be discussed and the decisions to be made. He also highlighted the importance of the integration of the built and natural environments internationally and the role that this plays in terms of meeting sustainable development objectives.

Dr Abbas Rajabifard, the Research Coordinator of PCGIAP-WG3, reviewed and presented the development of a three year research project through collaboration between WG3 and Melbourne University titled “Integration of Built and Natural Environmental Datasets within National SDI Initiatives”. This included an overview of the major aim of the project, which is to develop a model, framework and associated tools for data integration capable of being used in diverse jurisdiction.

An overview of the International Case Studies being utilised as part of the research project on data integration, which are being progressed through the use of an integration template, were presented by Mr Andrew Binns from the University of Melbourne. This template enables the discovery of information from case study countries on activities and issues in data integration including spatial information policies and SDI activities, laws and regulations, infrastructure implementation, institutional arrangements, integration issues and human resource and capacity building.

A focus on key data integration issues and activities related to case study countries within the PCGIAP-Melbourne University Data Integration Project was presented by Mr Hossein Mohammadi. This presentation outlined the key legal, institutional, social and policy issues that need to be taken into account in order to technically integrate datasets (Figure 1). This was followed by an overview of some of the actual technical issues hindering integration.

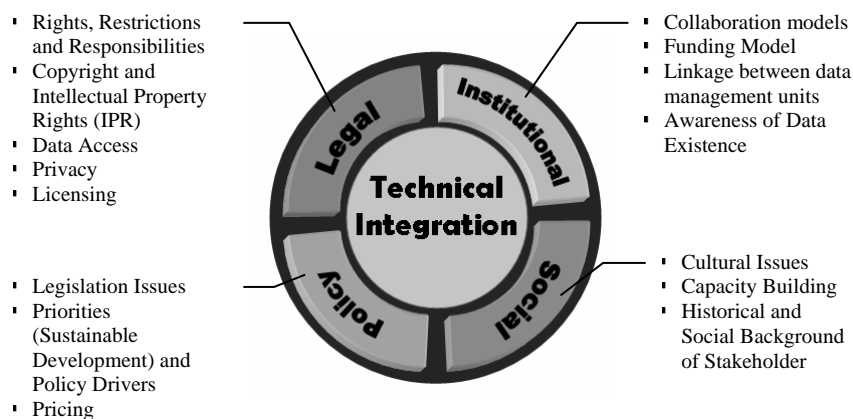


Figure 1 – Legal, institutional, policy and social issues surrounding the technical integration of built and natural environmental data

An invited report was then presented by Prof Stig Enemark on the “Integration of natural and built environment data – the experience of Europe with a focus on Denmark”. Prof Enemark discussed the development of the INSPIRE initiative in Europe which is both a top down and bottom up approach to the development of a European SDI. Prof Enemark also discussed the role of a web platform as a public information server within the Danish SDI from which both topographic and cadastral services and initiatives can be built off. He stressed however, that although the development of technical tools and a service oriented architecture are needed to aid in data integration, the creation of effective institutional arrangements and socio-technical responsibilities must also be taken into account.

Session 2

The second session of the Workshop was allocated to the presentation of Country Reports on SDI and data integration activities by participating countries, based on the WG3 integration template (Appendix 3). In this session, reports from Brunei Darussalam, Indonesia, Japan, Malaysia, Denmark, the Philippines, Singapore and New Zealand were presented followed by a short comment from other countries and organisations attending the Workshop, including Germany, Cambodia, Fiji, WHO and INSPIRE. This was followed by questions and discussion. Each country identified and reported on the most important issues and challenges affecting their jurisdiction.

The first of the presentations was from Hj Mohd Jamil bin Hj Mohd Ali, Surveyor General of Brunei Darussalam. He overviewed the current initiatives occurring within Brunei, including the development of a web enabled system and e-citizenship in order to create a National SDI

Mr Azuhiko Akeno, Head of International Affairs Office of the Geographic Survey Institute of Japan presented an overview of cadastral and topographic data developments within Japan. The two forms of data are developed and maintained by separate organisations which makes it difficult to integrate data. Mr Akeno outlined some major issues which flow from this separation including the use of different data models within the data sets and also the lack of a holistic data dissemination mechanism.

