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DESIGN OF A LOCAL SDI – A CORUÑA PROVINCE (SPAIN) PRE-EXISTANCES, CONSTRAINS AND PROPOSED SOLUTIONS

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ABSTRACT:

Diputación Provincial is the Council of A Coruña province, given its competences, it needs to deal with a considerable amount of spatial or georeferenced data, as almost all its actions are related to the territory. This means making a continuous effort to collect and compile those data that come from many different sources: EU organizations, national government departments, national mapping agency (IGN), Directorate General of the Cadastre, autonomic government departments, the municipalities, and Diputación Provincial own departments, between others.

In this context, the same problems described by the INSPIRE initiative of the European Commission also strongly hinder the geodata capturing and maintenance at provincial level.

This makes the implementation of an SDI the best solution in order to sharing core data between the different departments within Diputación and with the municipalities, as well as making possible that each thematic or sectorial dataset is maintained and updated at the level where it is produced and/or more intensively used, decentralising this tasks and making them to be more easy to afford by the different stakeholders.

As a consequence, Diputación Provincial needs to design its SDI, deciding what are to be its components and its architecture, and running the needed actions to ensure that the so defined SDI gets to achieve the above mentioned targets.

With these facts in mind, the designing works have been initiated by means of developing them in the way of an MSc in Geographic Information dissertation under the tutoring of Dr. Jonathan Raper (City University, London) and Mr. Roger Longhorn (IDG Ltd UK Director and External Lecturer, City University, London).

KEYWORDS: Local SDIs, access, data sharing, policies, constrains

BRIEF DESCRIPTION OF A CORUÑA PROVINCE:

Location and territorial organization

Territorially talking, Spain is divided into autonomous communities, which are subdivided into provinces, which can be considered as sets of municipalities. A Coruña is one of the four provinces in which the autonomous community of Galicia is divided, and it is placed in the most Northwestern corner of Iberia.

In fact, the most Northern point in continental Spain (Cape Estaca de Bares), and the most Western one (Cape Finisterre) are placed in A Coruña province.

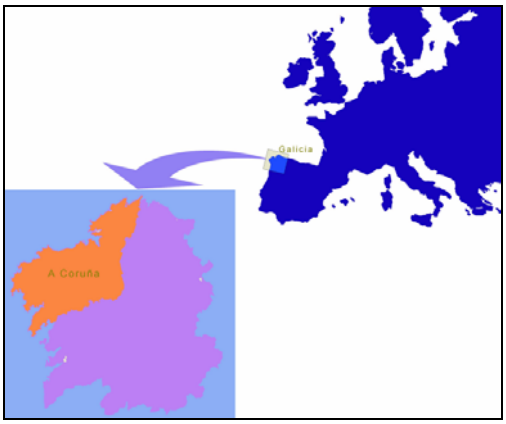

Fig 1: Location of A Coruña province

Accordingly to the last Municipal Census, it has 1.120.814 inhabitants, distributed along a 7951 Km^2 territory. This makes a population density of 140 Hab/ Km^2. As shown in the following map, it is one of the highest densities in Spain.

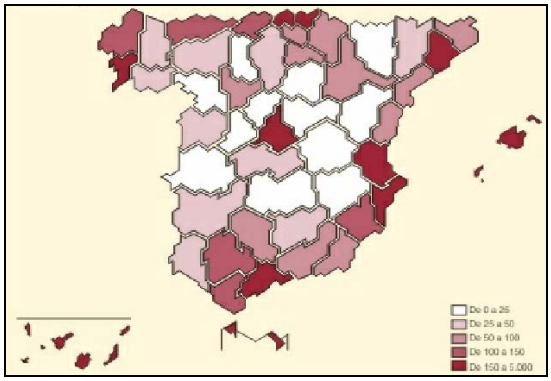

Fig 2: Population densities in Spain, by provinces
(Source: INE –Statistical Institute of Spain)

