CAPA 35

A data model for Cultural Heritage within INSPIRE

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Resumen

Esta monografía presenta los fundamentos, contexto y detalles técnicos de un Esquema de Aplicación para la incorporación de datos espaciales relativos al patrimonio cultural en el marco definido por la directiva europea INSPIRE sobre información geográfica.En la actualidad, INSPIRE representa el marco más relevante para la publicación y distribución de información geoespacial, de un amplo conjunto de temáticas, especialmente las relacionadas con el medio ambiente. Aunque los elementos del patrimonio cultural aparecen parcialmente recogidos en INSPIRE, no hay hasta el momento documentación específica acerca de cómo integrarlos, estructurarlos y publicarlos.Este texto pretende proporcionar una serie de guías técnicas que ayuden a cualquier agente implicado en el manejo de datos patrimoniales a publicarlos siguiendo los principios genéricos definidos en INSPIRE.

Este trabajo supone la publicación detallada de un modelo de datos y un esquema de aplicación que han sido ya parcialmente publicados previamente (Fernández Freire et al. 2013, Parcero-Oubi¶a et al. 2013, Uriarte Gonz§lez et al. 2013).

Abstract

This monograph presents the background, context and technical details of an Application Schema for the inclusion of cultural heritage spatial data into the INSPIRE framework. Nowadays, INSPIRE provides the most relevant framework for the dissemination and exchange of geographical data, covering many different thematic fields, particularly relevant for environmental datasets. Although cultural heritage elements are partially addressed within INSPIRE, there is no specific documentation on how these data should be considered, structured and published. This text aims to provide technical guidelines for decision makers, public administrations and the scientific community for the definition and implementation of harmonized datasets for cultural heritage, according to the interoperability principles of INSPIRE.

This monograph presents in full detail a data model and an application schema, some of whose aspects have been previously published in brief (Fernández Freire et al. 2012, Parcero-Oubi¶a et al. 2013, Uriarte Gonz§lez el at. 2013)

Palabras Clave

IDEs; Patrimonio cultural; Modelo de datos; Esquema de aplicación; Interoperabilidad; INSPIRE

Keywords

SDIs; Cultural Heritage; Conceptual Data Model; Application Schema; Interoperability; INSPIRE

Introduction: Spatial Data Infrastructures and Cultural Heritage

Cultural heritage as spatial information

The concept of *cultural heritage* is highly complex, recently becoming the subject of an increasingly intense theoretical debate regarding not only its definition but also its underlying content. Considered from a distance, and at its most generic, "commonsense" level (see p. 16), most people understand Cultural Heritage as something like the ensemble of tangible and intangible achievements accumulated by a community throughout time, as long as they are recognized in the present as being relevant for them and therefore are worth being preserved for the future. Although preservation nowadays is just a small part of what heritage study and management is all about, it does still remain one of the most visible fields of practice, and is especially relevant when it comes to the interaction between heritage elements and many other fields of economic, social and political practice.

This acknowledgement implies a political burden (for it regards a linkage between cultural heritage and an actual community), and so it has required a legal definition. Besides the history of the concept, we may say that its widespread recognition at an international level is closely related to the *Convention Concerning the Protection of the World Cultural and Natural Heritage* passed in 1972 by the UNESCO and confirmed by 190 countries so far. The content and legal expressions of the idea of cultural heritage within that normative context have been enhanced since the passing of the Convention, thanks to the transposition of its values to the member states and to the creation of new legal international instruments that have broadened the range of items regarded as cultural heritage. Relevant examples of this enhancement are the inclusion of the so-called *intangible cultural heritage* through the adoption, in 2003, of the UNESCO *Convention for*

the Safeguarding of Intangible Cultural Heritage, or of the inclusion of the figure of *cultural landscapes* within the World Heritage Convention in 1992.

Anyhow, the content underlying cultural heritage is an open matter of debate, always exposed to controversy. International practice, as reflected in the UNESCO World Heritage List, implies an ongoing conceptual broadening, derived from new inscriptions. Difficulties for establishing criteria to clearly delimitate what should be regarded as cultural heritage emanate from the appreciative nature of the concept itself. This difficulties are usually bypassed through the inclusion of extensive definitions in the Convention (see first article), as well as in most state legislations. Besides that, cultural heritage is a highly "granular" concept, which encompasses a wide range of frameworks of reference for what can be considered as significant: some things might be significant at an international level, others nationally, regionally, locally or even just within a reduced group of people.

The term *cultural heritage* will be used here primarily as a normative concept, being within the Spanish case a synonym of *Historical Heritage* (*Patrimonio Histórico* in Spanish), which is the term chosen in the Spanish main national law regulating heritage protection (*Ley 16/1985, de 25 de junio, del Patrimonio Histórico Español* – LPH onwards). The first article of the LPH bears a wide definition (as the UNESCO Convention does) of the range of things that compose heritage.