The development of the Malaysian SDI, MyGDI, was overviewed by Mr Ahmad Fauzi, Vice Chair of PCGIAP WG3 and the Workshop. He outlined several major issues which the development of MyGDI aimed to address, with one of these being the integration of data. Mr Fauzi discussed that results of previous attempts to integrate data have not been effective enough for the needs of users, and the process needs to become more efficient. The major issues

outlined in Malaysia in terms of data integration included Data Quality, Reference System, Data Structure and the current GIS Environment, as shown in Figure 2 below.

The presentation also overviewed research projects underway, such as the implementation of a coordinated cadastral system and standard metadata, that Malaysia are implementing to aid in data integration.

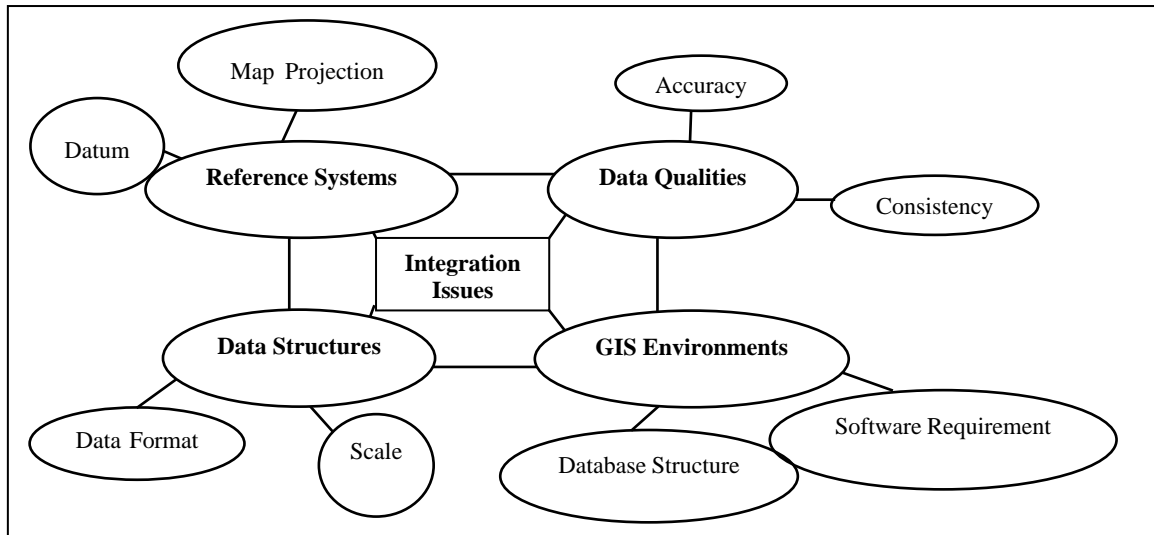


Figure 2 – Integration Issues in Malaysia

The presentation by Mr Arief Syafi'i of Bakosurtanal (National Coordination Agency for Surveying and Mapping), Indonesia focused on the integration of land and marine spatial datasets. This is of particular importance to Indonesia as it is an archipelagic state which relies heavily on the resources of the ocean, as well as the issues involved in managing and mitigating natural emergencies such as tsunami's and earthquakes. Mr Syafi'i highlighted the fact that integration of land and marine information requires a common reference level for elevation and depth. He also stressed that major issues relating to data integration within Indonesia are non-technical in nature, and that these need to be solved to enable technical integration to be effective.

The New Zealand approach to data integration was outlined by Mr Stephen Walsh of Land Information New Zealand (LINZ). New Zealand have managed to put in place efficient and effective data integration mechanisms, based on the government integrating data only when it meets defined government purposes which are outsourced where cost effective and practical. This has made the private sector important in providing data acquisition and value added services at the leading edge of data integration.

Short presentations were given by Mr Soh Kheng Peng, Chief Surveyor of Singapore and Mr Vose Galo Isada of the Philippines. The development of a land data hub and mandating data sharing are initiatives which are currently occurring which within Singapore which will aid in data integration, with the need for capacity building outlined as the major issue. The use of different reference and coordinate systems in the Philippines was seen as a major barrier to effective data integration. This is further compounded by the fact that different government agencies are the custodians of cadastral and topographic data.

The representative from Germany, Mr Dietmar Grünreich also briefly outlined the development of both integration initiatives in Germany, as well as developments within Europe as a whole through the INSPIRE initiative and stressed the need for close collaboration between the regions of Europe and Asia Pacific in the development of data integration policies and frameworks.

