THE RENEWAL OF SNIG UNDER THE INSPIRE UMBRELLA

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SNIG, the Portuguese NSDI, was one of the pioneers in the beginning of the 90's, being the first NSDI in Europe and also the first one opened to the Internet in 1995. The early existence of a clear legal support was a very important building-block for SNIG success.

The Decree-Law 180/2009 of August 7th, transposing INSPIRE Directive, established a new legal framework, by setting a scenario much more adjusted to its actual and future needs, within which is the creation of a Coordination Council (CO□SNIG) for strategic decision and a more effective involvement of stakeholders.

IGP, as National Contact Point (NCP) for INSPIRE and being in charge of SNIG coordination and development, is actively involved in all INSPIRE related activities in Portugal, steering its implementation.

The Portuguese strategy for INSPIRE implementation relies in four major vectors:

Organization: a major effort was placed in the creation of contact networks of public authorities, as the collaboration and joint involvement of national public authorities is considered a critical for the process success. The transposition enabled the identification of stakeholders' contact points and the mandatory appointment of Metadata Managers;

Contents: Mainly focused on metadata through the creation of the National Metadata Profile and the development of a metadata production and editing tool – MIG Editor – made freely available to all. Moreover, IGP developed geowebservices for some of its spatial data that are available through SNIG;

Capacity Building: Training actions in relevant areas such as metadata and geowebservices have been undertaken - training actions have been organised for approximately 262 metadata managers and a training plan has been set up on geowebservices;

Dissemination: Performed through the INSPIRE-PT website, the contact point's networks of public authorities and several public sessions organised in various locations around the countryduring recent years. It contributed to raise awareness on the INSPIRE concept and principles, spread information, disseminate developments already achieved within European SDI projects in which Portugal is participating and share knowledge associated to best practices.

The INSPIRE monitoring and reporting process was carried out in phases, based on three main foundations: the INSPIRE Focal Points Network (INSPIRE FPN), the operational working group created within CO-SNIG (GT M&R CO-SNIG) and the IGP as INSPIRE NCP.

Thematic working groups bringing together the public authorities responsible for the same or similar themes were recently created. These working groups intend to help clarifying the formal responsibilities of those authorities and to support the application of INSPIRE specifications. Cross-cutting working groups on Metadata and Geowebservices were also created, which will support authorities in the production and publication of metadata and in the development of geowebservices, in line with the INSPIRE implementing rules deadlines.

INSPIRE compliant metadata for Annex I and II spatial data sets and services was due until 3 December, 2010. This mandatory requirement conducted to 493 new metadata records in SNIG catalogue and to the registration of 62 new metadata managers.

This paper presents the Portuguese strategy for INSPIRE implementation, the activities undertaken until now and the main results achieved.

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1. Introduction

Since 2009, when Decree-Law 180 of August the 7th was published in order to meet the mandatory transposition of the INPIRE Directive, a new scene for the National Spatial Data Infrastructure (NSDI) development in Portugal was established.

In fact, SNIG, the Portuguese NSDI, was one of the pioneers in the beginning of the 1990's, being the first NSDI in Europe and also the first one opened to the Internet in 1995. The early existence of a clear legal support was a very important building-block for SNIG success [1].

Nowadays, SNIG benefits from the new legal framework, provided by the abovementioned Decree-Law 180/2009, 7th of August [2], being much more adjusted to the actual and future needs of a NDSI. Within these needs, one must highlight the creation of the Coordination Council (CO-SNIG) for strategic decision regarding the evolution of SNIG which envisages a more effective stakeholders' involvement. Moreover SNIG has evolved in technical terms by following the main developments achieved in the SDI domain, namely in what concern interoperability enrichment and the underlying data sharing potential.

IGP, as National Contact Point (NCP) for INSPIRE and being in charge of the SNIG coordination and development, is actively involved in all INSPIRE related activities in Portugal, steering its implementation. This paper presents the actual SNIG, the Portuguese strategy for INSPIRE implementation, the activities undertaken during the last years and the main results achieved.