As said, population is spread all along the provincial territory (see figure 3), with a total of 4064 settlements (villages, towns and cities). Only three of which have over 50,000 inhabitants:

- A Coruña. It is the capital city of the province, and has 243,902 inhabitants
- Ferrol. The main Spanish Navy headquarters for Northern Atlantic, it has 78,764 inhabitants, and
- Santiago. The capital city of the autonomous community, with 92,339 inhabitants

The rest of the municipalities are ranged as follows:

- 25K $\leq$ Pop < 50K: 3
- 15K $\leq$ Pop < 25K: 5
- 5K $\leq$ Pop < 15K: 45
- Below 5K: 38

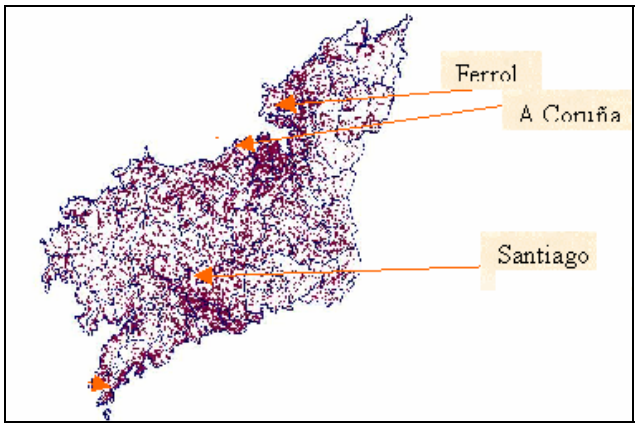

Fig 3: Geographic distribution of the settlements
(Source: sigEIEL – Diputación A Coruña)

Diputación Provincial (DPC, from now on) is the administration body of provincial level, and it can be thought of as 'the Council of Municipal Councils', as its competences deal mainly with the cooperation with and the advisory to the municipalities (this advisory dealing with economical, legal and technical matters). It also manages third range road network, and in some cases takes the bid of building supramunicipal public works and services.

Finally, and acting on behalf of the Spanish Ministry for Public Administrations (MAP), it also manages the so called EIEL, acronym that stands for the Spanish of Enquiry on Local Infrastructures and Equipments; but, despite its name, more than an enquiry it actually is an inventory of infrastructures, urban services and general data on the munipaclities of the province.

Geographic Information in the province

For DPC, the need to use GI is obvious. In fact, GIS have entered Diputación through the gate of EIEL management and, as a consequence, of the unit of Technical Advisory to the Municipalities, that is the one that has the Enquiry under its control. What's more, being in permanent contact with the municipalities, these bodies have often transmitted their interest in being provided with GIS tools to improve their government actions.

In fact, the municipalities have been sent an enquiry with two groups of questions. First one was addressed to those municipalities that already have some GIS application implemented, and asked them about the characteristics of those applications. Second one was addressed to the rest of the municipalities, asking whether they would be interested in implementing that kind of applications and what government tasks would they want to manage with them. The following figure shows the geographical distribution of the answers.

