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# LOCAL GOVERNMENT SPATIAL INFORMATION MANAGEMENT

## → TOOLKIT VERSION 2.0

Building capacity for integrated spatial information management solutions

JULY 2007

## MODULE 4

### Spatial data priorities, standards and compliance

A joint initiative of the Australian Local Government Association and ANZLIC—the Spatial Information Council

An Australian Government Initiative
*Working Together to Manage Emergencies*
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AUSTRALIAN LOCAL GOVERNMENT ASSOCIATION

ANZLIC the Spatial Information Council

# Contents




→ This is Module 4 to the **LOCAL GOVERNMENT SPATIAL INFORMATION MANAGEMENT TOOLKIT**.

Ten detailed modules and essential preliminary matter to the Toolkit are available via: www.alga.asn.au and www.anzlic.org.au.

→ ***Please note in particular the information detailed in the prelims regarding the use, resale and reproduction of the Toolkit.***

Users are directed to the prelims of the Toolkit for essential information, including that addressing copyright and liability matters, and the ISBN.

## → MODULE 4
Spatial data priorities, standards and compliance

# Guide for managers

## Context

Access to reliable and up-to-date information reduces uncertainty in planning and management by helping to identify, model and analyse situations and issues. Strategies to overcome such issues may then be prepared and implemented, with the impacts monitored as part of an overall system. The value of the information and the effectiveness of the decision-making and planning processes are very closely related to the quality and completeness of the information and the manner in which it is made available. In this respect, data access, management, integration, analysis and communication are key components of effective spatial information management.

The establishment and implementation of effective standards are essential elements of these components. Leading practices have recently evolved to assist councils to manage their spatial information systems. Such leading practices generally use an integrated information management solution, and combine leadership, people, technology, applications and data into a framework that ensures tools, procedures and standards are in place to maintain and transform data into useful information products that support operations and decision-making processes.

Many councils are both information providers and receivers. This means they collect and use data for their own purposes, as well as making data available to other users. Standards form a key ingredient underpinning the management of data and information. Benefits of standards for data include:

- → increased data access and sharing
- → improved data consistency
- → increased data integration and interoperability
- → better understanding of data
- → improved documentation of information resources
- → improved control over data updating activities and development of new versions of datasets
- → improved data security.

**Module 4: Spatial data priorities, standards and compliance** provides sufficient background material to enable practitioners to appreciate the importance of data standards and some of the elements involved in the development of standards. This understanding will assist practitioners to ask the right questions when searching for data, planning their own data capture programs or negotiating technical support for provision of data services.

## Actions

Managers should focus on developing data standards, and ensure that they are widely communicated to, and adopted by, the user community.

Most states and territories have overarching policies and standards for data collection, maintenance and classification. Local government managers need to be aware of those standards, and oversee the development of guidelines and assessment criteria (or score sheets) for their councils, in order to ensure compliance with the standards. This will enable new datasets to be evaluated, and existing datasets assessed, to ensure their appropriateness, fitness for purpose, and compliance.

## Acknowledgments

This module sources material produced by the National Land and Water Resources Audit, the Australian Government Department of the Environment and Water Resources, the Bureau of Rural Sciences, the Herbert Resource Information Centre, ANZLIC and Spatial Knowledge Engineering, Incorporated. These sources are duly acknowledged.

## Guide to symbols

The following symbols are used throughout the Toolkit to draw attention to important issues and information.

| | |
|---|---|
| NOTE! | Information of which readers should take particular note |
| LEADING PRACTICE | Leading practice information |
| TIP! | Tips for readers, based on experience and aimed at saving time and other resources |
| CAUTION! | Caution—readers should take particular care, or the issue may be complex |
| HIGHER CAPABILITY | Capability raising—shows a signpost to a higher capability level |
| **Bold Text** | Bold Text—highlights an important issue |
| Boxed Text | Boxed Text—highlights issues specifically related to ANZLIC or ALGA |

# 4.1 Introduction

Each year, Australian councils invest significant resources, including time and money, in collecting and maintaining data. Different councils often use different standards to collect, store, document and provide access to data. The resulting inconsistencies may create major inefficiencies and limit effectiveness.

