

## B.9 Spatial data standards and documentation

- [B.9 Spatial data standards and documentation](#)
- [B.9.1 National and international spatial standards](#)
- [Standards for geographic data](#)
- [Spatial metadata standards in the UK](#)
- [GiGateway and the National Geospatial Data Framework \(NGDF\)](#)
- [The Intra-governmental Group on Geographic Information \(IGGI\)](#)
- [INSPIRE](#)
- [B.9.2 Sharing spatial data](#)
- [Intranets](#)
- [Internet and map serving](#)
- [B.9.3 Useful websites and references](#)

## B.9 Spatial data standards and documentation#

### B.9.1 National and international spatial standards#

A number of national and international standards have been developed in the last few years to encourage consistent depiction of geographic space, and work is ongoing to discuss conventions for heritage datasets.

#### Standards for geographic data#

Spatial data require recording standards concerning issues relating to accuracy, scale and resolution that do not normally arise in relation to other types of data. This section of the manual only summarises the issues, as more detailed guidance is available from a number of other sources, with various textbooks providing introductions to the problems that may arise. A useful starting point for HERs is the ADS's "[GIS Guide to Good Practice](#)" ([Gillings and Wise 1998](#)) and section [E.3](#) of this manual gives guidelines on creating and managing layers in an archaeological GIS. The MIDAS mapped data Annexe addresses the specific needs of describing depiction of MIDAS inventory entries on maps, and the maps themselves, for example in a GIS (Geographic Information System), covering both individual features and layers.

Both in the initial capture of data and for subsequent maintenance and additions in the GIS, there are issues concerning standards which need to be considered if the spatial information is going to be usable. Because many of the outputs of GIS are visual, these pictures can be very persuasive. But GIS are only a model of the real world and the model can only be as good as the quality and appropriateness of the data within it. Data standards help users to control this and to be in a position to say whether data is 'fit for purpose'.

A number of different standards issues relate to spatial data and the following points should be considered:

- **How will spatial data quality be controlled?** Data quality can usefully be thought of as either compliance to a specification or the meeting of customer needs.
- **What metadata or documentation should be recorded?** Metadata might include information about a whole dataset (what it is, when it was captured, at what scale, against what base map product) or about individual items within it (who captured it, on what date and at what scale if variable).
- **How will new data be captured?** What are the standards for capturing information of different types? For example, a 1:10,000 base map may be appropriate for capturing point data, but will

be less useful for capturing the outline of a building. An appropriate standard must be adopted for each case.

- **What standards will be applied to the way data is displayed?** What symbols will be used? How will uncertainties over the precision of location, fuzzy boundaries and so forth be represented?
- **How will data be imported and exported from the system?** Who are potential data suppliers and customers for digital data? What are their requirements and can they be met?
- **How far should changes made to the data, or the source of the originals, be documented?**

For each of these areas working practices need to be agreed and documented for use within the HER and related to standards in use within the organisation as a whole and to externally agreed data standards.

A number of national and international standards have been developed to encourage consistent depiction of geographic space and work is ongoing to discuss conventions for heritage datasets. A non-exclusive list of relevant standards and organisations that are concerned with spatial data standards would include the following:

- **\_BS 7666 specifies the manner in which address information should be specified, and is important within Local Government and the Utilities. Archaeologically, it may prove most useful in the consistent provision of address information, for example for Listed Buildings.**
- **FGDC** the United States Federal Geographic Data Committee's Content Standard for Digital Geospatial Metadata is, perhaps, the best known and established of geospatial data standards, the current version having been first released in 1994, and updated in 1998. This standard underpins much of the US Federal Government's work with geospatial data, and is also used by other collectors of spatial data. The standard was recently enhanced, and is available in a variety of commonly used formats.
- **ISO 15046** is a draft standard from the International Standards Organisation Technical Committee TC/211 that addresses geographic information and geomatics. The draft standard appears modelled upon current FGDC practice, and offers powerful options for extensibility and modification within the wider standards framework.
- **OGIS** (Open Geodata Interoperability Specification) is an initiative by the vendor-led Open GIS Consortium (OGC). OGC is looking to increase the ease with which geospatial information may be passed between products, and OGIS is one important aspect of this work.
- The **National Geospatial Data Framework (NGDF)** was an important co-operative initiative aiming to provide effective means of access to geospatial data collected and held by government and the public and private sectors. It was replaced by the **GiGateway** which itself was decommissioned in 2011. Both services have been replaced by the [UK Location Infrastructure](#).

## **Spatial metadata standards in the UK#**

Fully describing spatial data is essential to using it, archiving it and deciding on how best to use it. It is also an essential first step in designing information systems that interoperate. Because of this, it is good practice to store spatial metadata as well as the attribute, topological and geographic components of a spatial database.