2. The Portuguese National Spatial Data Infrastructure

The National System for Geographic Information (SNIG) is the Portuguese National Spatial Data Infrastructure (NSDI). Its purpose is to allow geographic information on the national territory to be searched, viewed and used, through various access points, and by doing so to stimulate data sharing amongst public and private sector organisations. It is also a contact space allowing activities associated with this issue in Portugal, and in the context of the INSPIRE Directive (INfrastructure for SPatial InfoRmation in Europe), to be organised, linked and encouraged.

Set up 20 years ago [1] through Decree-Law No 53/90 of 13 February 1990, it was the first SDI to be developed in Europe and the first to be made available on the Internet in 1995. At the time, it was regarded as a highly innovative project [3].

Given the recent advances made in this area, driven mainly by the Open Geospatial Consortium (OGC) and the International Organisation for Standardisation (ISO), and more recently by the INSPIRE Directive, it has since then been substantially changed.

The mandatory transposition of the INSPIRE Directive, performed through the Decree-Law Nº 180/2009 of August the 7th, has created the opportunity to revise the former SNIG Decree-Law, by updating its framework and strengthen the underlying institutional component.

In what concerns technology, the advances made in recent years have resulted in a large number of standards on Geographic Information (GI), which are following and taking advantage of Internet developments and related technologies, such as XML and Web Services, and in new computing models such as the Service Oriented Architecture (SOA). This is leading to a paradigm of distributed geographic information services, which are accessible via the Internet and subsequently helping to increase access to spatial data, for which the SNIG Geo-portal (http://snig.igeo.pt) is a prime access point (Figure 1).

Figure 1. SNIG Geo-portal

The components of the SDI are the following, being described below [4] [5]:

(1) Metadata Catalogue;
(2) Catalogue Search;
(3) Publication of Metadata;
(4) Viewer;
(5) SNIG Geo-portal.

Metadata Catalogue
The catalogue is a metadata database, standardized at national, regional and local levels. This database consists of metadata published by the national authorities. In order to have a reliable metadata database that reflects national geographic production, all the authorities producing and using GI must be involved. For the purpose, the nomination of Metadata Managers from each identified entity has been mandatorily requested.

The metadata in the catalogue comply with the following ISO standards: ISO 19115 (schema for geographic information – metadata), ISO 19139 (schema for implementing metadata) and ISO 19119 (extension of ISO 19115 to map service metadata). These metadata included in the catalogue also feed the catalogue search engine.

The Metadata Manager is responsible for publishing the metadata in the SNIG and coordinates the production of metadata within the authority. The MIG Editor is a metadata production tool made available through the SNIG and developed according to the applicable standards. Metadata can be produced using the MIG Editor or any other compliant application that implements the same standards. A specific area in the SNIG is allocated to the Metadata Managers in order to assure the proper publication and maintenance of its related records in the NSDI.

The SNIG Administrator accredits the Metadata Managers for publication purposes and approves the metadata submitted.

The Geo-community can freely search and consult the metadata, and possibly view the geographic information (if the resource is a map service) or download spatial data sets (SDS), if these are available for the purpose.

Other applications or SDI can also access the SNIG catalogue through the Catalogue Service for Web (CSW). In its basic form, this web service allows read-only searches to be carried out, while, in its transactional form, it allows the addition and removal of records or harvesting from the catalogue.

Catalogue Search
The catalogue can be searched using a form, which allows free text, spatial extent, temporal extent, thematic category and resource type searches to be combined (Figure 2).

The search interface also includes a geographical name location system with over than 30 000 records, taken from both the Portuguese Official Administrative Map (CAOP) maintained by IGP and the Geographic Base for Information Referencing (BGRI) built by the National Statistics Office (INE). This system quickly and efficiently finds the target location and defines its spatial extent.

