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Information and communication technologies (ICTs) for web dissemination of historical cartography of Extremadura

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Summary

The Cartographical Information and Territorial Centre of Extremadura is an organism which main objective is to compile and generate territorial information, topographical cartography, satellite images, statistics and thematic maps. This Centre, founded in 2006, depends on *Dirección de Urbanismo y Ordenación del Territorio* of the *Consejería de Fomento* of the *Junta de Extremadura,* (Regional Government of Extremadura, Spain) (Decree 181/2006). It has been founded with the purpose of coordinating and unifying efforts for the establishment and organization of geospatial information according to the INSPIRE1 European Directive, (Directive 2007/2/ec). Among its functions is the development, structuring and management of a digital map library of Extremadura as well as provide access to ancient information.

This project is a starting point for building a digital library with the compilation of historical maps of Extremadura.

The main purpose of this project is the generation of a digital catalogue with old maps of Extremadura. The project began some months ago with the digitization of the maps. Once this process is complete, the information concerning each map is introduced into the catalog data; the final result will be the dissemination of this information to the general public through the web. Furthermore it ensures the preservation of the original documents. Maps have been catalogued according to the International Standard Bibliographic Description (ISBD), following the Ministry of Education and Culture Cataloguing Rules.

Introduction

The new technologies of information and communication have a great importance in our daily life, especially in the workplace context facilitating the development of knowledge and the dissemination of information. The documentation and diffusion of digitized material gives it quality; the fact of being freely available on the web provides:

- Access to information by the administration, outside users and the entity itself
- Knowledge of the existence of digitized material
- Later potential use of it.
- Free use for all users.

The creation of a fund digitized historical map library gives context and content to the Cartographical Information and Territorial Centre of Extremadura, in which one of its

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[1] INSPIRE:Infrastructure for Spatial Information in Europe

functions is the establishment, structure and organization of the Map Library of Extremadura.

The Centre has been founded in 2006 with the purpose of being able to coordinate and unify efforts for the establishment and organization of geospatial information according to the INSPIRE European Directive. Among its functions is the development, structuring and management of a digital map library of Extremadura, also providing access to ancient information. Digitization can keep any old map, regardless of size or condition; the digitization technique employed in this case was not aggressive for existing maps.

Advantages of the digitization of historical maps

- Digitization allows the query without having to physically move to the place where the fund is kept. Furthermore, a larger number of people can access the catalogue this way.
- Avoiding the direct use of the material, this would mean its gradual erosion, preserving the documents and preventing deterioration due to human factors.
- Getting with digitization, the material would be durable (since environmental and biological agents could cause physical deterioration of the document), facilitating the process of physical preservation, consultation and reproduction. This does not mean that we don't have to retain the original document, or that the original paper format looses importance, but this storage system allows greater durability of the material over time.
- Layout and immediate ubiquity of the material. Being available on the web, it may be consulted by several people at once and from different physical locations, making it more accessible to more people.

This project is the starting point for building a digital library with the compilation of historical Extremadura maps. The main purpose is that users can search, discover and access the information they look for and download the maps they want. Knowledge can be shared in a simple way.

Dataset

The initial dataset is small with only fifty historical maps. These maps are from different topics, such as military or geological ones. However most of the maps are of an immense value. Nowadays this collection is going to be improved with the recompilation of many more historical maps of Extremadura.

