Geographic Information and Local Government Management (SIGMUN)

E. COLL ,J.C. MARTINEZ, J. IRIGOYEN, E. VELASCO
Department of Cartographic Engineering, Geodesy and Photogrammetry
Polytechnic University of Valencia
Camino de Vera, 46022, Valencia
SPAIN

Abstract: - This paper explains the study developed in a first phase, of the research project: Information Systems and local government management (SIGMUN), carried out in the Polytechnic University of Valencia (UPV). The main purpose is obtaining a work methodology to carry out the Geographic Information System (GIS) implementation in most of the city councils of the Spanish state. GIS have roles to play at all levels in local government, from basic map handling through complex spatial analysis or decision-makers support, consequently they are indispensable tools for local administration.

Key-Words: - Geographic Information Systems, Local Management, Local Government, Territorial Information Systems, Cartographic Standard.

1 Introduction

Technologies progress and development of the information society are promoting public organisms' information to be showed on the Internet, and even allowing citizens to process official documents through the Internet. [1]. In order to offer it, local governments must widely control databases creation, use and management.

The technologic advances make possible to face an old idea, always postponed considering its highly technical difficulty and its huge cost, but the need of which becomes each day more obvious. This idea is to manage local governments by means of Territorial Information Systems (SIT) that, from the basis of an existent cartography, would be able to georeferencing the information as well as the municipal management and, also, to offer it to inhabitants through the Internet.

The 80% of the municipal information that is daily managed is georeferenced, (which means that it has a spatial component that can be represented), in addition to a huge volume of databases with alphanumeric information that can be related within this spatial component. Geographic Information Systems (GIS) represent a fundamental and essential tool for the knowledge and management of the territory; the proof is that the biggest Spanish councils and the majority of the public organisms from other countries are already using this tool.

One of the problems that can be considered when trying to implement this tool in the Spanish state is the fact that the 85% of the 8.109 existing councils has less than 5 000 inhabitants.

Consequently, the main part of these organisms is unable to implement and use this new technology as they have a lack of technical and economic resources. The problem gets worse as there isn't a proper standard for the GIS implementation or the cartography processing. The research project about information systems and municipal management (SIGMUN)[2], that focuses on this line, is carried out by the research group of Cartographic Production and Geographic Information Systems teaching group, from the Polytechnic University of Valencia. The current research is to set the real state of local government, its needs, and the way implementation has been developed in other similar conditions. From this study the basic standards about cartography and geographic information systems will be established in order to make municipal management much easier, to facilitate geographic information research, and cartographic updating and quality.

2 Metodología general

This research sets out from two main support pillars:

- Firstly, the experience of the research group, which work, from the last years has been based on local government [3], and the tutorial/leadership of more than 80 final degree thesis based on informatics applications for cases studies and on GIS implementations on councils;
- Secondly, an international research based on similar experiences from three countries: United States of America[4], United Kingdom[5], and Australia[6];

The phases of the research project are the following ones:

- Study of the current state of the council, examining lacks and working procedures.
- Study of the true needs from the citizens and the local government.
- Creation of procedures for the geographic compatibility between departments and different public and private organisms that interact with the council.
- Analysis and optimization of management, maintenance and updating procedures of geographic information.
- Creation of other procedures.
- Documents compilation.

On this context, a study is going to be carried out in depth, for all the phases of the project in a council of the Valencian Community, with the following characteristics:

1.- Population: around 20.000 inhabitants.
2.- Area: 228,0 Km²
3.- Localisation: Comarca del Camp del Turia. (Valencian Community, Spain)
4.- Budget: 12.730.813,32 euros in 2003.

3 Problem Solution

The first step consists on distinguish all the council departments, set which are the daily tasks on each one, and which is the horizontal relation between them with questions like: How many times a search to georeferenced data is carried out daily?, Which kind of cartography is used regularly?, And occasionally?, How is this cartography consulted?, How many accuracy is necessary?, Which tasks are the most frequently carried out daily?, Which of the citizens questions is the most complicated or takes more time to perform?, etc.

The second step, which is based on the depth research of the municipal organization, began with the schedule for each department. The purpose is to study each person working on the same department almost two days, by means of a researcher that get incorporated into the daily department work, take a list of the accomplished tasks and generates a sample of all the documents from the council that are usually the ones given to the citizen. Each week the documents are presented to the research group, that produces a questionnaire, a small demonstration of the way GIS incorporation would positively affect their work, and prepare, specifically for each department, an introduction to these tools. Afterwards a senior researcher moves to the council to met people from the studied department.

In this way, the implementation is strengthen as each meeting is laboriously studied, knowing perfectly the specific needs of the department, and adding knowledge from other implementation experiences [5] (Box 1.). The aim of this step is to perform a deeply research on municipal needs, as well as to turn municipal staff on participants and experts in the implementation process. In this way GIS implementation will not be considered as a compulsory political decision, but as an effort from managers to improve each working area by creating only one cartography, accessible to everyone depending on their needs, with direct connection from each computer; therefore as a way to improve daily work.