A short discussion was conducted after the presentations concluded on the impact of issues presented by both country and organisation representatives. This was summarised and fed into the final Outcomes session of the Workshop.

Workshop Outcomes

The final session of the workshop was used to discuss and finalise workshop outcomes, resolutions and the report to the PCGIAP.

Issues were split into two levels, the first being at a country level which includes the ability to effectively combine data within nations and the second being the importance of the development of the GSDI to help integrate and access data from across the globe to ensure global interoperability. It was noted that in most cases 70% of time is spent on integrating and preparing data for use, with only about 5% being spent on actual decision making. This shows the important need for the development of an effective integration framework and associated tools in order to streamline the integration process in order to increase the amount of time spent on decision making.

Discussion also centred on the importance of providing seamless data integration within the coastal zone or land-sea interface. This is especially relevant for countries within the Pacific region and archipelagic states such as Indonesia and the Philippines who rely on the marine environment as a source of food and income through industries such as fishing and tourism. The utilisation of spatial data for planning and decision making does not stop at the high water mark, and this is reflected in the increasing activities and complexities in coastal areas requiring integrated information for sustainable development and good governance.

The major issues and challenges highlighted during the discussion session are listed in the table below, separated into technical, institutional, legal and social categories.

Issues and Challenges in the Integration of Built and Natural Environmental Data	
Technical	Institutional
<ul style="list-style-type: none"> • Lack of Vertical Topology • Data Model Heterogeneity <ul style="list-style-type: none"> – Discrepancy in scales and across jurisdictions – Hierarchical approaches • Standards and specifications • Attribution Inconsistency • Incompatible formats and data structures • Reference systems • Lack of an holistic technical data integration framework • Metadata • Data completeness and quality 	<ul style="list-style-type: none"> • The governance system • Collaboration approaches • The historically different perspectives of built and natural data • Custodianship arrangements • Lack of awareness among decision makers • Inflexible funding models/Pricing • Conflicting economic and political priorities • Lack legislative support • Land-Sea interface
Legal	Social
<ul style="list-style-type: none"> • Data security • Privacy and policy 	<ul style="list-style-type: none"> • The historically different perspectives of built and natural data

<ul style="list-style-type: none"> • Intellectual Property (IP), licensing and copyright issues • Rights, restrictions and responsibilities on data 	<ul style="list-style-type: none"> • Capacity building • Cultural barriers including <i>silo mentality</i>
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Table 1 – Issues and challenges in the integration of built and natural environmental data

From these issues and challenges, the participants discussed, made suggestions and agreed on two resolutions (which are attached in full as Attachment 2) which outlined the major recommendations to be made to the UNRCC-AP from the Workshop. Resolution 1 focussed on the management of the spatial dimension of the marine environment including the ability to integrate data at the land-sea interface. The second resolution focussed on the challenging role of utilising an integration framework within SDI initiatives to support spatially enabling governments. This second resolution focuses on the use of location to organise government information and business activities, of which integrating built and natural environmental data is an integral component.

- Resolution 1 – Marine Administration – the Spatial Dimension
- Resolution 2 – SDI to Support Spatially Enabled Government

The workshop was concluded by Prof Williamson who thanked the UN and PCGIAP-WG3 for their contributions to the organisation of the Workshop. He also thanked all participants and delegates from different countries.

**Workshop on Integration of Built and Natural Environmental Datasets within National
SDI Initiatives
21st September 2006, Bangkok, Thailand**

Participants - Countries and Organisations

Country	Country Report
Australia	*
Brunei Darussalam	*
Cambodia	
Cyprus	
Denmark	*
FIG	
Fiji	
Finland	
Germany	
GSDI	
Indonesia	*
INSPIRE	
Japan	*
Malaysia	*
New Zealand	*
Philippines	*
Singapore	
Switzerland	
Thailand	
WHO	
UN OCHA	

**Workshop On Integration of Built and Natural Environmental Data within
National SDI Initiatives
September 21st 2006, Bangkok, THAILAND**

RESOLUTIONS

RESOLUTION 1 – Marine Administration-the spatial dimension

The Conference

Noting that the majority of National SDIs and cadastral initiatives are only related to the land environment and that most countries in the region have an extensive marine jurisdiction and related administrative responsibilities,

Further noting the requirements and obligations of countries under UNCLOS to support the management of their marine environment,

Acknowledging that the marine environment and particularly the coastal zone are critically important for food production and sustainable development within Asia and especially the Pacific Island countries,

Recognising the outcomes of the PCGIAP Working Group 3 International Workshop on Marine Administration, Malaysia 2004 which recommended that a marine cadastre be defined as a management tool which spatially describes, visualises and realises formally and informally defined boundaries and associated rights, restrictions and responsibilities in the marine environment as a data layer in a marine SDI, allowing them to be more effectively identified, administered and accessed.