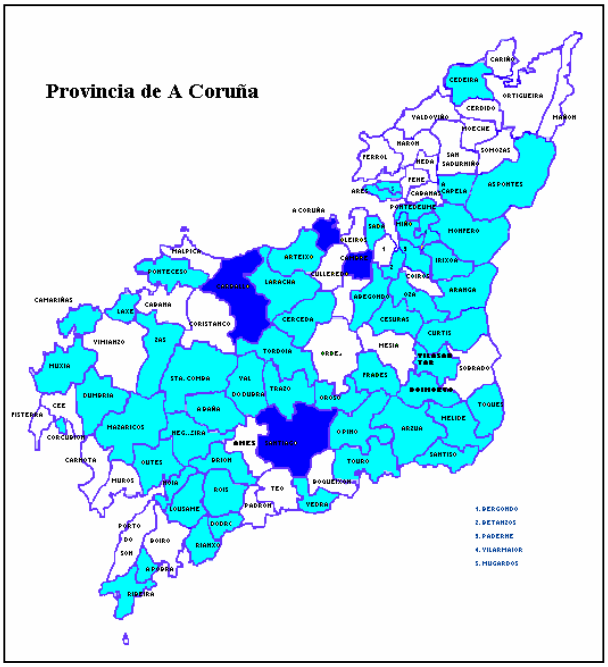

Fig. 4: GIS in the province

As shown on the map, only four of the municipalities currently have a GIS application running (those with dark blue background). They are: A Coruña, Cambre, Carballo and Santiago.

	WITH GIS																															
	AREA					MODEL			BASE MAPPING						SOFTWARE																		
MUNICIPALITY	LAND PLANNING	TAX MANAGEMENT	PUBLIC WORKS	URBAN SERVICES	OTHER	VECTOR	RASTER	ORTHOPHOTO	LAST UPDATE	SELF PRODUCED	XUNTA DE GALICIA	DEPUTACIÓN	D.G.CADASTRE	OTHER	AUTOCAD	MICROSTATION	OTHER	ACCESS	APPROACH	INFORMIX	DBASE	ORACLE	SQLSERVER	OTHER	ARCINFO	ARCVIEW	GEOMEDIA	SMALLWORLD	OUTROS	METADATA
CAMBRE	1	0	0	0	0	1	0	1	99	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
CARBALLO	0	1	0	0	1	1	0	0	04	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0
CORUÑA (A)	1	0	0	1	0	1	0	0	02	1	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	1	0	0
SANTIAGO	0	1	0	0	0	1	0	0	03	1	0	0	1	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	1	0
TOTAL	2	2	0	1	1	4	0	1		3	0	0	3	0	1	2	0	2	0	0	0	3	0	0	0	0	1	1	2	0

Table 1: Municipalities with GIS

A Coruña and Cambre have developed their applications to deal, mainly, with land planning and land-use, whilst Carballo and Santiago use it to manage land property taxes. A Coruña is also managing urban services and has planned including land property taxes between their GIS utilities. Carballo uses its GIS to control industrial activities.

All of them have built their GIS upon vector models, although Cambre also use ortophotos as a secondary source of territorial information.

Finally, all of them use commercial desktop GIS applications, with a certain degree of programming on them.

The case for DPC is that it currently uses GIS to manage EIEL geodatabase, which includes information on all of the items mentioned above and, especially, on urban services. Its GIS has been extensively customized from a commercial GIS application, and works on vector model.

As for the rest of the municipalities that have fulfilled the questionnaire (with light blue background in the image), all of them have answered that they would be interested on implementing GIS applications in the next future. Also all of them would use it to manage land planning, land use and public works, and 70% would also use it to manage land property taxes and urban services. Other uses mentioned include: tourism, industrial activity monitoring, building, industrial and commercial licenses managing, coastal managing, agriculture monitoring, local police and civil protection, and environment managing.

This wide range of tasks is related to territory, and it is clear that they need to make extensive use of GI. But, where does this GI come from? In some cases, the municipalities make proportionally high investments in acquiring digital maps of their territories, but this is not always possible, so that they have to demand the data they need from other bodies of the administration. And Diputación Provincial, being the Council of Municipal Councils, as said, is the first one to be asked to provide them with those data.

But DPC, itself, after trying to produce the maps it needed by means of an agreement with the national DG Cadastre, finally had to incorporate maps coming from other sources[1] in order to complete the EIEL 2000 updating.

From another point of view, municipalities and DPC sectorial departments are those that are more close to the territory and, hence, the ones that better know what's happening on it and the most appropriate level to generate, maintain and update data, as expressed within INSPIRE objectives.

These two sets of facts indicate that if DPC wants to gain a profitable return on its investments and provide municipalities with the best possible service, it needs to investigate means of sharing the geographic data it has acquired, both internally (between its different sectorial units) and externally (with the municipalities and other administration bodies). This makes that building up an SDI is the best solution.