Most of those things regarded as cultural heritage can be found in a place, or linked to a geographical location. This is especially evident in the case of immovable features (buildings, historical places, archaeological sites, cultural landscapes, etc.), whose integrity is intrinsically tied to the place they occupy. As for movable items, their heritage value may subsist regardless of their location, though it is frequently lessened when moved, since such value depends to a great extent on the successive spatial contexts where it has been through its life cycle (from the places where these movable features were created and used to the museums and collections where they are preserved). Finally, intangible heritage will always be linked to its spatial dimension, as the context for the human activities which generate and recreate it, though its heritage value remains initially detached from any specific object-based appearance. The spatial dimension of cultural heritage is central to understand its nature and to ensure the protection commitments made on behalf of public administrations. This is true either if we approach heritage from the perspective of experts, practitioners or enthusiasts in the field, or if we do it from the point of view of the use and management of land and environment. But this becomes especially relevant when heritage preservation conflicts with landscape change brought about by development, a challenge which has attained an unprecedented scale (Vicent García 2007). This and the problems that arise when guaranteeing accessibility are the main reasons for requiring public intervention to ensure an adequate protection of cultural heritage.

The enduring conflict between heritage conservation and its accessibility on the one hand, and urban and rural landscape transformation processes on the other, poses the main problem for public intervention. This concern has shaped a management practice that has begun, in most cases, by identifying and cataloging heritage features (monument catalogs, archaeological inventories, etc.) before implementing protective measures (by creating legal protection entities).

This activity has engendered a network of spatial data that is quite dense, though fragmentary and heterogeneous and, all too often, barely accessible, even to the public administration itself (the Spanish case is the most familiar to us, and provides a good example of this problem, see Parcero-Oubiña, 2012, though the problem is global, see for instance Snow et al., 2006). Although this may also have been the case in many other fields, heritage management has traditionally been characterized by inefficient data management and unjus-

tified limitations on citizens' rights of heritage use and enjoyment (Corns and Shaw 2010).

As in many other fields related to spatial information, the INSPIRE Directive, issued "to support Community environmental policies, and policies or activities which may have an impact on the environment", represents both a commitment and an opportunity to integrate data and to divulge and make a diverse range of geographic information accessible to the public. Although cultural heritage is included to some extent as one of the layers considered as "reference data" (belonging to Annex I) and is also mentioned in the data specification on Buildings (Annex III), as we will see shortly, the point is not further developed within INSPIRE. However, this is a major opportunity to promote and encourage the development of cultural heritage SDIs within an interoperable framework, taking into account the spatial nature of this specific type of data in order to enhance their role within territorial governance, to help manage their protection and to bring them closer to the general public.

To aid the attainment of those objectives, several steps must be taken on different levels. On the technical level, the development of a data model and an application schema that expands the range of the already existent INSPIRE themes is what we have been considering over the last few months. The results of that work are presented in detail in this volume.

Spatial Data Infrastructures

The emergence of *Spatial Data Infrastructures* (*SDI*) deserves a place along with other remarkable milestones as one of the real steps forward in the scientific evolution of cartography, a science with thousands of years of history and whose origins can be dated back to ancient Alexandria with the work of Eratosthenes (276-196 BC).

It was not until the middle of the 20th century, thanks to the application of the Information and Communication Technologies (ICT) to the management and analysis of large datasets, that a technological and intellectual shift of paradigm in the conception and uses of cartography and geographic information will happen, represented by the emergence of *Geographic Information Systems* (*GIS*)[1] (Buzai and Baxendale 2006: 49). This paradigm should be understood as the ensemble of technical and methodological procedures that enable the management of the spatial dimension of geographical phenomena, allowing the study and analysis of reality from multidimensional and integrated approaches, fostering at the same time the "socialization" of geographic information and placing cartographic science at the service of the users and under their direct control (Mas Mayoral 2008: 18).

Spatial Data Infrastructures (*SDIs*)[2] are interpreted as a natural evolution and extension of Geographic Information Systems (Rodríguez Pascual et al. 2007). A central idea in the emergence of SDIs is the need for an open and general access to geographic information and, therefore, the beginning of its "democratization". The focus on the idea of information sharing and exchange means that a main pillar is the interoperability between data and systems. The adoption of new methodologies, the objective of resource sharing, the possibility to combine information through the Web, the reuse of data and the principle of public usefulness, make some authors refer to SDIs as a new paradigm in the field of geomatics (Guimet 2004; Mas Mayoral 2008; Rodríguez Pascual et al. 2005).

[1] The origins of GIS are to be found in the 1960s. The first reference is the *Canada Geographic Information System* (*CGIS*), developed by Tomlinson for Canadian forest resources management.

[2] SDI origins date back to 1994, with the approval in the USA of the Executive Order 12906 – Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure. More information at The American Presidency Project (Accessed February 04, 2013).