Digitization of the maps

The digitization of the maps, after undergoing some studies and tests, was made by photographic technical techniques due to the extension and conservation of the maps; some maps have long dimensions so it was very difficult to digitize them with a photogrammetric scanner.
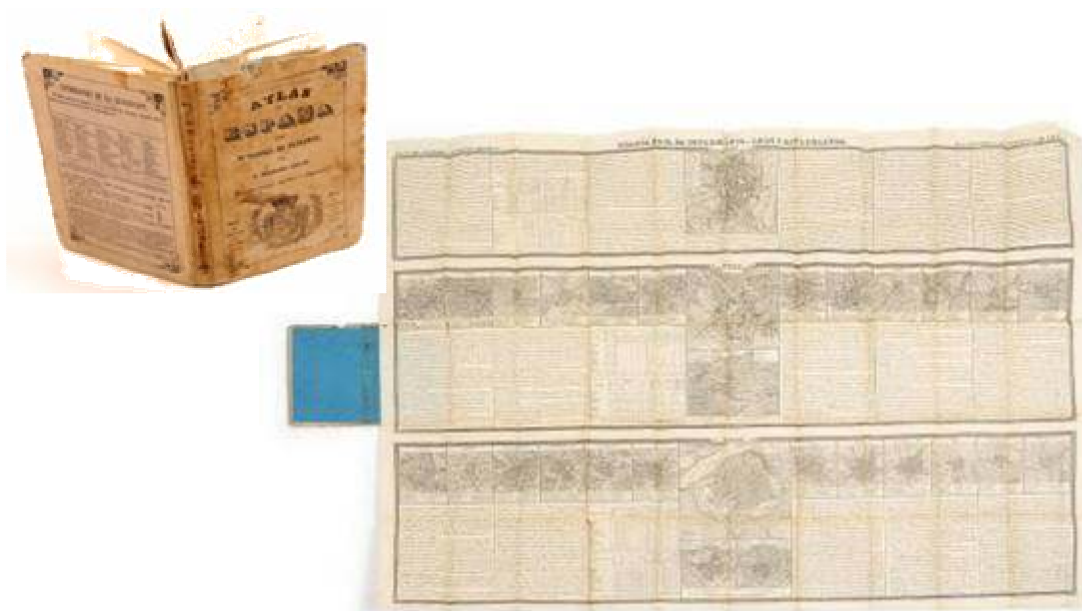
Figure 1. Example of a map with long dimensions.
(Map of Extremadura and León. 1860. Coello, Francisco)

The final solution was to photograph them with a digital camera (Canon EOS-1D MARK-III Digital SLR Camera) with the following characteristics: 10.1 megapixel CMOS sensor APS-H size with Integrated Cleaning System and a 3.0-inch LCD monitor. The CMOS sensor has an expanded sensitivity range of ISO 50-6400. 14-bit A/D conversion, the image size is 28.1 x 18.7 mm, and the Zoom is 1.5x - 10x. The final product has a resolution of 300 pixels per inch. Graphic Information can be consulted on the web in a Portable Document Format (.pdf). In figure 2, we can see a complete map and its detail, in which the resolution of the images can be appreciated.

Cataloguing the maps

To catalogue the map material a base document was used: Chapter 4 of the Listing Rules, drafted by the Directorate General of Books, Libraries and Archives of the Ministry of Education and Culture, which compiles the normalization catalogue and efficient management of technical bibliographical processes. A normalization catalogue is an essential element in the recovery of information, both in a manual form and when technologies of information and communication are used. And it's still more essential when the information is available on the Web, once its interchange is improved.

The catalogued information was collected via Web with the online catalogue from the National Library of Spain and with REBIUN[2] (Network of University Libraries), both used for the upset and verification of information. Similarly, thematic search engines were used to compare and evaluate information not found in sources of information previously mentioned.

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[2] REd de BIbliotecas UNiversitarias

Figure 2. (Map of Castilla and Extremadura. 1762. Mendes Silva, Rodrigo)

Data Catalogue and Web

Contents are aimed to be accessible trough an easy and simple interface. This emphasizes the use of Internet and Intranet for the development of electronic data interchange.

For dissemination and presentation of digitized information on the Web an application called "Data Catalogue" has been used. This application has two parts: one for internal use, used by staff for the introduction of information, changes and so on, with a very simple user interface based on Visual Basic, founded in Client-Server systems; and the other one, in web query, which is viewed by external users and allows search, consultation and download of digitized information. This system allows changes in real time, that is, any changes made on a catalogue card are visible immediately by the user who is consulting this fund on the Web. This emphasizes the friendliness of the program, indirectly, savings and independence of personnel, and to avoid having a person specialized in computer

science exclusively devoted to the introduction and management of information relating to mapping object of study. However, it does not mean that the professionals mustn't be trained and recycled in an ever-changing field such as ICT.