Inconsistent data increase the time, effort and cost required to integrate datasets for purposes such as:

→ area comparisons
→ addressing regional strategic issues requiring the combination of data from more than one council
→ analysing trends in the status of local communities over time.

Increasingly, councils and their communities want to compare information across local government areas and/or regions. Users of spatial information are increasingly demanding:

- → consistency between related data (e.g. the location of traffic monitoring stations should match the location of roads in the database)
- → seamless maps that are not interrupted by artefacts such as map sheet boundaries, local government area boundaries and state or territory borders
- → consistent descriptions of similar features, so that a feature is defined the same way across Australia.

Leading practice procedures are available to ensure that data are developed that facilitate consistency and interoperability and fulfil the minimum requirements of relevant national or international standards, thereby ensuring that councils and the community can achieve maximum value from the investment through multiple use of data.

The peak body involved in the promotion and coordination of standards for spatial data in Australia and New Zealand is ANZLIC.

NOTE! Note: The criteria by which datasets can be assessed to determine their compliance with standards for the Australian Spatial Data Infrastructure are currently being updated, as there has been, and continues to be, significant work in both the international and Australian geographic (spatial) information standards arenas. In addition, councils would benefit by conforming to the requirements of their state or territory, as there may be overarching criteria in place.

## 4.2 Determining priorities for data

Data are the most expensive component of any information management system. As a result, there is never enough money available to conduct all the data collection and preparation that might be required by councils. This means that priorities need to be set. The following are some parameters and considerations that may assist in determining priorities:

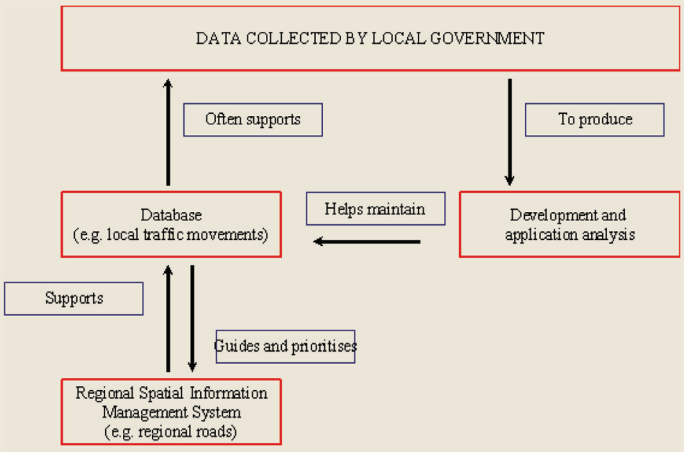
- → an understanding of key information needs and business drivers; for example:
  - how urgent is the need?
  - what decision-making processes are to be supported?
  - what information products require the data?

TIP! → opportunities for partnership with neighbouring councils, state or territory agencies, or other organisations

- → opportunities for management and maintenance
- → data collection and storage systems
- → practical data collection issues, such as terrain, the availability of expertise and external aspects such as weather and timing
- → potential costs for acquisition and management, and available budget
- → data availability, integration, sources, standards, priorities and proposed use
- → metadata and clearinghouses: standards, sources, and current state of the art
- → applications relevant to the data, such as current data collection and input tools, access tools, publishing tools and sharing priorities

→ organisational fitness, including leadership, vision, resourcing, training requirements and plan, partners and participants, current and future information policy requirements (e.g. partnerships, sharing, access, usage constraints)
→ technology infrastructure, including networks, software, computers and internet access opportunities
→ key information products required, used and/or available.

**FIGURE 4.1** *Business processes supporting data maintenance*




HIGHER CAPABILITY 1 → 2

Individual council staff or sections document spatial data management standards, processes, policies and procedures. They should document the parts of the business processes that require spatial information, and cross-reference to the general data management requirements outlined in *Module 3: Data management principles*.

### 4.2.1 Data publishing considerations

Data publishing and access should be addressed when implementing a spatial data infrastructure or integrated information management solution. This includes ensuring that the published data make sense and are usable by those accessing them, and that suitable documentation is available to enable users to determine whether the data may be useful and to thus take steps to access the data.