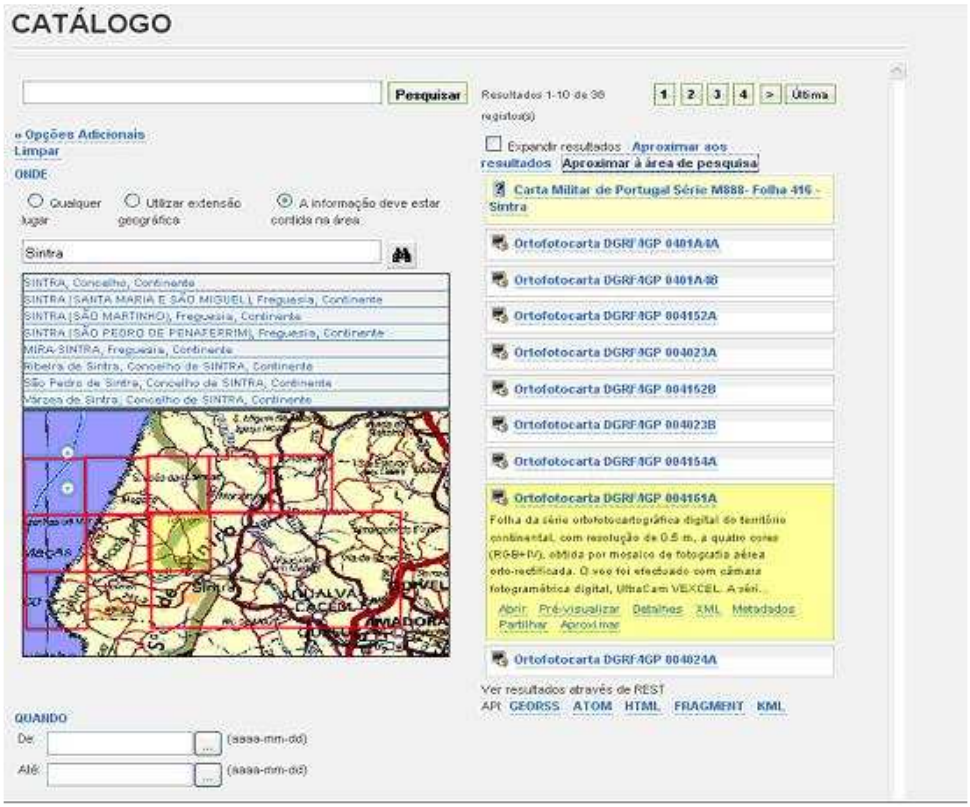

Figure 2. Catalogue search form

Another way for searching the catalogue is to use the indexed resources of the portal. There is a directory of applications indexed by theme (e.g. land register, geodesy, planning, Municipal GIS) together with resources indexed by INSPIRE theme, national series, basic geographic information, atlases and services.

Publication of Metadata

There are various ways of publishing metadata in the catalogue: (i) via the geo-portal form, (ii) by uploading metadata files produced using the MIG Editor (Figure 3) or other editors compatible with the ISO 19139, or (iii) by harvesting from other catalogues.