The "Data Catalogue" in its internal part, was developed from its origins on the basis of information that it had to contain, but the functionality of the system has been adapted with the inclusion and incorporation of new types of documentation to those formats, whether territorial studies, urban planning, cartography, aerial photography, etc., in order to achieve greater quality and understanding in the control of information. The publication and maintenance of data, applications, news, directory and contacts is another of the achievements of such application, allowing the transfer of land information with the introduction on the website of a common workspace for different organisms.

It emphasizes the easy use of the web query, since it allows a free query and a formal query (figure 3). The only difference between both is that the latter is based on a hierarchical tree structure for its representation.
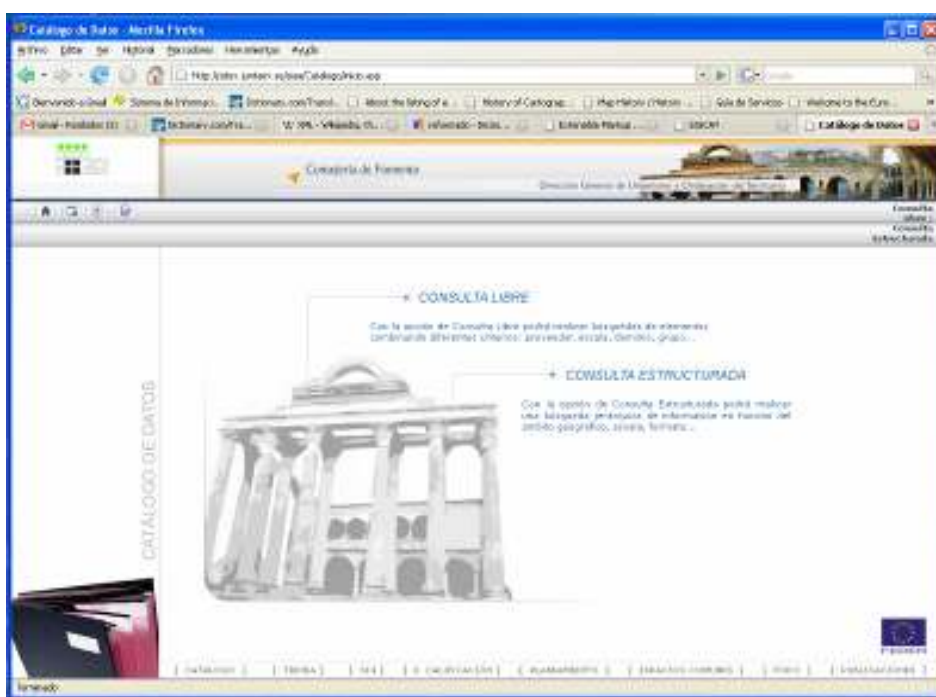

Figure 3: Initial Screen, where we can choose two options: free query or hierarchical query.