Recommends that

- All countries in the Asia-Pacific region with a marine jurisdiction and administrative responsibilities be encouraged to include the development of a marine administration component (including a marine cadastral component) as part of a seamless SDI that covers both land and marine jurisdictions to ensure a continuum across the coastal zone.
- The PCGIAP through Working Group 3 continue investigations into marine cadastre, marine SDI, and the spatial dimension of marine administration and ocean governance, and particularly encourage member nations to complete the Marine Cadastre Template at www.marineadministration.org .

RESOLUTION 2 - SDI to support spatially enabled government

The Conference

Noting the outcomes of AGENDA 21 and the UN Bogor Declaration which promote the importance of efficient and effective national Spatial Data Infrastructures (SDI) and land administration systems as key factors in support of sustainable development and environmental management,

Further noting the resolutions and deliberations of the 16th UNRCC-AP and the 8th UNRCC for the Americas on the need to integrate land administration, cadastre and land registration functions with topographic mapping programs within the context of a wider national strategy for SDIs,

Mindful of the benefits and difficulties of integrating built (including legal, cadastral, economic and demographic data) and natural environmental datasets in providing an understanding of the real world and supporting decision making for sustainable development,

Recognising the outcomes of the 17th UNRCC-AP workshop on integration of natural and built environmental data which concluded that firstly such integration is an important component for delivering technical, economic and social solutions to real world problems in government, business and the community at large, and second that SDIs serve as enabling platform supporting spatially enabled government to support strategies such as e-government,

Recommends that

- Member Nations develop a better understanding and pursue the principles of:
 - the integration of natural and built environmental datasets in support of sustainable development,
 - a spatially enabled platform to support the integration of natural and build environmental data by exploring related conceptual, institutional, policy, legal and technical issues,
 - designing SDIs to support spatially enabled government.
- PCGIAP, through Working Group 3, for the period 2006-2009 assist member nations building or re-engineering their SDIs to support the role of spatially enabling government by investigating the concept and associated institutional, technical, policy, legal, socio-economic and capacity issues.

Workshop On Integration of Built and Natural Environmental Data within
National SDI Initiatives
September 21st 2006, Bangkok, THAILAND

INTEGRATION TEMPLATE



PCGIAP-Working Group 3

and

The University of Melbourne



International Workshop
On
**Integration of Built and Natural Environmental
Datasets within a National SDI**

in conjunction with the 17th UNRCC-AP and PCGIAP Meeting

20th September 2006
Bangkok, Thailand

An objective of Working Group 3 (WG3) of the UN sponsored "Permanent Committee on GIS Infrastructure for Asia and the Pacific" (PCGIAP) for 2005-2007 is the development of a framework and associated tools to facilitate the integration of built (cadastral) and natural (topographic) environmental datasets within a National SDI initiative.

PCGIAP, through WG3, with the support of the Centre for Spatial Data Infrastructures and Land Administration, the University of Melbourne, is to hold a dedicated workshop (**20th September 2006**) for the discussion of the integration of built and natural environmental datasets within a National SDI during the 17th UNRCC-AP Conference from **18-22 September 2006** in Bangkok Thailand. The Workshop will review the national administration of SDI and data integration within countries in Asia and the Pacific region based on a common template to identify problems, issues, similarities and differences in spatial data infrastructures; institutional arrangements; current data integration methods; technology and human resource and capacity building in data integration.

The attached template is a guide to assist member nations to prepare a country report of their National SDI and data integration issues and activities (used for presentation at the Workshop). Could you please return the completed template by the **15th August 2006**. Completed templates will aid in creating an integration framework and associated tools.

This template will aid the research team to better understand and describe:

- *History of integration of built and natural environmental datasets and related National SDI initiatives.*
- *Capacity for and policies relating to data integration of cadastral and topographic datasets.*
- *Institutional support for and barriers against data integration of cadastral and topographic datasets.*
- *The technical, jurisdictional, institutional, legal and land policy perspective surrounding cadastral and topographic datasets in a National SDI.*
- *Other countries experiences and initiatives in integrating data in order to identify best practice.*

This will lead to the development of a model and framework for integration of these two forms of data capable of being used in diverse jurisdictions in support of sustainable development.