One of the most widespread definitions of SDI is that included in *The SDI Cookbook*, by the GSDI Technical Working Group:

> *"The term 'Spatial Data Infrastructure' (SDI) is often used to denote the relevant base collection of technologies, policies and institutional arrangements that facilitate the availability of and access to spatial data. The SDI provides a basis for spatial data discovery, evaluation, and application for users and providers within all levels of government, the commercial sector, the non-profit sector, academia and by citizens in general [...]. An SDI must be more than a single data set or database; an SDI hosts geographic data and attributes, sufficient documentation (metadata), a means to discover, visualize, and evaluate the data (catalogues and Web mapping), and some method to provide access to the geographic data. Beyond this are additional services or software to support applications of the data. To make an SDI functional, it must also include the organizational agreements needed to coordinate and administer it on a local, regional, national, and or trans-national scale" (Nebert 2004: 8).*

Therefore an SDI constitutes the policy and technological framework to make available large volumes of geographic information on the Internet, overcoming some common problems with geodata (related to management, integration and location of data with different thematic, spatial and temporal components). Significant norms, rules and standards have been developed to ensure a harmonic development of SDIs, both at the European level (namely INSPIRE) and internationally, most remarkably by the International Organization for Standardisation (ISO) and the Open Geospatial Consortium (OGC).

The legal and organizational framework for SDIs in Spain

The main regulation in Spain regarding geographic information and infrastructures is the *LISIGE*. This law defines the *Consejo Superior Geográfico* (*CSG*) as the board responsible for the regulation of the institutional framework which facilitates open access to geographic data produced and maintained by public administrations. The *Consejo Directivo de la Infraestructura de Información Geográfica en España* (*CODIIGE*) is the specific body which is committed to implementing policies and to coordinating all the public bodies involved. It is composed of representatives from local, regional and national administrations and operates through working groups, whose function is to analyse the performance of INSPIRE, implementing rules within the public sector and assisting the administrative bodies in meeting their commitments in this field[3].

As suggested above, one of the main problems regarding geographic information in the public domain in Spain is the existence of many official bodies - at different levels (national, regional and local) – each of them responsible for the production, maintenance and publication of different datasets and services. In order to build an integrated framework which gathers together all these agents and the information they produce, while maintaining their autonomy (purely an SDI approach), the *IDEE* (the Spanish acronym for *Spanish Spatial Data Infrastructure*) was created (Rodríguez Pascual et al. 2005). The IDEE is not only the point of entry to gain access to all the public spatial data in Spain, but it is also an organizational framework which aims to foster the publication and sharing of spatial data and to develop rules and recommendations. The latter function, that of technical guidance and advice, has been carried out since 2002 by the IDEE Working Group (*Grupo de Trabajo IDEE, GT-IDEE*), an open technical group made up of experts and producers of geographic information.

[3] Link (Accessed February 04, 2013).

At the 2010 meeting of the GT-IDEE, a new subgroup on cultural heritage (*GTT-PAH*) was set up (Del Bosque Gonz§lez and Vicent Garc²a 2011). The aims of this subgroup were the harmonization and integration of spatial data on cultural heritage, and the promotion of their publication and visualization within an SDI framework. The group was discontinued in 2011 before its final results were produced. The proposal presented in this volume was further developed by some of the former members of the group (see Annex D. List of Authors, p. 79).

Since the proposal was conceived as an extension of the INSPIRE schema on Protected Sites, we shall start the next section with a review of the framework upon which our proposal was developed. Then, we shall dedicate a section to presenting the conceptual and theoretical foundations of the data model. Following this, the data model itself will be presented in detail.

Additionally, a series of annexes are included with the description of different cases and the complete technical data dictionary.

THE INSPIRE FRAMEWORK

The INSPIRE Directive, published in the *Official Journal of the European Union* on 25 April 2007 and coming into force on 15 May 2007, established an *Infrastructure for Spatial Information in the European Community*. One of the aims of the INSPIRE Directive is to enable the interoperability and harmonization of spatial datasets and services across Europe. *Interoperability* is understood as providing online access to spatial datasets through network services, typically via the Internet, making them available according to commonly agreed data specifications, so that data can be combined in a coherent way, without repetitive manual intervention.

INSPIRE is based on a number of common basic principles:

- Data should be collected only once and kept where it can be maintained most effectively.
- It should be possible to combine seamlessly spatial information from different sources across Europe and share it with many users and applications.
- It should be possible for information collected at one level/scale to be shared with all levels/scales; detailed for thorough investigations, general for strategic purposes.
- Geographic information needed for good governance at all levels should be readily and transparently available.
- It should be easy to find which geographic information is available, how it can be used to meet a particular need, and under which conditions it can be acquired and used.

The key elements of INSPIRE to address these objectives (Craglia and Campagna 2009: 13–14) include:

- Creation of metadata to describe existing information resources so data can be more easily found and accessed.
- Harmonization of key spatial data themes.
- Agreements about network services and technologies.