As it is shown in Figure 4, free query allows filtering information through different criteria: author, date, scale, geographical scope, etc...
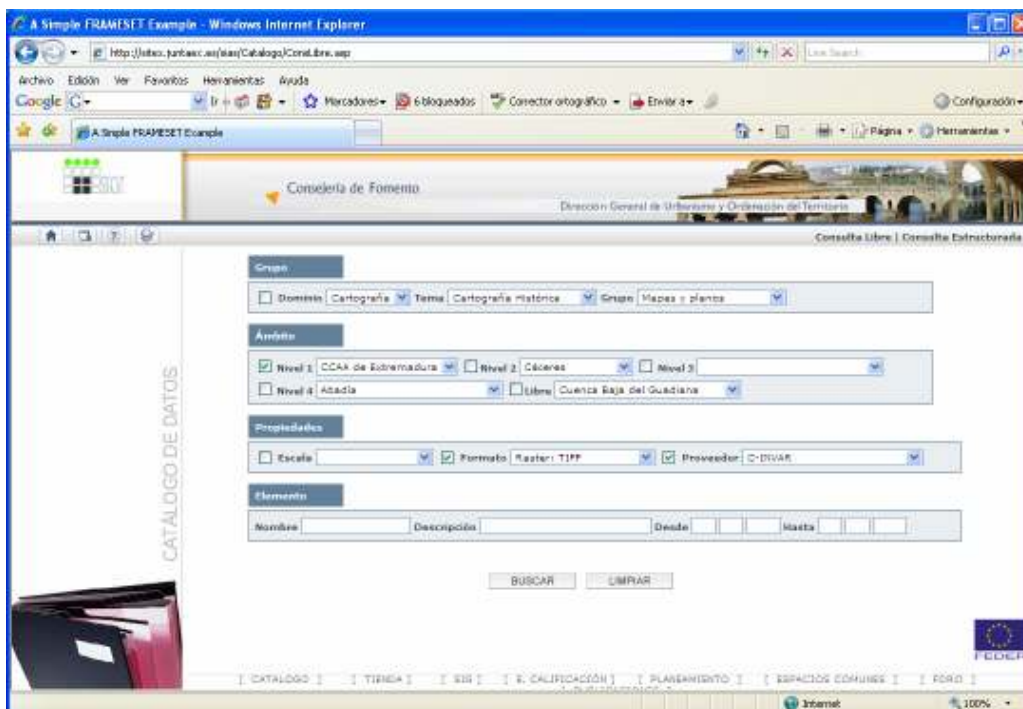
Figure 4: Screen of free query.

The main difference which regards the hierarchical query is that this second is unfolded into a thematic menu, according to which it is descending in the hierarchical level, the required cartographic material is centred to us (figure 5).
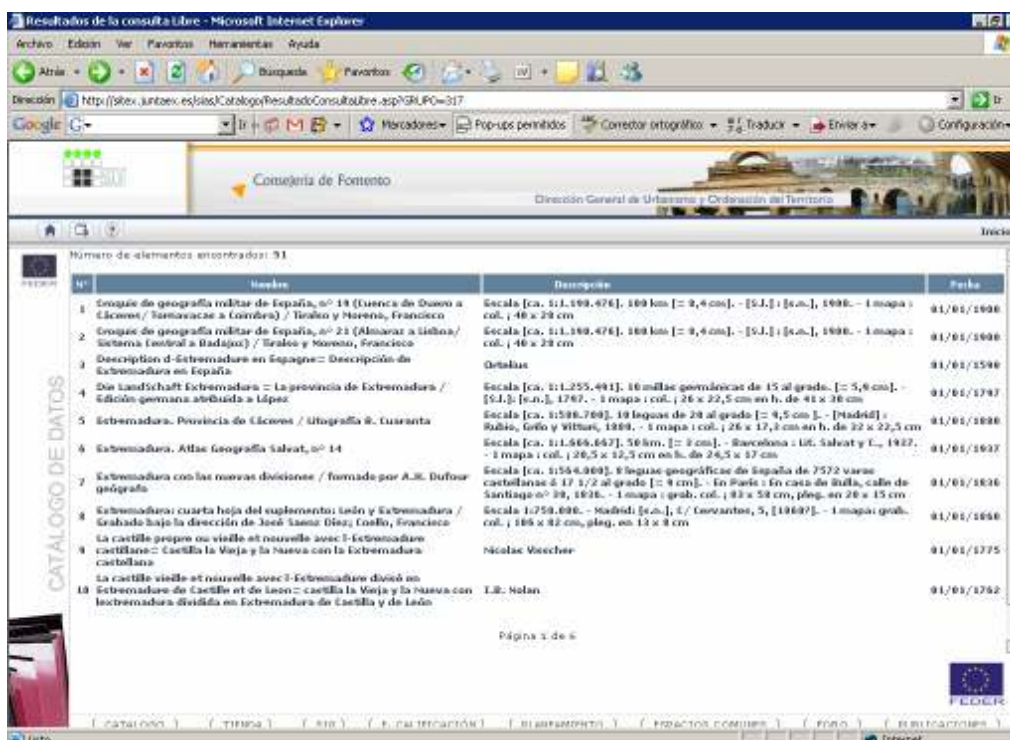

Figure 5: Screen of hierarchic query, where we can see a thematic menu in the left.