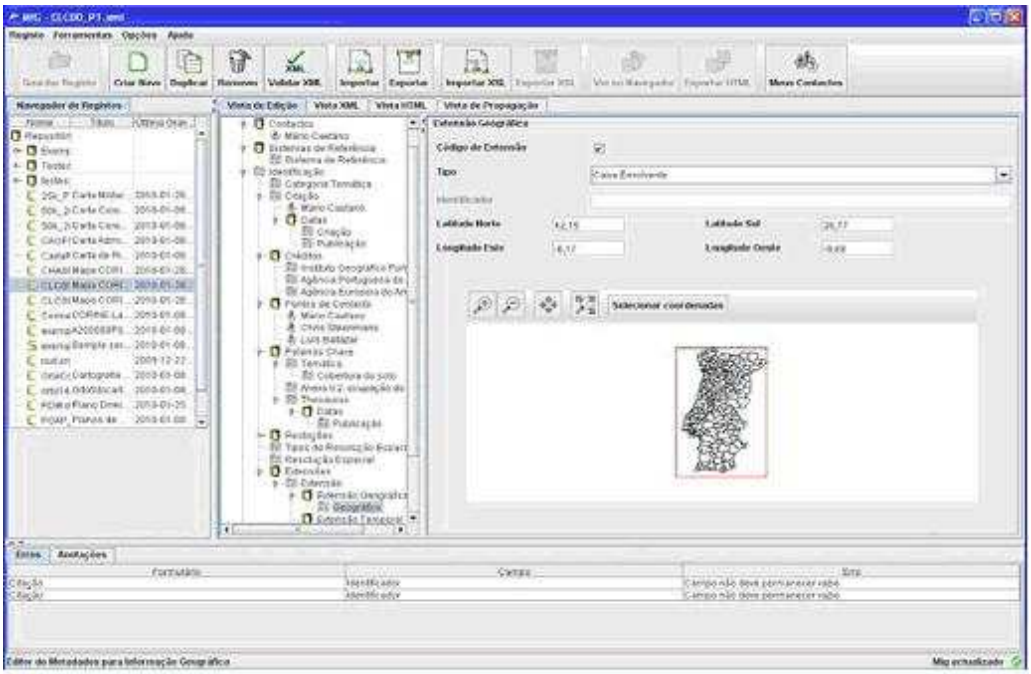

Figure 3 – MIG Editor

A system authentication is required to publish metadata. After being produced, metadata can have four statuses: (i) submitted, (ii) incomplete, (iii) rejected, or (iv) approved. Metadata only become public when approved by the System Administrator. Each Metadata Manager has an area for carrying out the metadata management and publication operations.

Viewer

The SNIG map viewer is a tool allowing spatial data to be viewed and overlaid (thematic maps, orthophotos, etc.), which therefore allows new maps to be created. These data may coexist in different formats and coordinate systems, and also be located in many servers sited elsewhere and belonging to several organisations or authorities (Figure 4).

These data must be based on the OGC (Open Geospatial Consortium) specifications, as is the case for Web Map Service (WMS). These services are generically known as GeoWebServices.

As commonly known, the Web Map Service (WMS), which is the simplest service, only provides images of the geographic information, allowing the associated attributes (text information) to be viewed. The Web Feature Service (WFS) and the Web Coverage Service (WCS) not only allow the information to be viewed, but also provide effective access to the geographic information, being the former for vector information in GML (Geography Markup Language) format, and the latter specific for grid-type information. At the moment, the SNIG viewer only supports WMS, but the other services may be viewed using any GIS Desktop tool.

To add map services – i.e. to add new maps to the viewer – the URL address of the service where the target data is located or the metadata of these services may be used. In the latter case, the services available may be searched via the catalogue and viewed immediately.

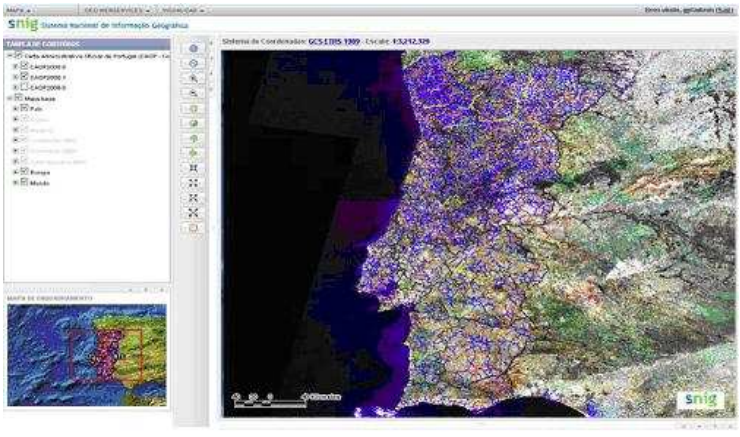

Figure 4 – Visualization of the Official Administrative Map combined with the Base Map

The provision of these types of services represents an open and transparent way of exchanging geographic information, using the Internet as a communication channel.

SNIG Geo-portal
The Geo-portal has evolved into an SOA (Service Oriented Architecture) in the sense that, by means of searches, it allows users not only to assess the services and resources available by viewing the metadata, but also to use the available services and resources, as is the case when viewing maps made available via the Geo Web Services (WMS, WFS and WCS). Therefore, the Geo-portal functions mainly as a broker, allowing users to find and use services. It should be noted that the Geo-portal can also be a catalogue service client, of the CSW (Catalogue Service for Web) type. The services can be made available by any authority, both national and international.