Once this stage is finished, a report will be prepared for each department manager, presenting the obtained results. The manager is invited to answer the report and explaining if he agree with it or not, and the reasons. All the answers are revised, and this phase of the research finishes when the true state of the council is known

Flexible Mapping
- Consistent and easy-to-find maps for all services.
- Automated updating of base maps.
- Easier map production and plan processing.
- Seamless customized maps.
- Base maps plus user overlays.

Land and Property
- Land and property gazetteers.
- Planning applications and local land charges.
- Planning constraint and policy areas.
- land use and terrain analysis.
- Identifying unused, underused land.
- Identifying derelict, and contaminated land.
- Locating sites for housing, schools,etc.

Network Analysis
- Roads management
- Accessibility and route planning.
- Coordination of street works.
- Pipelines and power lines.

Incident Analysis
- Traffic accidents, holes in the road.
- Street lighting faults.
- Drugs, crime, and disorder.
- Environmental health, noise, litter, and other complaints.
- Pollution incidents,
- Health epidemics, and other emergencies.

Socio-Economic Analysis
- Population analysis.
- Citizen profiling (geodemographics).
- Facility planning and catchments area analysis.
- Assessment of housing and leisure needs.

Environmental Monitoring and Management
- State-of-the-environment reports and Local Agenda 21.
- Archeology, landscape, and ecology.
- Listed buildings, sites of special scientific interest.
- Listed conservation areas.
- Impact assessments .

Box 1. Some applications from U.K.local government

During the second big phase a report will be drawn up with all the advantages that the GIS would have being used for the management and knowledge of territory.

Besides, during this phase a detailed research will be carried out about all the cartography that is managed on the council. An inventory of all the existing cartography will be created, listing and documenting the metadata as much as possible, depending on the true information available. All the aspects of the cartography should be studied in detail: format, encoding, scales, representation, etc. as well as others like: Where will this cartography be stored?, Who will be the person in charge of updating and available depending on each department's needs?, Which is the minimum detail to represent?, Which are the key field in order to link all municipal databases?, etc. The outcome of this second phase is a complete report with procedures regulation for domestic use of local government.

One of the implementation purposes is that the cartography, besides to be only one, must be constantly updated. Otherwise these tools wouldn't be correctly employed, as any analysis would give wrong results: cartography wouldn't reflect terrain reality or it wouldn't show the whole real information. A clear example is a traffic detour in a municipal area: if data is not updated, some streets like new estates can not appear on the analysis, so the police would have problems to carry out the detour and they wouldn't trust GIS anymore.

In order to update cartography easily, the cartographic regulations must be compulsories for all the firms that direct or indirectly modify municipal cartography or related tables. Therefore when for example a construction company finishes a building site, all changes must be reflected on cartography with a format specified on the regulations. This information must be given to the council that can automatically add it to the municipal cartography, achieving the purpose of having only one cartography always updated.

Another essential study is the one related to alphanumeric databases from local government, in order to check their integrity and compatibility with the geographic information system. In order to improve local government performance, it's important to avoid data to be dispersed, repeated, with different formats, on different tables, etc. Therefore each informatics applications that use municipal tables must be listed and an entity-relation model must be performed to make the conceptual design of the new municipal database, corporate database without repetitions data.

The last stage of this research project is to launch the phases for the implementation of a municipal corporate GIS. An economic study of the implementation cost will be performed with a complete hardware and software list available from the council, in order to set if new hardware is necessary, to calculate the cost of GIS software installation and the way to gradually implement it. In this phase a case study will be carried out on a parallel way by adding the council to the GEOPISTA project, Open Source Territorial Information System for Councils [7].

To this end, the Industry, Trade and Tourism Ministry (www.min.es), by means of PISTA initiative, is running a process that will allow any local organization to ask for GIS software. The aim is to help different Organisms to motivate them in a suitable way on the actions that improve the use of electronic public services by citizens and firms.

This project joins a set of activities managed in order to encourage the Information Society at Local Government level, carried out by the Science and Technology ministry, in collaboration with the Spanish Federation of provinces and Councils (FEMP), inside the PISTA program.

4 Conclusion

This study seeks to emphasize the importance that GIS has for the public administration. With the results obtained during the time (around twenty-four months), that has been dedicated to the research, a model has been performed in order to add as many local administrations as they would want, as deeply as possible.

As one of the main purposes of the research is to show importance of having unique and updated data, any implementation process never finishes and needs continuous evaluation, justification, and revision.

If the technology and the data are not kept up-to-date, the GIS applications will soon be of little value. Instabilities within the organization, changes in the controlling political party at either local or national levels, and variations in the external environment all have important influences on the continuing implementation of any technology. Indeed, the very essence of implementation is change, and continuous monitoring and review are therefore vital.

We plan continued refinement and extension of this analytic platform with several directions for future research emerging from the experience reported in this paper. We conclude with a discussion of what we view as being desirable conceptual and methodological refinements, and further software development initiatives.

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