

MUNICIPAL INFORMATION SYSTEMS A powerful, low-cost, policy-making tool

I. Paraschakis

P. Patias

The Aristotle University of Thessaloniki
Faculty of Surveying Engineering
Department of Cadastre, Photogrammetry and Cartography
Univ. Box 473, GR-54006 Thessaloniki, Greece
e-mail: patias@olymp.ccf.auth.gr

ABSTRACT

Municipal Information Systems are special applications of the Geographical Information Systems (GIS). The problems they are called to solve are quite complex in nature and are ranging from compilation and updating of surveying data to utilities mapping and documentation of historical buildings and sites.

In this paper such a system is presented. Its main characteristics are its desktop platform, its low cost, its ability to handle interrelated vector plus raster plus alphanumeric data and thus solving a diverse range of problems, remaining however very much user friendly with an easy-to-use graphics interface.

The system has been developed by our research group for a pilot city of 100,000 inhabitants and is operational by the municipal administration for the last two years.

1. Introduction

The organizational status and the responsibilities of the municipalities in different countries are often very different to each other. In Greece, the municipalities have a wide responsibility of their space. This responsibility includes map making at topographic scales, photogrammetric updating of those maps in cooperation with the Ministry of Planning, management of the utility network, issuing building licences, land and building taxing, management of the transportation in the city, and management of the preservation and the restoration of buildings and structures of historical and cultural importance in cooperation with the Ministry of Culture [1, 2, 10].

In reference to these activities of the municipalities, it is clear that in order to develop an Information System capable of handling all these responsibilities and supporting decision and policy making, is not an easy job. These special-purpose GIS systems are called **Municipal Information Systems (MIS)** [3].

2. The requirements for an MIS system

The design of an MIS should take into account that the system should be able to perform the following functions in a routine manner [4]:

- *The system should be able to handle many types of data (textual, graphic, photographic).*
- *The system should be able to interrelate and compare all types of data and answer an unlimited number of different queries according to user wishes.*
- *The system should be of low initial cost but expandable according to needs.*
- *The system could be used by both the Local Authority and the Public and should require only marginal exposure to computer technology.*
- *The system could be used by different Municipal Agencies to manage a range of problems.*
- *The system will be used to support decision making [2].*

The logical framework of the posed problem is depicted in Fig. 1

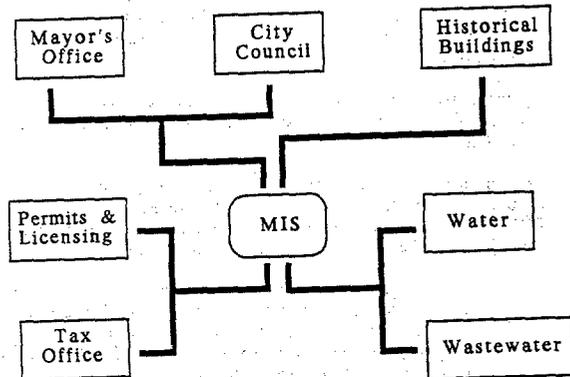


Figure 1. The logical diagram for the development of a Municipal Information System

The design and implementation of an MIS follows the next phases :

- *Selection of the appropriate cartographic background.*
- *Recognition and proper definition of the municipal needs: Selection of the necessary thematic information to be used [8, 9].*
- *Dissemination of the initial study conclusions in the municipal agencies: Induction of a wider discussion within the users group in order to recognize any potential problems and put the advantages into proper perspective.*
- *Introduction and positioning of the designed system within the administrative network of the municipality and recruitment of the necessary supporting group in order for the system to be functional from day one.*
- *Geometric cartographic data acquisition, evaluation and updating; Structural analysis of the cartographic background; Creation of topological links [6]; Design and organization of the necessary database infrastructure.*
- *Acquisition of the thematic information as well as the photographic data and insertion of these data into the system.*
- *Development of the necessary user interfaces so that the system will function in a user-proof and friendly way [7].*
- *Training of the system support group: Training exercises can be designed to be the first pilot results.*
- *Continuing evaluation and calibration of the system to the user needs; Possible future upgarding and expanding of the system.*

Each one of the above phases is critical and decisive for the implementation of the system. A "golden rule", however, remains the *simplicity* of the system (avoidance of technological gaps/jumps for the user group), the *friendly use* (avoidance of human dislike of computers), and *easy maintenance* and service by the municipal services (autonomous use and maintenance).

3. Developing a prototype low-cost MIS

The initiation of a two year research project sponsored by the city of Lamia raised the question of the development of a prototype low-cost MIS system. The city of Lamia is a typical middle size city of central Greece, with 65,000 inhabitants covering an area of 8,000 acres [3]. About half of this urban area has been recently mapped at 1:1,000 scale, while the rest of the area is being surveyed during the development of the system. Thus a solid, highly accurate, and up-to-date cartographic background is available, consisting of 42 map sheets of 1:1,000. The more recent of these data were also available in a digital format and they were directly introduced into the system. The rest of the data, being in an analog form, had to be digitized first.

Besides the topographic data, surveys of the utilities networks (water supply and wastewater) are available. The accuracy of these surveys are not of the same accuracy in all the cases, but they were the only available at that time data.

Luckily at the time of this project, another project was in progress concerning the surveying of the land and building use in the center of the city, and was sponsored by the European Union in the frame of the RECITE program. Therefore all the collected cadastral and thematic information concerning a good part of the city has been also available to the MIS system.

Another important fact at the same time was the new legislation about the land taxing. According to the new law the taxing of the land and the buildings, as well as the income of these taxes, belong to the municipality responsibilities. This fact gave a decisive perspective to the system under development. It also gave a very good argument and motivation for this development, since the cost of the system would be overcome with only the first years' tax income of the municipality!

Finally, it was clear that there was a new trend in the city and many of the historical buildings were changing owners. Many of those buildings were bought by big organizations (banks, etc.) for restoration purposes and re-use as offices. Some of them, belonging to the municipality, should be also restored and re-used by the public.

After the study of these needs (some of them really urgent) the system organized into three database structures as shown in Fig.2.

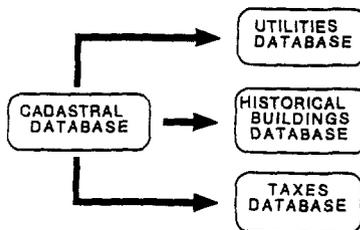


Figure 2. The MIS database structure

More specifically the developed system is organized in the following way :

The developed MIS system consists of software modules, which can function separately or as a whole, according to the needs. The developed system is named *PCMIS (Personal Computer Municipal Information System)* in order to stretch its low-cost character. Technically the system uses the Intergraph's MicroStation as the CAD background and a number of MDL applications developed in house. On the other hand it uses the Dbase IV RDBMS structure and a number of Clipper modules developed also in house. The whole system has been "dressed-up" with a friendly, icon-driven user interface, requiring only minimal computer training from the part of the user.

4. Conclusions

The PCMIS system has been designed to be a prototype Municipal Information System. The system is characterized by its economy, flexibility, interactivity, its alternate use of different data types. It is based on a minimum off-the-self hardware and software requirements and has been developed to be used by the Local Authority Officers and engineers with almost no previous experience in computer technology.

PCMIS due to its philosophy, design, implementation and first application is a unique example of ready-to-use system by the Local Authorities. Moreover, the system is designed so that it can be easily expanded from its current DOS configuration (PC, A0 digitizer, A4 scanner, A0 plotter, A4 laser printer, Dbase IV, MicroStation PC) to a Workstation / Network configuration whenever the needs will ask for it.

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