A CORUÑA PROVINCE SDI

Being conditioned by upper level SDIs, and taking into account the current state of the art, the technological decisions are quite clear: it is necessary to implement OGC specifications, ISO TC 211 standards and INSPIRE recommendations. The only variation on these items is that the Spanish *Consejo Superior Geográfico* (Higher Geographic Council) has decided that Spanish SDI will implement a specific profile of ISO 19115 called *NEM*[2], which incorporates must of ISO core items plus some ones taken from Dublin Core.

As for reference and core data, EIEL contains most of those selected by INSPIRE, and only lacks of those being more related to biological conditions and vegetation.

Finally, as it is usual in Spain, maps are projected accordingly to UTM projection (zone 29, in our case), referenced to the International 1959 ellipsoid, and to Potsdam datum. So, in order to harmonize maps with the rest of Europe and given the scales that we are working with, a conversion to ETRS89-TMzn[3] is recommended.

[1] Mainly from Consellería de Política Territorial (the autonomous government department of territorial policies)
[2] This acronym stands for the Spanish of *National Metadata Core*
[3] Annoni et Alt: 'Map Projections for Europe', European Communities 2003

Hence, so far there is little doubt about how to build A Coruña Province SDI (provisionally called *ideAC*), we simply have to follow the track opened by the pioneers. But, of course, SDIs are made of many other components, and technology is not the 'stone' on that track.

What are the problems then? First of all is that DPC currently has a very limited number of qualified personnel and no proper organization to lead and manage the SDI. This is a consequence of another difficulty: its economical resources are also limited and are mainly devoted to funding municipalities' activities and investments.

The third main problem is that there is almost no 'data sharing culture'. The usual practice so far was that each DPC as a whole, as well as each of its departments, owned the data they had compiled, obtained or produced and controlled them. If an individual or another organization wanted to make use of those data, they had to pay for 'the proportional part of producing or acquiring costs'. This meant really high prices.

In the particular case of EIEL, the prevailing theory was that each municipality was the owner of the data related to its territory, and that those municipalities couldn't even know what was the situation of their neighbours.

Fortunately, two events seem to mark the beginning of a clear change in this culture:

- After the past summer elections, a new President heads DPC and during his investiture speech whem he explained the goals of his mandate, he mentioned that his government would make as much information as possible accessible by the citizens through the Internet
- The recent launching of the web mapping site for EIEL[4] has supposed a clear shift on this matter: all of the data are now publicly accessible and even freely, and for free, usable by other administration bodies, researchers, Universities, non governmental associations and other not-for-profit organizations. The only expected counter provision in this case is that the users provide DPC with a free copy of their works, so that its conclusions can be used to improve DPC actions on the territory.

The final problem to be taken into consideration during ideAC design is that it has to be published in three languages: Galician, Spanish and English, as first two are co-official at regional level, and the third one is almost compulsive at European and global levels.

So, to override these constraints, it is necessary that building of the SDI is made on a stepwise basis, so that we may deal with a problem at a time and may take full profit of the limited resources that we dispose of.

In fact, designing and building works are currently being developed under two parallel lines of action: design is being made by means of an MSc dissertation[5] whose final deliverable will consist of the specifications document of the SDI, whilst some aspects of the building process are being developed within the upgrading process of EIEL managing and publishing applications i.e. taking advantage of the fact that data and applications are being exported to Oracle Spatial DBMS, data are being transformed so that they fulfil ETRS89 and OGC Simple Features Specification, their metadata will be generated, and GML export/import tools are being developed. This way, the investments devoted to that action are optimised and the data and applications are being prepared to their ulterior use within the SDI.