Adding to the five main components briefly described above, the SNIG also comprises a community area for exchanging information on related subjects, within which it is worthwhile to highlight the section dedicated to the INSPIRE.

3. INSPIRE Strategy in Portugal

The INSPIRE Directive was one of the driving forces for some of the more recent SNIG developments.

The Portuguese strategy for INSPIRE implementation relies in four major vectors:

(1) Organisation;
(2) Contents;
(3) Capacity Building;
(4) Dissemination.

The way INSPIRE transposition was performed already foreseen such main issues, while creating the strategic organisational structure, CO-SNIG, and requiring the identification of stakeholders' contact points, such as the mandatory appointment of Metadata Managers.

Organisation
In what concerns the *organisational issues*, the creation of contact networks of public authorities based on the SNIG network has been a major effort, as the collaboration and joint involvement of national public authorities is considered a vital component of all the process. These networks represent a privileged channel to provide access to information on the Directive, encourage discussions on the documents produced by the European Commission (EC), disseminate national and international best practices or support the

creation of working groups. The establishment of procedures to monitor the Directive's implementation was also considered a priority requiring the set-up of specific

organisational arrangements to guaranty the implementation monitoring and reporting process.

Contents
The promotion of content availability has been mainly focused on metadata, with the establishment of the National Metadata Profile and the development of a metadata production and editing tool – MIG Editor – that has been made available to all authorities intending to create and publish their metadata. Moreover, IGP developed geowebservices for some of its own spatial data that are available through SNIG.

Capacity Building
Another major component of the INSPIRE strategy in Portugal is capacity building. Several training actions in relevant areas such as metadata and geowebservices have been undertaken. Training actions were organised for approximately 262 metadata managers and a plan has been set up for geowebservices.

Dissemination
It is mainly based on the INSPIRE-PT website available through SNIG and on the contact point's networks of public authorities. Several dissemination sessions, seminars and workshops on the SNIG and INSPIRE took place in various locations around the country during the last few years, raising awareness on INSPIRE concept and principles, spreading information on the Directive, disseminating the developments already achieved within the European SDI projects in which Portugal is participating and sharing knowledge associated to the national and international best practices.

The INSPIRE implementation activities in Portugal undertaken during 2010 were substantially influenced by the need to establish and perform the first monitoring and reporting process and to fulfill the metadata INSPIRE directive mandatory requirements for Annex I and II spatial data and services.

The monitoring and reporting process was carried out in phases, based on three main foundations: the INSPIRE Focal Points Network (INSPIRE FPN), the operational working group created within CO-SNIG (GT M&R CO-SNIG) and the IGP as INSPIRE NCP. As a starting point for this process a study entitled 'Analysis of the INSPIRE Directive themes and the Public Authorities responsible for the Spatial Data Sets of each Theme'[6] was completed. Started in 2008, this study aimed to identify the public authorities with formal responsibilities on the spatial data sets associated with INSPIRE themes, based on the public authorities legislation (framework laws, statutes and other specific texts) and on the description of the Annex themes. The study served as a basis to identify the list of public authorities that were involved in this first monitoring process.

The publication of INSPIRE compliant metadata for Annex I and II spatial data sets and services was due until 3 December, 2010. This mandatory requirement conducted to 493 new metadata records in SNIG catalogue and to the registration of 62 new metadata managers.

During 2011, one main focus has been to strengthen the organisational component through the engagement of related entities into the process. For the purpose, thematic working groups have been established by gathering the public authorities responsible for the same or similar themes. Table 1 presents the composition of these groups.

