Thematic Mapping: A Tool for Urban Governance. Contributions of Classical Graphic Semiology in the Context of New Geographical Paradigm

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1. Introduction:

The aim of this work is to present two cartographic applications in an urban context. Both of them have used the 'Semiology of graphics' theory, which is a methodological framework developed in 1967, adapting it to new geographic paradigms as 'Neogegraphy'.

This concept means the reinvention of the geography to be used by non expert users. They are able to use the geographic and scientific technologies for their personal and social use. In this context, three elements are outline again: (1) supports, increasing the importance of internet, (2) functions, because the public is allowed to change its role: observer to actor and (3) users, which are professional and non expert people now.

Both applications are developed in the city of Zaragoza, so in an urban area. However, they are using two different forms of organize the information to facilitate knowledge and know-how transfer between research establishments and society. It warrants a community empowerment and a smart government. The projects are supported by the Government of Zaragoza (Ayuntamiento de Zaragoza).

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On one hand, the "Demographic Viewer", which visualize the sociodemographic situation of the city through an interactive and intuitive way. On the other hand, 'Zaragoza Map a Map: to know, to appreciate' is a semi-permanent exhibition. Its objective is to make city information easier and understandable.

2. Methods:

Three elements have to be kept in mind related to the used method: (1) geographic scales, (2) data representation models (raster and vectorial) and (3) map design.
First of all, both applications, the 'Demographic Viewer' and the 'Zaragoza Map a Map' exhibition, combine the use of different scales (urban blocks, census sections and neighborhoods) which provides different perspectives. This variety of scales implies a deep reflection about the best representation. A change of scale is a change of spatial problem, because the spatial pattern can be altered.

Data representation models, vectorial and raster, were used in these projects. Vectorial model was used with polygonal implantation for sections, urban blocks and neighborhoods limits. Also, punctual implantation was used for centroids of these limits, which facilitate the construction of multivariable maps. In addition, a 50 x 50 meters matrix was chosen after considering different options. It is a very suitable model for visualizing urban landscape, because it integrates demographic, social and economic data easily.

Finally, the explication of the map design elements in both applications. The methodological framework is based on four concepts: nature of information, level of measurement, implantation and visual variable, any combination of all of them is called "cartographic trajectory". The nature of information can be qualitative or quantitative; the level of measurement can be nominal, ordinal, interval or ratio; the implantation can be point, line or polygon and the visual variable can be color hue, color value, size, orientation, shape or texture.

It is necessary to keep an homogeneous presence of the layout regarding to the elements' order, aesthetics, and the use of typography. The general instructions were: (1) to assure the easy reading of the map, (2) to use images and graphs better than descriptions and text, (3) to elude 'Chunkjunk' and focusing the map design on the message, (4) to remove no necessary elements, (5) to difference levels of cartographic information and (6) to avoid brilliant color hue in context elements.

3. Results:

This section describes the two applications: 'Demographic viewer' and 'Zaragoza Map a Map' exhibition. For both the aim public is the same, it involves from non expert users interested in their close urban area to planners.

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3.1. The 'Demographic Viewer'

The 'Demographic Viewer' is included in the Spatial Data Infrastructure (SDI) of the Ayuntamiento de Zaragoza, which is called IDEZar (http://idezar.zaragoza.es/visorDemografico). It presents multiscale information of three socio-demographic topics: population distribution, age composition and migrations. Depending on the nature of the data, the user can access to a more general scale o more detailed scale.

Any topic develops different variables: (1) Population distribution main indexes are population density and total population, (2) Age composition has three variables: Old people, Young people and Sundbarg Index and (3) Migration section shows the number of foreign people.

The main characteristics of the viewer are: (1) responsive web design, to provide an optimal viewing experience across a wide range of devices, (2) the access to cartography with geographic standards: WMS(OGC), WMS-C(OSGeo), OpenStreetMap or Google Maps, (3) the work with standards formats: GML, GeoRSS, GeoJSON… (4) an intuitive tools to visualize, change and navigate over the maps, (5) the search of data, (6) the legend fit to selected data, (7) the description context included, (8) a thematic order to visualize data and (8) the possibility of printed map of a selected area.

3.2. The exhibition 'Zaragoza Map a Map: to know, to appreciate'

The exhibition is placed in eTOPIA, Center of Art and Technology in Zaragoza city and it is part of the Government of Zaragoza. This project involves the society in the knowledge, assessment and making decision process of its own urban space. It has the following aims: (1) to bring closer social, economic and demographic data to assess and to express opinion, (2) to make easier the understanding of these data, (3) to facilitate knowledge and know-how transfer between research establishments and society and (4) to collect spatial information thanks to social networks. The visitors can build new information with the material ready-to-use in the exhibition, so they can enrich and qualify the data.

The main sections of the exhibition are: (1) The map as an incredible tool, (2) Zaragoza and her limits as a city, (3) Where are we? How are we? Population in Zaragoza, (4) How do we move? Transport and mobility around Zaragoza and her metropolitan area, (5) Serving citizens: facilities, open spaces and activities, (6) Open Govern of Government of Zaragoza and (7) your life space: a tool for knowing your closer area.
The exhibition has 26 maps of different size (50 x 50 centimeters to 3 x 2 meters), 11 text panels, 1 animated video, 1 control panel with 5 thermometer, 7 Quick Response code panel to visit websites of the Government of Zaragoza and an interactive blackboard. It also has a children game of color pieces to place the significant spaces of the city.

4. Conclusions

Information and Communications Technologies are natural ways for the present society to offer innovation, information, co-responsibility, opinion and talks opportunities between the public and the government. The two applications explained are two examples of the incorporation of these ways to citizenship in Zaragoza.

Internet is playing and important role in this process: thanks to Spatial Infraestructure Data and Open Govern, internet allows the access to services and gives support to geovisualization. The map design of these documents can use the 'Semiology of graphics' principles, because they are still in effect.

Citizen Science is much more than a sensor for collect information. It has the potential of support the community empowerment and a smart government of the region or urban area.

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