Councils already maintain large volumes of data. The challenge for the potential data user is first to *discover* the data. While this might seem obvious, the internet today is rife with examples of organisations that focused on the system to get their data published, and forgot about their audience and its need to discover the data, and then access and interpret the data. As a result, data often lack descriptive headings and legends, and exhibit poor metadata and other documentation, and inconsistencies.

The review of the Australian Spatial Data Directory (ASDD), reported in the National Land and Water Resources Audit's report *Australian Natural Resources Information 2002*, stated that more than 20% of the data records had no information about when the data were created, and less than 50% had sufficient information about the quality of the data to allow users to determine whether the data might be useful.

The ASDD can be accessed at http://asdd.ga.gov.au/. The National Land and Water Resources Audit's report is available at http://www.nlwra.gov.au/about.asp?section=13.

## 4.3 Data standards

Data need to be managed carefully and organised according to defined rules and protocols. A wide range of support material is available on the development and application of standards for spatial data used by councils.

ANZLIC has produced a series of policy documents and support material on standards that serve as useful templates for councils (e.g. *Policy Statement on Spatial Data Management* and *Model Data Access and Management Agreements*). All documents are available online from the ANZLIC website (http://www.anzlic.org.au/publications.html).

In addition, each state or territory has protocol and policy documents on data standards. Councils should refer to those documents whenever they are available.

Data standards describe objects, features or items that are collected, automated or affected by the activities or the functions of organisations. The development, publication and acceptance of data standards are important goals of an integrated information management solution. Such standards are essential for all users and producers of data and information. They are particularly important in any co-management, co-maintenance or partnership arrangements where data and information need to be shared or aggregated.

Several standard themes of data are common to most local government spatial information systems, including elevation, land use, cadastre and transportation. These need to be organised according to a system that makes them useful to the broadest community.

### 4.3.1 Increasing need for standards

Modern councils are increasingly networked in a variety of ways, including through:

- → internal networks (intranets)
- → a number of operational nodes (distributed networks)
- → the internet, where data can move within the council and between the council and other agencies or individuals.

A fundamental principle that allows for effective transmission and sharing of data is *interoperability*. Interoperability ensures that information and even functionality can flow freely between communication and software systems without impediments, such as a need for data format translation. Recent developments are tending towards *open data standards* that are accepted by governments, private industry and vendors. The Open

Geospatial Consortium (OGC) is the lead global body for the development of open standards for geospatial information. Further information can be found on the OGC website at http://www.opengeospatial.org/ogc.

### 4.3.2 Fitness for purpose and point of truth

LEADING PRACTICE Fitness for purpose and point of truth are key elements of data standards.

Prior to using a dataset, users should undertake an assessment to determine the appropriateness of the dataset for the intended use, or its fitness for purpose. This involves assessment of the dataset against criteria such as:

→ age
→ scale
→ resolution
→ accuracy

and the:

→ classification, aggregation, generalisation systems
→ integrity

of the dataset.

In particular, the important attribute fields in the data should be checked to verify that they are appropriately populated with values (i.e. that they contain data).

Where possible, and especially where more than one version of a dataset exists, users should work with the relevant state or territory agencies or other custodial authority to determine the authoritative, or *point-of-truth*, dataset. Problems may arise from using outdated, inaccurate or unofficial datasets, which can lead to major difficulties in analysis and a lack of interoperability and integration with other datasets. Further, the use of such datasets may cause doubts about data integrity.

### 4.3.3 Benefits of data standards

NOTE! Benefits of the implementation of data standards include:

→ increased data sharing
→ higher quality data
→ improved data consistency
→ increased data integration
→ better understanding of data
→ improved documentation of information resources
→ improved control over data updating activities and new versions of datasets
→ improved data security and reduced translation and validation costs.

HIGHER CAPABILITY 4 → 5

Ensure that the council has developed a comprehensive suite of metrics for understanding the impact of spatial data management on core business. Such metrics incorporate standards, process performance measures, and measures of how well the council's spatial information management operations compare to recognised Australian leading practice.

### 4.3.4 Metadata standards

Spatial metadata are[12] information that describe spatial datasets (i.e. the data about the datasets). This enables a consistent approach to facilitate the storage and retrieval of information about a particular dataset. This is analogous to the labelling of food on supermarket shelves.