Once we have the results, if we list and click on each element, a sheet with its metadata will appear in an emergent window, as shown in Figure 6.

Figure 6: List of results in the emergent window with the metadata of one of the elements.

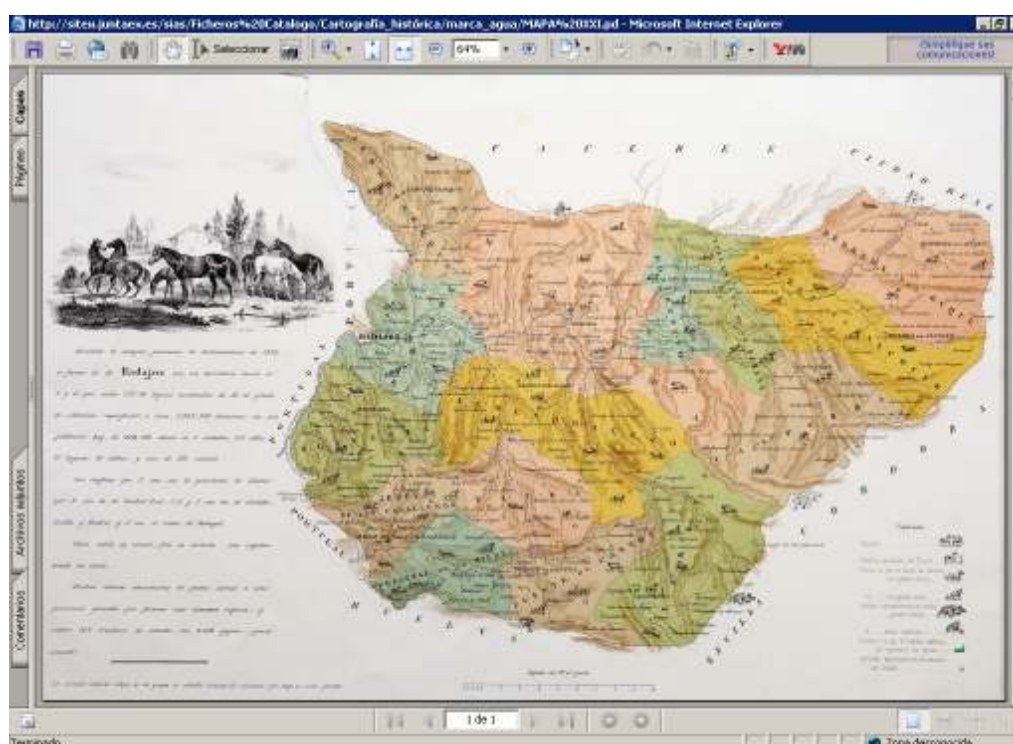Furthermore if we want we can see the map in a .pdf format.

Figure 7: Map in a pdf format.

On the other hand, the creation of a common space ensures communication and the exchange of information with other users, by building a cooperative space between the Centre, its collaborators, its suppliers, partners of projects and communitarian initiatives.

Improvements to Data Catalogue

The management tool of the Catalogue is going to be modified; the design of the web application will be improved incorporating publishing metadata of our product and geographical data available through a system of structured metadata search and display maps. The Catalogue, with the adaptation to new formats and metadata, is fitting into the format eXtensible Markup Languag (XML), which is a compulsory data format for Spatial Data Infrastructure. XML is a fee-free open standard recommended by the World Wide Web Consortium; its main purpose is to facilitate the sharing of structured data across different information systems, and it is used both to encode documents and to serialize data (Bray et al, 2006). To metadate the maps an application of metadata has been chosen, oriented to Internet and based on open standards, which will enable the Centre make an improvement in the exchange of its cartographical data, and which will develop the steps towards a data Infrastructure of Extremadura by extension to the cataloguing of geographical regional information.