Table 1. INSPIRE Thematic Working groups

WG	**Themes**
GT01	I.1 Coordinate reference systems I. 2 Geographical grid systems I. 3 Geographical names II.1 Elevation
GT 02	I.4 Administrative units I.5 Addresses III.1 Statistical units III.10 Population distribution — demography
GT03	I.6 Cadastral parcels III.2 Buildings
GT04	I.8 Hydrography II.4 Geology
GT05	I.9 Protected sites III.16 Sea regions III.17 Bio-geographical regions III.18 Habitats and biotopes III.19 Species distribution
GT06	II. 2 Land cover II.3 Orthoimagery III.3 Soil III.4 Land use III.9 Agricultural and aquaculture facilities
GT07	III.8 Production and industrial facilities III.20 Energy resources III.21 Mineral resources

GT08	III.5 Human health and safety III.6 Utility and governmental services III.7 Environmental monitoring facilities III.11 Area management/restriction/regulation zones and reporting units III.12 Natural risk zones
GT09	III.13 Atmospheric conditions III.14 Meteorological geographical features III.15 Oceanographic geographical features
GT10	I.7 Transport networks

This strategy has been approved by the CO-SNIG, being the mandate to help clarifying the formal responsibilities of the participating authorities and to support the application of INSPIRE specifications, within a framework of distributed empowerment. The overall coordination of this structure is assured by SNIG team at IGP. For each thematic group, a coordinator has been appointed by the entities participating, which is responsible for leading the process, follow the agreed plan and articulate with the SNIG team.

A cross-cutting working group on Metadata and Geowebservices was also created. The purpose is to support authorities in the production and publication of metadata and in the development of geowebservices, in line with the deadlines set for the INSPIRE implementing rules.

4. Conclusions

This paper presented the Portuguese strategy for INSPIRE implementation in Portugal and the evolution of SNIG following the technological achievements and the INSPIRE Directive obligations. The new legal framework, provided by Decree-Law 180/2009 of August the 7th, that transposed INSPIRE regulation into the Portuguese law, brought some positive hints to the SDI process in Portugal and a view more adapted to the actual directions followed in this domain.

The need to tackle with INSPIRE requirements already generated considerable benefits not only in technical terms but also in what concerns a much wider involvement of stakeholders compared with the one achieved during the recent years, as well as an improved organisational structure.

The approach based on well structured networks targeting specific components of the process proved to be efficient on achieving the initial requirements for INSPIRE, as well as on renewing the NSDI through the value added by the participating authorities.

The next steps include the enrichment of the infrastructure based on further integration of spatial data sets and services, on the renewal of the technological solutions, and on the enlargement of the community involved in the process, namely to an extensive coverage of the local administration level.

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References

[1] Henriques, R.G., Fonseca, A., Gouveia, C.: Sistema Nacional de Informação Geográfica, In: Forum SNIG, vol. 5, pp. 35 – 39, Lisboa (1999).

[2] Decreto-Lei nº180/2009 de 7 de Agosto. Diploma que procede à revisão do Sistema Nacional de Informação Geográfica (SNIG) e transpõe para a ordem jurídica interna a Directiva INSPIRE - que estabelece uma Infra-Estrutura de Informação Geográfica na Comunidade Europeia.

[3] Masser, I.: All shapes and sizes: the first generation of national spatial data infrastructures, International Journal of Geographical Information Science, Vol. 13, Issue 1, pp 67 – 84 (1999).

[4] Julião, R. P., Bonnet, A., Silva, H., Furtado, D., Rizzonne, A. S., Marrecas, P., Silva, A. J.: Sistema Nacional de Informação Geográfica (SNIG) – Infra-estrutura de Dados Espaciais Portuguesa, 5º Congresso Luso-Moçambicano de Engenharia, Maputo, Moçambique, 2-4 de Setembro de 2008.

[5] Member State Report: Portugal, 2010, INSPIRE, 13 May 2010 (http://snig.igeo.pt/Inspire/documentos/monitorizacaoRelatorios/M&R2010/INSPIRE ReportPortugal2010.pdf).

[6] Santos, A., 2010, Análise dos temas dos Anexos da Directiva INSPIRE e das Autoridades Públicas responsáveis pelos Conjuntos de Dados Geográficos de cada Tema, Grupo de Trabalho GT INSPIRE- DSIGIG, IGP, 5-02-2010.