Metadata can be accessed using database and internet technologies that automate search and retrieval capabilities. This can be facilitated by the ASDD, available online at http://asdd.ga.gov.au/asdd/tech/zap/basic.html).

NOTE! Metadata are maintained and kept up to date in much the same way as spatial data. When metadata fall out of date, the data utility and value are reduced. Metadata should be maintained in accordance with the council data policy and relevant state or territory government requirements.

The ANZLIC Metadata Project is a current collaborative initiative between Australian and New Zealand jurisdictions and government agencies. ANZLIC is committed to harmonising existing efforts to develop a single metadata profile for Australia and New Zealand, and has established a project team to deliver a metadata profile and entry tool. Further details are available through the ANZLIC website (http://www.anzlic.org.au/).

The outputs from this project will eventually replace the information below.

ANZLIC has previously developed a metadata standard that sets out minimum requirements for metadata published in the ASDD. The ANZLIC Metadata Guidelines, which include information about standards, are available via the ANZLIC website at http://www.anzlic.org.au/infrastructure_metadata.html.

The guidelines have been widely adopted and are designed for use by data custodians to assist them to create, store and distribute core metadata elements. The document includes introductory information on metadata, their use and management. The references provide sources of more detailed information that users may require as they become more experienced with metadata and their use as an aid to data management within their own organisations.

The ANZLIC Metadata Profile, prepared in accordance with AS/NZS ISO 19106 *Geographic information—Profiles* and based upon AS/NSZ ISO 19115 *Geographic information—Metadata* and ISO/TS 19139 *Geographic information—Metadata—XML schema implementation*, has been endorsed by the ANZLIC Council members. It is expected to be available on the ANZLIC website in the near future.

### 4.3.5 Principles for developing standards in a multi-user environment

LEADING PRACTICE Data standards usually reflect the business uses and requirements of the organisation, group or person who developed the dataset, and not the multiple needs of different potential users and data collectors. Therefore, data standards should be documented and communicated clearly.

It is also important that the development and implementation of data standards are carried out in an environment of trust and follow agreed principles. The participation of key stakeholders in the development of standards is essential to their success.

12 'Metadata' is variously treated as a singular or plural noun in common use.

ANZLIC policy on the development of standards may be summarised as follows:

→ Where possible, adopt the following in order of priority:
  – international standard
  – national standard
  – regional (or state/territory) standard
  – local standard.

→ Where possible, adopt a minimum standard—less is better than more.
→ Specify the version of the standards used, as standards are constantly being updated.

The following guidelines should be kept in mind when developing standards.

### A standard is accepted when it is broadly used

There is no merit in referring to something as a standard if it is not used and adopted. Good standards are developed in an inclusive process, are well communicated, and are widely used. Use is facilitated by access, so improving access to data and information about the standards will increase adoption.

### Standards evolve

Standards often change in parallel with changes in technology and business processes. A process with built-in continued participation and review is important, so that standards evolve rather than drop out of favour as parties find new individual approaches.

### Most data are already collected to some standard

By definition, all data contained in a database conform to some standard. A good standards review should begin by identifying what standards already exist (i.e. the standards currently associated with the dataset).

### Standards reflect a business need or circumstance

Datasets and their related standards exist to support business requirements. Understanding those business requirements is a key in gaining broad acceptance of standards.

With increasingly networked information flows within organisations, priority may be given to reducing impediments to information flow. In effect, there is a trend towards boundaryless organisations. The development of standards to facilitate this requires the participation of all organisational areas. More information on boundaryless organisations and their implications for information management can be found in an article written by Allen Brown of the Open Group. The article can be accessed at http://www.opengroup.org/downloads/Boundaryless_Organisation.pdf.

### A standard won't meet all business needs

Any one standard may not meet all the business requirements for a dataset. For example, a dataset might be satisfactory for broad-scale local government land-use zoning purposes, but not accurate enough for site-specific evaluation. Hence, as noted above, standards should be developed in consultation with all key stakeholders, including users.

### Look for a minimum standard or key common components

LEADING PRACTICE

Despite the range of requirements associated with various business needs, it is often feasible to achieve one broadly accepted standard for a dataset. Business processes involving multiple partners or participants should adopt common standards that support the maintenance and development of datasets. Common components (e.g. access, distribution, scale, accuracy) of the various related datasets may be encompassed in the standard.