Metadata standards are necessary to make sure that that different users can find out about the suitability of data from different sources. This is particularly important if users need to compare metadata describing HER data with metadata describing, for example, rights of way or environmental information. Metadata standards set out what information should be recorded for a particular dataset and in what format. Some kinds of information may be regarded as compulsory (should always be recorded) while others may be optional either because they may not be universally relevant, or because they are useful but not essential. Metadata for a spatial dataset will enable users (or interoperating systems) to know, for example, the dates when a spatial data layer was created and/

or modified, the date of the source mapping from which it derives, the scale, accuracy and precision of the data and any copyright issues that pertain to the layer and so on. Metadata standards enable metadata to be validated so that meaningful comparisons can be made between diverse spatial data sources.

There are a number of metadata initiatives within the UK geospatial community. The most relevant of these is probably **\_UK GEMINI\_** (GEO-spatial Metadata INteroperability Initiative) launched in 2004 following a collaboration between the [Association for Geographic Information](#) (AGI) and the [Cabinet Office e-Government Unit](#), with additional representation from national and local government and the academic community. Adherence to the UK GEMINI profile, which will replace the Gigateway Discovery Metadata Specifications (the NGDF Standard) as the UK's national geospatial metadata profile, allows for the creation of discovery metadata with both ISO 19115 (Geographic Information ? Metadata) and the national e-Government Metadata Standard (eGMS), ensuring compliance with both. Adopting UK GEMINI will also simplify the process of publishing metadata via Gigateway's Data Locator.

Further details can be found at <http://www.gigateway.org.uk>.

### **GiGateway and the National Geospatial Data Framework (NGDF)#**

GiGateway replaces the National Geospatial Data Framework (NGDF). It provides a free web service aimed at increasing awareness of and access to geospatial information in the UK; offers assistance and guidance on the collection of metadata to national and international standards and provides purpose built software. GiGateway services include a Data Locator to find out what geographic datasets exist, Area Search to find out more about specific localities and Data Directory to help locate organisations which supply geographic data, products and services.

NGDF produced a metadata standard for spatial information, compatible with the Dublin Core. HERs have been recommended to follow the Dublin Core for electronic resources other than GIS as this provides a standard content-description model widely used on the internet (see Miller and Greenstein 1997). At the time of writing, GiGateway is currently working on redevelopment of its [MetaGenie](#) product to create metadata in line with UK GEMINI (see above). Until then, the AGI Information Services Team urge data creators to start or continue using MetaGenie v1.0 alongside the GiGateway Discovery Metadata Specifications (Association for Geographic Information 2003) to produce and publish geospatial metadata.

Further details can be found at the GiGateway website (<http://www.gigateway.org.uk/default.html>).

### **The Intra-governmental Group on Geographic Information (IGGI)#**

The Intra-governmental Group on Geographic Information (IGGI) was established in 1993 to enable central government to liaise effectively and exchange best practice in the use of geographic information. It aims to increase the efficiency of central government while enabling it to meet its responsibilities for provision of geographic information to the general public. Details can be found at the IGGI website <http://www.iggi.gov.uk/welcome.php>.

### **INSPIRE #**

The Infrastructure for Spatial Information in Europe Directive, or more simply, [The INSPIRE Directive](#) (2007) mandates all European Union countries to share environmentally related datasets so that they can be easily accessed by other public organisations within their own and neighbouring countries. Key to delivering INSPIRE is the establishment of Spatial Data Infrastructures (SDIs) providing a framework for coordinating the policies, infrastructure and standards needed to acquire, process, distribute, use, maintain and preserve spatial data.

The Directive addresses 34 spatial themes, grouped into nine thematic clusters, needed for environmental policies, and policies or activities which may have an impact on the environment. The key theme for Historic Environment data is [Protected Sites](#) which is part of the [Biodiversity and Management Area](#) cluster. However much of the data we are interested in is also relevant to other themes within INSPIRE. Our records about the built heritage help inform the [Buildings](#) theme within the [Topographic and Cadastral Reference Data](#) cluster. Historic Landuse Classification data should relate to the [Land Use](#) theme within the [Land Cover and Land Use](#) cluster and our use of LiDAR data is underpinned by data published under the [Elevation](#) and [Orthoimagery](#) themes within the [Elevation, Orthoimagery, Reference Systems and Geographical Grids](#) cluster.

Despite the environmental focus of INSPIRE, datasets about the cultural heritage and historic environment are largely underrepresented with limited engagement from data curators. In part, this is due to the emphasis on the natural environment but there is also genuine ambiguity in how the Directive applies to cultural heritage data.

For the purposes of INSPIRE, a Protected Site is defined as an

?Area designated or managed within a framework of international, Community and Member States' legislation to achieve specific conservation objectives? (Directive 2007/2/EC).

And described as

?According to the International Union for the Conservation of Nature (IUCN) a Protected Site is an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means.