We are also working to make it more user-friendly and of easy accessible consultation and downloading of copyrighted material in the data catalogue, where the visual search against the textual one predominates. Due to information graphics, it is more appropriate for this type of tool, as in the case of an application of cartographical information.

Currently, the search screen available on the Web is the following:
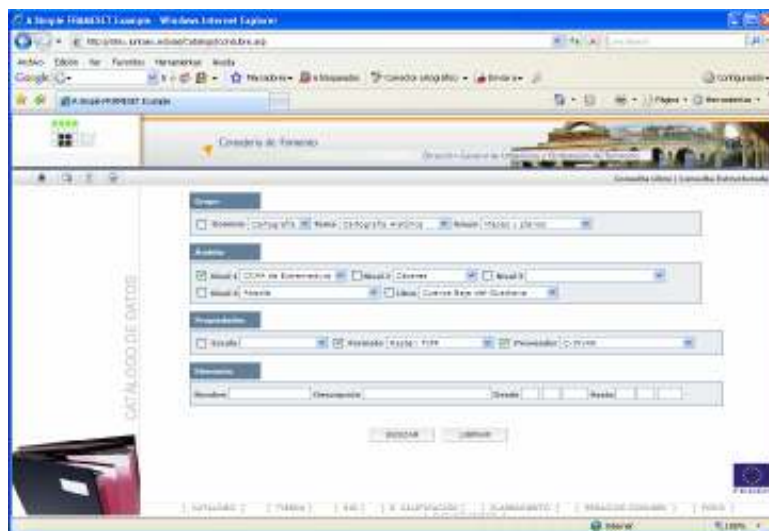

Figure 7: Actual screen with textual query.

For visual search it is recommended: The search of material through a map, that allows you to "select" what you want. It takes you to the existing information about the chosen material, indicating if there are some satellite images, cartographical or air photos, and allowing their download as well. They will include typical control pictures like zoom to move away, zoom to approach, to move around the map, etc. Although there is a visual search, it should be complemented with a search through a dialogue box that allows the user a textual search, introducing the name of the author, as well as any other keyword.

This is shown in the following screen, where the visual interface dominates against the textual thing, but without omitting either of them.
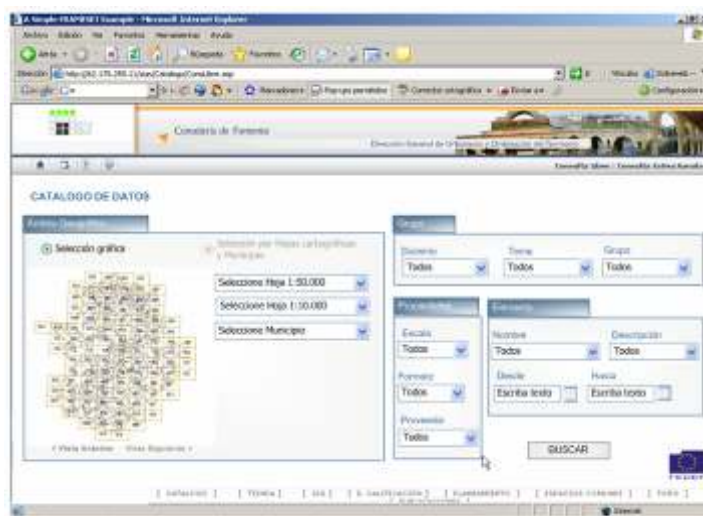

Figure 8: New screen with visual and textual query.

In conclusion: the objective aimed with this project is to make the historical information of the region more accessible, usable and exploitable, making the dissemination of information easier.

References

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