Once adopted, those standards form the basis of a *minimum standard*. Other users are then free to add business-specific elements to the data (in accord with their defined standards) for their own use, while still sharing the set of core data elements (which are in accord with the defined minimum standard).

An example is provided in Figure 4.1. The minimum standard components of a spatial information management system (the land parcel database) support the activities of a number of different business processes, such as traffic planning and the assessment of development applications.

HIGHER CAPABILITY 4 → 5

Ensure the acceptance and uptake of standards for data interoperability. This will open opportunities to share data and services within and between councils, and also across government levels, resulting in benefits in increased capability and reduced costs.

## 4.4 Data standards components

### 4.4.1 Standards for the sharing of information

It is important to consider the full range of technology issues that are behind the information presented on the geographic information system (GIS) software user interface; for example, how did the spatial information get there? The information may have come from intranet or internet sources. Communications protocols (that have been established using standards) will have been employed to permit the information to transmit freely through those networks.

The communication standards are likely to be *open standards*; that is, openly accepted and implemented by governments, private organisations, universities and vendors around the world. Protocols such as HTTP and languages such as XML are examples of such standards. Other examples include:

- GML (Geography Markup Language), a data standard for representing geographic information such as points, lines, areas, etc.
- SOAP (Simple Object Access Protocol) is a 'protocol intended for exchanging structured information in a decentralized, distributed environment. It uses XML technologies to define an extensible messaging framework providing a message construct that can be exchanged over a variety of underlying protocols. The framework has been designed to be independent of any particular programming model and other implementation specific semantics' (W3C, http://www.w3.org/TR/soap12-part1/). It is this that allows data to move freely across networks.

In 2005, the Australian Spatial Information Business Council, with support from the Open Geospatial Consortium—Australasia (OGC-A), conducted the Spatial Interoperability Demonstrator Project. That study highlighted the value of web services for spatial information distribution and the benefits for managers. For more information on the project, see http://www.asiba.com.au/clients/asiba/UserFiles/File/SIDP%20Materials/SIDP_Factsheet_1_eBook.pdf.

> TIP! The Spatial Interoperability Demonstrator Project (SIDP) modules and fact sheets are excellent resources that demonstrate the use and sharing of spatial data. The information they contain will assist staff from technical levels to managerial levels and will aid in the preparation of a business case for implementation of web-sourced spatial data. The fact sheets are available via http://www.asiba.com.au/static/industryfacts.php. The Australian Spatial Information Business Council provides other material in response to requests to ceo@asiba.com.au.

The use and development of standards for spatial and non-spatial data are discussed further in the following sections (adapted from http://www.nlwra.gov.au/toolkit).

## 4.4.2 Spatial standards

A number of standards may be involved in spatial datasets used in a spatial information system project to support local government activities. These may include standards associated with map projection, datum, the coordinate system in which the dataset is stored, and the scale and accuracy of the dataset. Such standards are essential, as datasets can be rendered useless without them. For example, a satellite image or vector road layer cannot be used in a spatial information system unless it matches, or can be made to match, the projection and coordinate system adopted for use in that system.

The following information describes various data standards that practitioners need to be aware of, or may encounter, when managing or searching for data.

### Map projections

A *map projection* can be described as a mathematical model that transforms the spatial relationships of features on the Earth's three-dimensional surface onto a flat map, or two-dimensional surface.

To achieve this, some method must be used to depict a map in two dimensions. As a flat map does not accurately reflect the shape of the Earth, many different map projections have been developed and used in spatial analysis and mapmaking. Some projections preserve shape, while others preserve accuracy of area, distance or direction.

### Datum

The Earth approximates a sphere. For small-scale maps, such as an those in an atlas, that represent large areas (e.g. a country), mapmakers treat the earth as a true sphere. For large-scale maps, which reveal far more detail for a given area than small-scale maps, the Earth must be treated as an ellipsoid or spheroid. A *datum* is a set of parameters and control points that are used to define the three-dimensional shape of the Earth accurately.