Country/state:
Name of contact person:
Affiliation, Organization:
Function, Position:
Address:
Email address: Tel, Fax

Integration of Built and Natural Environmental Datasets within National SDIs

Project Overview:

Sustainable development and meeting "the triple bottom line" (economic, social and environmental objectives) requires an understanding of the natural and built landscape in order to observe and monitor change and to create realistic simulations of the evolving environment. This requires access to both built and natural environmental datasets. Over the last decade these needs are being addressed by establishing spatial data infrastructures (SDI) where one of the key objectives is the integration of these datasets, and specifically cadastral (built) and topographic (natural) spatial data. The drive to establish SDIs is also driven by a need for governments and businesses to improve their decision-making and increase efficiency (Gore, 1998), as well as the advent of accessible, powerful information and communications technologies.

Amongst spatial data, cadastral and topographic datasets are the most important for describing the built and natural environment. These datasets are the 'foundation data' (Groot and MacLaughlin, 2000) in modern market economies. Cadastral datasets are the accumulation of individual property boundary surveys undertaken by land surveyors. By nature, cadastral data is very different to topographic data that is produced at medium to small scales over large regions using various techniques.

In all countries, these foundation datasets were developed to serve different purposes and are usually managed separately. This separation is recognised as a barrier to implementation of sustainable development. Duplication imposes unjustifiable costs on data collection and maintenance. The datasets should adopt the same overarching philosophy and data model to achieve multi-purpose data integration, both vertically and horizontally (Ryttersgaard, 2001). Merging of these datasets at a local level has been achieved to some degree, however, attempts to integrate the datasets at a national level, even where SDIs are well developed, has been difficult and problematic internationally.

Data Integration:

Spatial data integration is being done in most spatial services to some extent at different levels. Users of spatial data gather data from data providers and integrate them to meet their needs. Social behaviors, legal considerations, institutional arrangements and policy issues which are attached to datasets differs across different providers and makes integration problematic both from a technical and non-technical perspective.

From a technical point of view, some applications superimpose data layers geometrically in order to analyse and monitor them against each other without the establishment of any interrelationship amongst features and layers, while some other services integrate datasets based on topology relations between features or based on relationship between feature classes or attributes through data models.

The integration of multi-sourced datasets is not only the match of datasets geometrically, topologically, and having a correspondence of attribute, but also providing all social, legal, institutional and policy mechanism together with technical tools to facilitate the integration of multi-sourced datasets.

I. Country Report

Briefly describe the national administration of spatial data and data integration using the following structure. We would like you to fill out each of the four topics A-D. Section A is generic and answers may be similar to those provided for the cadastral template. Sections B-D however are focused on National SDI and Data Integration.

As we are trying to collect comparable information, we ask you to leave the headings as they are and fill out the empty space provided below. If you feel that you need further headings, feel free to add them for your own purpose. We have provided some further information in italics to help fill in each section. Please complete to the best of your knowledge – something is better than nothing.

A. Country Context

Geographical and Historical Context

Description of the basic geographic context, i.e. population, size of country, etc. as well as other outstanding geographic features. Description of the country's history in terms of relevant periods, e.g. colonization, and political development.

→

Current Political and Administrative Structures

Description of the current political and administrative structures, such as the political system, number of states or provinces, etc. and how this may affect efforts to integrate spatial data.

→

B. National SDI Context

History and Status of National SDI Initiative

Description of the origins and the development of National SDI initiatives.

For example, is the National SDI initiative based on collaboration or legislation? Are the major SDI activities occurring at a National government level or Sub-national government level? Include information on the development of SDIs at all levels within your country, eg. State SDI, Local SDI, involvement in Regional SDI etc.

→

Have Core Datasets been defined within the SDI structure?

Core datasets, sometimes called reference data, are the basic data that everyone involved with spatial information uses. For example, what are the core datasets? Have custodianship guidelines concerning data maintenance and control been created for the core datasets?

→

Describe the data acquisition and access mechanisms within the SDI.

For example, is there an effective clearinghouse or portal for sharing of spatial data? Are there effective partnership arrangements in place to share data? Are pricing, licensing, reproduction principles etc. defined to help govern data access? Do these principles govern all datasets or just framework datasets? At what level do they apply eg. national/state/local? Are there standardized, frequent and documented update cycles for spatial data?