Within the INSPIRE context, Protected Sites may be located in terrestrial, aquatic and/or marine environments, and may be under either public or private ownership. They may include localities with protection targets defined by different sectors and based on different objectives. Objectives for protection may include: the conservation of nature; the protection and maintenance of biological diversity and of natural resources and the protection of person-made objects including buildings, prehistoric and historic archaeological sites, other cultural objects, or sites with specific geological, hydrogeological or geomorphological value. Protected Sites may receive protection due to more than one type of objective, and may have a double or multifarious designation status. Protected Sites may differ greatly in their reasons for protection, their designation and their management.? (INSPIRE 2014)

INSPIRE provides a clear mandate for those who create and manage designated datasets to publish them to deadlines outlined by the INSPIRE roadmap. Historic Environment Records are also within scope of the Protected Sites theme as the data they hold supports policies and activities that may have an impact on the environment.

## **B.9.2 Sharing spatial data#**

There are many advantages to sharing spatial datasets both within an organisation (such as a County Council) and beyond. Within large organisations shared access to spatial data can help integrate different activity areas and prevent duplication of data within the organisation (which can, in turn, lead to redundancy within the datasets and unnecessary cost through duplication of both expenditure and effort).

There are also many advantages to making HER data available outside an organisation, although this raises wider issues relating to freedom of information, ownership of information and protection of heritage resources.

In both cases, there is a clear need to integrate any approach to spatial information with wider initiatives that may exist within the organisation. Many HERs will be components of wider corporate database and GIS strategies and will need to fit within these in order to benefit from data sharing within the organisation, while both local and national government is now coming to terms with the requirements of the [2000 Freedom of Information Act \(The Stationery Office 2000\)](#) and how best to meet obligations placed on it under that.

### **Intranets#**

Intranets are closed networks that are established by organisations to serve the computing needs of their staff. An intranet may be small, for example a number of computers connected to a Local Area Network (LAN) within a building, but can be very large, for example the computing networks for a series of buildings connected to a Wide Area Network (WAN). In a WAN the buildings may be widely separated, as is the case in organisations with regional offices, such as [Historic England](#) or multinational companies. The technology that links the computers is similar to that used in the internet. The difference is that use of an intranet is restricted to those with security clearance and a valid password. Intranets are enclosed inside a firewall to secure the information held on corporate systems from unauthorised access.

Intranets provide secure environments within which many users can gain access to shared resources. For GIS users, this can mean that different groups within a larger organisation can have access to the same spatial data themes permitting easier sharing of spatial data between, for example, HER, planning, rights-of-way and environment groups. This level of integration, however, usually requires significant investment by the wider organisation both in terms of technical infrastructure and effective management.

### **Internet and map serving#**

At present, very few (if any) HERs have made it possible for the general public to directly access spatial information on the internet. There are few technical restrictions on this, with several solutions available for 'map serving' or for creating internet interfaces to databases. There are however, currently two main issues preventing this:

1. Such projects would be expensive to establish and maintain. Clearly, direct access to 'live' data is rarely desirable, and so data must be regularly output from the main HER system usually requiring human intervention. Servers and infrastructure also require management for which few HERs are currently funded. Meeting the requirements of the Freedom of Information Act may change the economics, however.
2. There are significant concerns about the impact on the heritage resource of making accurate, spatial locations for known archaeological sites available to the general public. It does not require a leap of imagination to see such resources becoming a favoured resource for the metal-detecting community and therefore producing a significant increase in damage to recorded (and in many cases Scheduled) monuments. Again, it is currently unclear how the requirements of the [2000 Freedom of Information Act](#) will impact on this issue.

One recent example of online access to spatial information is Pastmap, a map-enabled query system for Scotland's Scheduled Ancient Monuments, Listed Buildings, and the National Monuments Record. This requires users to register, and once registered displays user-defined maps for the locations (and boundary polygons) for Scheduled Ancient Monuments, and locations of Listed Buildings, entries in the National Monuments Record of Scotland and Historic Gardens and Designed Landscapes (<http://www.pastmap.org.uk/>). (See also [F.8.4.1](#))

### **B.9.3 Useful websites and references#**

Dublin Core <http://dublincore.org/>

Arts and Humanities Data Service (AHDS):

- Main website <http://ahds.ac.uk/>
- Archaeology Data Service (ADS) <http://archaeologydataservice.ac.uk/>
- Metadata advice <http://www.ahds.ac.uk/creating/information-papers/metadata/index.htm>

IGGI website <http://www.iggi.gov.uk/welcome.php>

GiGateway (formerly NGDF):

- Main site <http://www.gigateway.org.uk/>
- Metadata standards pages <http://www.gigateway.org.uk/metadata/standards.html>

Z39.50

- Z39.50 <http://ads.ahds.ac.uk/project/z3950/z3950.html>
- NISO brochure [http://www.niso.org/standards/resources/Z3950\\_Resources.html](http://www.niso.org/standards/resources/Z3950_Resources.html)