### Coordinate system

A *coordinate system* provides a reference for measuring horizontal and vertical distances on a map. Coordinate systems are usually defined by a map projection, a spheroid reference, a datum and a number of other parameters (e.g. standard parallels, a central meridian and possible shifts in the x and y directions). The two most commonly used coordinate systems in Australia are geographical (latitude and longitude) and the Map Grid of Australia (MGA).

**CAUTION!** Councils may not necessarily use the MGA projection or Geocentric Datum of Australia 1994 (GDA94) datums. Some areas of Australia may use regional or local datums, projections and coordinate systems, for example:

- → the Perth Coastal Grid is used for the Perth coastal plain (see http://www.landgate.wa.gov.au/docvault.nsf/web/SPM_DLI_APPENDIX5/$FILE/SPM_DLI_APPENDIX5.pdf)
- → VICGRID94 is used in Victoria (for VICGRID94 specifications, see http://land.vic.gov.au/land/lcnlc2.nsf/9e58661e880ba9e44a256c640023eb2e/901b482ea48a8724ca25719a007ff064/$FILE/VICGRID94%20Map%20Projection%20Information.pdf).

### Scale and accuracy

The term *scale* refers to the relationship between represented data (e.g. data on a map) and the things in the real world represented by those data. It is, in effect, a reduction or expansion factor. Most usually, scale is thought of as limited to map scale, but the term 'scale' can also apply to other activities where information is drawn from the real world, such as survey sampling.

In general, maps with smaller scales are more highly generalised and simplified, and they are less suitable for applications demanding high accuracy. This is also the case for spatial information system datasets, which are often derived from maps or images at given scales. Spatial information system software functionality enables the user to zoom in closely on a dataset and print it at very large scales. Note that enlarging a map beyond the scale at which the data were captured does not make the map more accurate.

When considering scale and accuracy, there is also a need to distinguish between accuracy and precision for both raw and derived data.

### Documenting spatial standards

An example of a standards document is presented in the National Land and Water Resources Audit's *Information Management Manual*, available online at http://www.nlwra.gov.au/toolkit/4/audit_manual_2_0.pdf.

### Information on spatial standards

**LEADING PRACTICE** Councils are encouraged to contact the relevant state or territory agencies to obtain information on the most appropriate spatial standards for their jurisdictions.

*Module 7: Guidelines for purchasing spatial information management software and hardware*, provides additional information on purchasing spatial information software that ensures compliance with key standards, including the OGC, the World Wide Web Consortium (W3C) and the Australian Spatial Data Infrastructure (as mandated within the national Interoperability Framework initiative).

The GDA94 datum is an example of a standard. The GDA provides compatibility with satellite navigation systems and national mapping programs, and is a single standard for the collection, storage, and dissemination of spatial information at global, national and local levels. It thus allows for the efficient exchange of data.

States and territories have passed legislation mandating adoption of GDA as the new standard. There are benefits to councils in adopting the GDA, including:

→ reduced data translation costs
→ increased use of GPS by mobile applications
→ reduced risk of error and possible litigation
→ reduced confusion
→ better coordination between councils, and with other agencies.

### 4.4.3 Non-spatial standards

LEADING PRACTICE

The following brief overview of non-spatial standards also applies to geographic datasets.

#### Data acquisition/collection standards

Standards relating to data acquisition or collection include process standards for survey, collection and data capture methods. Data collection standards are the methods and processes for the collection of new data or conversion of existing data. There are numerous international and national groups that deal with specific standards for data acquisition and/or collection.

#### Database structure and content standards

Database structure and content standards relate to the organisation, representation and content of database files and data elements. Data content standards provide semantic definitions of a set of objects. Data content standards may be organised and presented in a data model, such as an entity relationship model.

#### Data processing standards

Data processing standards are standards to which data are subjected for the purposes of data manipulation and conversion into information products.

#### Data quality standards

Data quality standards may include:

→ accuracy
→ precision
→ resolution
→ reliability
→ repeatability
→ reproducibility
→ currency
→ relevance
→ ability to be audited
→ completeness
→ timeliness.
→ completeness.

### Database maintenance standards

Database maintenance standards relate to the process and timing of updates to datasets. They encompass additions, changes and deletions to datasets. It should be noted that it is an accepted practice for an organisation to have an official version of a dataset available for general use while the dataset is being updated or modified to produce a new version.