→

If your country is not developing a National SDI, are there any plans on developing an SDI in the future?

→

Historical Outline of Built and Natural Environmental Data Development

Please describe the origins and development of both cadastral and topographic data, along with other built and natural environmental datasets..

Include names of agencies that have been involved in cadastral and topographic data development and management. Have they been developed separately from different backgrounds eg. Cadastral from a property perspective, topographic from a GIS environmental perspective?

→

Current Administration of Built and Natural Environmental Data

Please describe current institutional and management arrangements that govern cadastral and topographic data.

Include names of organisations, agencies and government departments that are involved in cadastral and topographic data at various political levels (eg. local, state, national, regional) and within various administrative areas.

→

Please describe current institutional and management arrangements that other built and natural environmental data.

→

Please describe the metadata arrangements for built and natural environmental datasets

For example, are there effective and consistent Metadata management tools in place for built and natural environmental datasets? Are these well documented and accessible? Are the arrangements standardized across all datasets at all jurisdictional levels? Is metadata searchable?

→

Please describe the data format or conceptual model for built and environmental datasets, especially topographic and cadastral datasets.

For example, is there a common data model for cadastral data at all jurisdictional levels? Is there a common topographic data model? Are data models interoperable? Is there a conceptual model developed in order to better understand and define the relationship and hierarchical structure of topographic and cadastral data and encourage data integration?

→

C. Institutional Framework for Integration – Data Provider

Please provide information on how spatial information is managed from a data provider perspective

For example, is the private sector involved in the management and administration of built and natural environmental datasets? If yes, please explain how. Description of the role that legislation and other instruments of governance play in the administration of built and natural environmental datasets. How do agencies interact? Flow of spatial data and relationships within and between agencies.

→

Please describe the tools that are used to manage spatial information.

What are the tools, for example, modeling tool, software, etc. Are tools used accessible, open source, useable, documented, user-friendly? Are generally acknowledged interoperability standards used eg. ISO 9001, OGC?

→

At what scale do you produce built and natural environmental datasets such as cadastre and topo?

→

D. Institutional Framework for Integration – Data User

Please describe the major data uses.

List and describe the major data users (including private sector, academia, public sector etc) and their most commonly used data layers.

→

Describe current services and products that are available to data users and customers.

For example, are these services and data integratable? Are there any services that utilize integrated data for applications? How do data providers support customers (single dataset or integrated product delivery)? Do issues such as pricing, intellectual property and privacy detract from your ability to create integrated products and services?

→

E. Issues in the Integration of Built and Natural Environmental Datasets

Need for Integration

For example, is data integration a priority for your jurisdiction? What benefits do you gain from the integration of built and natural environmental datasets? What are the drivers for integration in your jurisdiction eg. environmental protection, hazard management, sustainability, counter terrorism etc?

→

Major Issues in attempting to integrate built and natural environmental datasets

What are the major issues hindering the ability to integrate multi-source datasets on a national level?

Include any perceived issues and barriers which your country may face in attempting to integrate these types of data, especially within the context of a National SDI. Do cross-jurisdictional issues play a role within a National context? Are issues of a technical, social, institutional or policy perspective?

→

Please list and describe the outcomes of any attempts to integrate built and natural environmental datasets at a national or state type level.

Where these one off projects or an attempt to create a long term, integration solution? Who was the driving force behind such integration initiatives (eg. land administration, environmental management etc). What was the end result (eg. common data model, integration framework, tools etc). Where some of the issues mentioned in the previous section solved? If yes, how?

→

II Questionnaire

Please answer to the best of your ability.

1.0 Policy Principles:

What are the current issues that policy needs to address within your jurisdiction in regards to spatial information?

Has your jurisdiction developed any policies on data integration? If so, what is the capacity for and policies relating to data integration within your jurisdiction?

How much of the spatial information policy and initiatives is user driven? Please give examples of user driven projects or initiatives.

Are there policies or guidelines in place for the following aspects of spatial data? If yes, at what level do these policies apply (please tick National, State/Provincial or Local)?

Policy	National Level	State/Provincial Level	Local Level
1. Management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Data Model	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Metadata	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Custodianship	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Pricing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Access	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Distribution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Privacy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Security	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Purchasing, Procurement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.0 Institutional Principles

What are the current institutional issues hindering the integration of data within your jurisdiction? Please tick level of importance.