As for the planned steps, these are the ones that follow:

- Launching OGC Web Mapping and Web Feature services regarding EIEL data
- Developing Search-and-Query services, and launching a G-Portal

[4] HTTP://www.dicoruna.es/webeiel/
[5] MGI, City University – London (http://www.soi.city.ac.uk/mgi/)

- Implementing Catalogue services
- Adding new web services as needed and/or demanded by DPC departments and municipalities

The first two actions are initially programmed for 2005, depending the available funds, whilst thr Catalogue services would have to wait at least until 2006 and new services should be developed from 2007 on.

As explained, the problem of data sharing policies seems to be rolling along the good track. Anyhow, new decisions are to be taken to guarantee that any GI that is owned or produced by DPC will be easily accessible, under a minimum of restrictions derived from the need to protect those data that are referred to individuals, as a consequence of data protection acts. Prices and conditions of use need also to be re-thought, taking into consideration what do EU directives and recommendations on Public Sector Information advocate.

Finally, the solution for language problem has also been previously adopted by other organizations like the European Space Agency. It consists of specializing the links to the information, so that when accessing it from a node at a given level (be it local, regional, national or international) the services and information provided are in one given language. This way, the search, query and use process gets highly simplified, as language selection will be automatically done and won't require a specific choice from the user.

Nevertheless, raw data will be only stored in Galician, but their metadata, data dictionaries, table and column names, and so on, will be accessible in the three languages.

This solution is explained in the following schema.

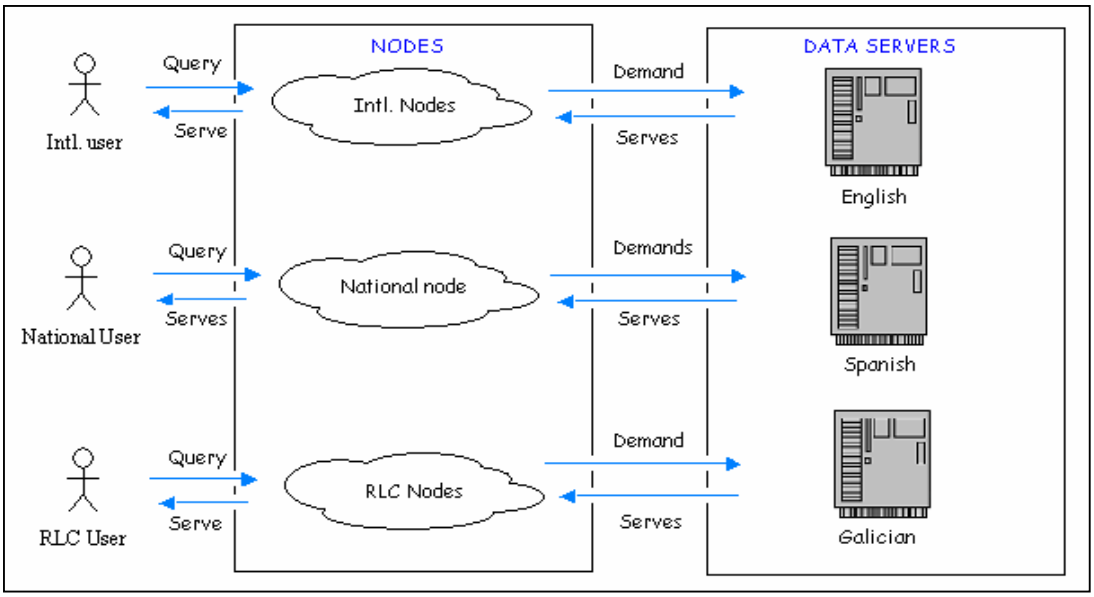

Fig. 5: The three languages architecture

The SDI defined in this way will not only be a Local SDI, but also a corporate one that will serve the GIS needs of both DPC and the municipalities of the province. In Parallel, it will also let other administration bodies taking advantage of the GI generated and updated at the lowest level, and thus at the one that is closest to the territory.

In the meanwhile, DPC GI is available (even not yet fully interoperable) at *webEIEL* site:
www.dicoruna.es/webeiel/

A Coruña, June 2004