### Data usability

Data usability standards describe the applicability or essence of a dataset or data element, and include data quality and accuracy, and reporting or documentation standards.

### Data dissemination standards

Data dissemination standards include standards for data and information access, dissemination processes and products (e.g. maps, reports), and information regarding copyright, privacy and freedom of information. The National Land and Water Resources Audit's *Information Management Manual* is an example of a document containing data dissemination standards.

### Terminology/symbology standards

Terminology and symbology standards include terms or symbols that must be used or adhered to. Data symbology or presentation standards define graphic symbols. In GIS standards, symbol sets can be generated and can be easily utilised on an organisation-wide basis.

### Presentation standards

Presentation standards govern the display and formatting of information from a dataset. Map presentation standards are an example (see *Module 9: Map production guidelines*).

### Quality control and assurance standards

Quality control and assurance standards are used to achieve a specified quality and to check the quality of an existing dataset. Details for accuracy and precision are often included in these standards.

Checklists and scorecards are often used to assess the compliance of a dataset to a particular standard as part of quality control and assurance processes. The following example of a compliance checklist is taken from the National Land and Water Resources Audit's *Australian Natural Resources Information 2002* report, available at http://www.nlwra.gov.au/toolkit/4/4-3.html.

## → Compliance checklist

Compliance of the 1996/97 Land Use of Australia Map with standards for the Australian Spatial Data Infrastructure.

### ACCESS

☐ Are the data easily accessible?

- Land use data are available free of charge over the internet through the Australian Natural Resources Data Library.
- Data may be mapped through the Australian Natural Resources Atlas Map Maker. Detailed regional summaries of land use for each river basin are available through the Australian Natural Resources Atlas.

☐ Are the data documented?

- Summary documentation and full metadata is available through the Australian Natural Resources Data Library and the Australian Spatial Data Directory.

### SUPPLY

☐ Are licence arrangements in place that ensure that the information are accessible, while protecting copyright, intellectual property, privacy and confidentiality?

- A licence agreement exists between the National Land & Water Resources Audit and ANZLIC—the Spatial Information Council, and is supported by Australian, State and Territory government agencies.

### QUALITY

☐ Do the data meet national guidelines or standards?

- Data meet the following national guidelines:
  - ☐ Spatial data coordinates are available in the Geocentric Datum of Australia (GDA94).
  - ☐ Attribute data use the Australian Land Use Management Classification Version 4, October 2000. The Executive Steering Committee for Australian Land Use Mapping monitors compliance with the classification.
  - ☐ Download of data from the Australian Natural Resources Data Library is subject to an agreement with licence conditions.

### MAINTENANCE

☐ Are there national coordination arrangements in place to help ensure that data are being assembled, maintained and delivered in a nationally consistent way without duplication of effort?

The Australian Government Department of Agriculture, Fisheries and Forestry coordinates the Executive Steering Committee for Australian Land Use Mapping with Australian, State and Territory government representatives.

☐ Are custodians of the data maintaining the data according to national guidelines or standards?

The Australian Government Department of Agriculture, Fisheries and Forestry maintains data according to the Australian Land Use Management Classification.

As mentioned above, the criteria by which datasets can be assessed to determine their compliance with standards for the Australian Spatial Data Infrastructure are currently being updated. Councils should check with the relevant state or territory agencies for current information on those criteria and any specific to their jurisdiction.

### Data classification standards

Data classification standards apply to groups or categories of data that serve an application. They describe how data are analysed to produce a classification and the processes that are followed to achieve data precision. Land-use and soil classifications are examples.

Several groups are currently involved in determining classification methodology standards and outlining procedures to be used when implementing a data classification standard. For example, the Australian Bureau of Statistics prepares the *Australian Standard Geographical Classification*; details are available via http:www.abs.gov.au.

### Storage procedures

Standards for storage procedures address the mechanisms and schedules for archiving and backing up data. Where appropriate, storage procedures also need to consider types of storage media (e.g. streamer tape, hard disk, CD or DVD).

### Data analysis procedures

Standards for data analysis include methods for computing, comparing, contrasting, assembling and/or evaluating a dataset for an application or specified product.