Issue	Very Important (5)	Important (4)	Neither (3)	Not Very Important (2)	Not Important At All (1)
1. Funding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Collaboration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Awareness of data existence	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Licensing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Data Access	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Other.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Other.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

How is spatial information accessed within your jurisdiction? Please tick if access mechanism is the primary method of accessing data (used constantly), secondary method (used occasionally) or not used at all.

Access Mechanism	Primary	Secondary	Not Used
1. Paper maps (tourist maps, detail maps, charts)	[]	[]	[]
2. Directory (ie. Street Directory), set of indexed maps	[]	[]	[]
3. CDROM or other portable (digital) medium	[]	[]	[]
4. Email (attached file)	[]	[]	[]
5. Online, Internet (ie. Data Directory / Data Atlas / Map Viewer)	[]	[]	[]
6. Local Area Network (LAN), Wide Area Network (WAN), other communication network	[]	[]	[]
7. Other.....▶▶▶

How is spatial information managed within your jurisdiction?

SI Management	Please Tick
1. Centralised (National Government)	[]
2. Decentralised (State/Provincial/Local)	[]
3. Other.....	[]

How are spatial data initiatives funded within your jurisdiction?

Funded By	Please Tick
1. Government (public sector)	[]
2. Cost recovery of data	[]
3. Private sector	[]
4. Public/private partnership	[]
5. Other.....	[]

3.0 Technical Principles:

What are the current technical issues hindering the integration of data within your jurisdiction? Please tick level of importance.

Issue	Very Important (5)	Important (4)	Neither (3)	Not Very Important (2)	Not Important At All (1)
1. Computational heterogeneity	[]	[]	[]	[]	[]
2. Vertical topology	[]	[]	[]	[]	[]
3. Reference system	[]	[]	[]	[]	[]
4. Data quality	[]	[]	[]	[]	[]
5. Metadata	[]	[]	[]	[]	[]
6. Data format	[]	[]	[]	[]	[]
7. Other.....	[]	[]	[]	[]	[]
8. Other.....	[]	[]	[]	[]	[]

What standards organisations or bodies for spatial data does your jurisdiction subscribe, member or adhere to?

Standard	Please Tick
1. International Standards Organisation ISO, Technical Committee for Geographic Information / Geomatics - TC 211	<input type="checkbox"/>
2. National Standards Committee or Body	<input type="checkbox"/>
3. Open GIS Consortium OGC	<input type="checkbox"/>
4. World Wide Web Consortium W3C	<input type="checkbox"/>
5. Other▶

4.0 Legal Principles:

What are the current legal issues hindering the integration of data within your jurisdiction? Please rank.

Issue	Very Important (5)	Important (4)	Neither (3)	Not Very Important (2)	Not Important At All (1)
1. Copyright	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Intellectual property	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Data access	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Privacy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Data licensing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Other.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Other.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5.0 Social Principles:

Who are the major users of cadastral and topographic data within your jurisdiction?

Data User (Cadastral)	Major User	User	Sporadic User	Not a User
1. Government – technician	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Government – manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Private sector	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Academia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Military	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Other.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Data User (Topographic)	Major User	User	Sporadic User	Not a User
1. Government - technician	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Government – manager	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Private sector	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Academia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Military	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Other.....	[]	[]	[]	[]
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What capacity building initiatives are currently underway within your jurisdiction in regards to spatial information development?

6.0 Spatial Data Infrastructure

What are the main data sets available within your National SDI? Please list.

Data Set	Please Tick
1. Geodetic reference, survey network	[]
2. Cadastral, ownership, property boundary information	[]
3. Topography	[]
4. Land use, zoning, planning	[]
5. Native title	[]
6. Road networks, road centre-line data	[]
7. Utilities and essential services infrastructure	[]
8. Transportation	[]
9. Geographic names, localities and administrative boundaries	[]
10. Street Address	[]
11. Aerial or Satellite Imagery	[]
12. Elevation and Bathymetry	[]
13. Hydrology	[]
14. Vegetation	[]
15. Forestry	[]
16. Mineral resources	[]
17. Agriculture	[]
18. Environment	[]
19. Other▶

What is the cost for data available through the SDI?

Cost	Please Tick
1. Free (open access)	[]
2. Cost of transferring the data	[]
3. Full cost recovery (cost of transfer plus cost of creation, updating etc)	[]
4. Other.....	[]