### Data transfer

Standards for data transfer should be independent of technology and applications, and facilitate the moving of data among systems without prior specification of the intended end use of the data. Some transfer standards are specific to a technology, such as the file transfer protocol (FTP) used on the internet.

## 4.5 Leading practice for standards

LEADING PRACTICE

Leading practice procedures for information management involve the development of guidelines that detail the specific requirements that a council should adopt in relation to standards. In many cases, most data standard elements listed above are incorporated into a document that outlines the council's data principles and management guidelines.

Other leading practice procedures include:

- → the development of compliance criteria, such as scorecards
- → the development of guidelines for standards other than spatial data (e.g. reporting requirements).

An example of this type of document is the *Data and Information Management Guidelines* report, produced by the Natural Land and Water Resources Audit (see http://www.lwa.gov.au/Publications_and_Tools/Researcher_Guidelines/index.aspx).

## 4.6 Additional support

As mentioned earlier, the criteria by which datasets can be assessed to determine their compliance with standards for the Australian Spatial Data Infrastructure are currently being updated. In addition, states and territories may have in place overarching criteria with which councils may be required to conform. To promote the adoption of such standards, most jurisdictions have material related to data policies and standards available on their websites.

The following web sources, while not exhaustive, provide a starting point to assist councils to locate information relevant to their jurisdiction:

Australian Capital Territory: http://www.actpla.act.gov.au/actlic/

New South Wales: http://www.canri.nsw.gov.au/policies/

Northern Territory: http://www.ntlis.nt.gov.au/

Queensland: http://www.qsiis.qld.gov.au

South Australia: http://www.environment.sa.gov.au/mapland/sicom/sicom/index.html

Tasmania: http://www.dpiwe.tas.gov.au/

Victoria: http://www.land.vic.gov.au/land/lcnlc2.nsf/FID/-869AEC581C5361B84A256C390082E029?OpenDocument

Western Australia: http://www.walis.wa.gov.au/.

## Acronyms

| | |
|---|---|
| ACRES | Australian Centre for Remote Sensing |
| ADAC | Asset Design and As Constructed |
| AGD | Australian Geodetic Datum |
| ALGA | Australian Local Government Association |
| ANZLIC | ANZLIC—the Spatial Information Council for Australia and New Zealand |
| ASDD | Australian Spatial Data Directory |
| ASDI | Australian Spatial Data Infrastructure |
| AS/NZS | Australian Standard/New Zealand Standard |
| CAD | computer assisted design, computer-aided drafting |
| CPU | central processing unit |
| DSDB | detail survey database |
| GDA94 | Geocentric Datum of Australia 1994 |
| GIS | geographic information systems |
| GML | Geography Markup Language, Generalised Markup Language |
| GPS | global positioning system |
| GSDI | Global Spatial Data Infrastructure |
| GUI | graphical user interface |
| HTTP | Hypertext Transfer Protocol |
| ICT | information and communications technology |
| INCIS | Integrated National Crime Information System (New Zealand) |
| ISO | International Organization for Standardization |
| IT | information technology |
| MGA | Map Grid of Australia |
| OGC | Open Geospatial Consortium |
| OGC-A | Open Geospatial Consortium—Australasia |
| PRINCE | Projects IN Controlled Environments |
| RCSC | Regional Collaboration Steering Committee (Queensland) |
| RFP | Request for Proposal |
| RIP | raster image processor |
| ROC | regional organisation of councils |
| SDE | spatial database engine |
| SDI | spatial data infrastructure |
| SEQ | south east Queensland |
| SIDP | Spatial Interoperability Demonstrator Project |

| | |
|---|---|
| SLIP | Shared Land Information Platform (Western Australia) |
| SOAP | Simple Object Access Protocol |
| URL | Uniform Resource Locator (website address) |
| VROC | voluntary regional organisation of councils |
| WALIS | Western Australian Land Information System |
| W3C | World Wide Web Consortium |
| XML | Extensible Markup Language |

**NOTE**: A list of several online spatial information system, GIS, cartographic, data and IT glossaries and dictionaries is provided at http://www.gis.com/whatisgis/glossaries.html. An additional online glossary for definitions of many current IT-related words is available at http://whatis.techtarget.com/.