

GIS applicability in urban management

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Abstract: For a society that has undergone many social, economic and political radical transformations, its future depends on innovation and skills to exploit the resources of existing socio-economic and cultural of all actors involved in the evolution of urban society.

The development dynamics (both its advantages and constraints) require a series of strategic redefinition, flexible and creative administrative levels and their operating mechanisms. The sheer volume of information contained in existing plans and documentation to the local administration level, perishability and difficult handling, interpretation and analysis troubles, determine public institutions to allocate significant financial resources in order to achieve urban GIS applications.

Accurate cartographic feature extraction, map updating, digital city models and 3D city models in urban areas are essential for many applications, such as mapping of buildings and their heights, simulation of new buildings, military operations, disaster management, updating and keeping cadastral databases current, and virtual reality.

In this paper we develop the GIS applicability in urban management of Odorheiu Secuiesc city. Its practical result is an interactive system of spatial data to an associated WEB platform. Having all these information can be developed a short, medium and long term strategies regarding planning and its management in the context of general sustainable development.

Key-Words: Urban Management, GIS, Spatial Data, Urban GIS, Cadastre, Digital Map

1 Introduction

Geographic Information System (GIS) usually aims to producing maps and plans, managing network utilities (water-supply, sewerage system, mains, district heating, roads and railway system etc.), identifying the optimal location for an investment, the study of the impact of a certain objective upon the environment complying with the general policy of sustainable development. The consequence of the sustainable development implementation is a necessity of spatial system designing. This means that ensuring sustainable development presumes different Geographic Information Systems (GIS) because they give quick access of updating and analysing spatial databases. [1]

For a society that has undergone many social, economic and political radical transformations, its future depends on innovation and the skills to

exploit the resources of existing socio-economic and cultural of all actors involved in the evolution of urban society.

The development dynamics (both its advantages and constraints) require a series of strategic redefinition, flexible and creative administrative levels and their operating mechanisms. One of the most important of these function mechanisms - urban management - is an activity that involves multi- and transdisciplinary approaches of urban problems.

In this context, the local administration level, this type of management, is applied in two main areas:

- Localities land managing and monitoring;
- Urban development planning.

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2 Geographic Information System

Geographic Information System (abbr. GIS) can be defined as a computer system used for collecting, storing, querying, transforming and displaying spatial data (Borough 1985). Basically a geographic information system encompasses various data about the environment. Spatial data are information about the shape, location and Geographic relationships between entities and their attributes. This data are stored in different formats depending on the type of information (figure 1):

- Raster - map in the form of photos or scanned images;
- Vector - data are stored in a Cartesian system, each entity has an identifier and each entity element has Cartesian coordinates;
- Database - store the attributes for an entity or vector. Maps used in geographic information systems (GIS) are recommended to be predominantly as spatial databases, which must respect the topological and geometric integrity restrictions, respective the traditional restrictions on databases.

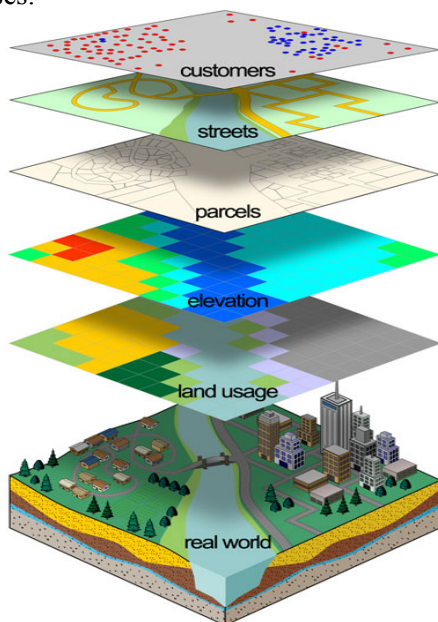


Fig.1 Information stratification

Geographic Information System data and functions in specific is an indispensable tool in urban management, both in terms of authority issue but rather acts as a decision support system.

Processing and synthesizing information from the database provides urban indices and pointers necessary to understand the existing situation, which offer support on short, medium and long term urban planning.

3 GIS use in urban management- Odorheiu Secuiesc city

Today, Urban GIS offers specialized functionality for each stage of processing including the digital map creation, plotting cadastral and topographical plans, generating and combining geo-referenced data in order to obtain a validated relational geo-database.

Odorheiu Secuiesc city belongs to the Secuiesc Land, which is a part of Harghita County. It is located at 105 km from Târgu Mureș and it is crossed by Târnava Mare River, with a population of about 37,000 inhabitants, which are overwhelmingly Hungarian (figure 2).

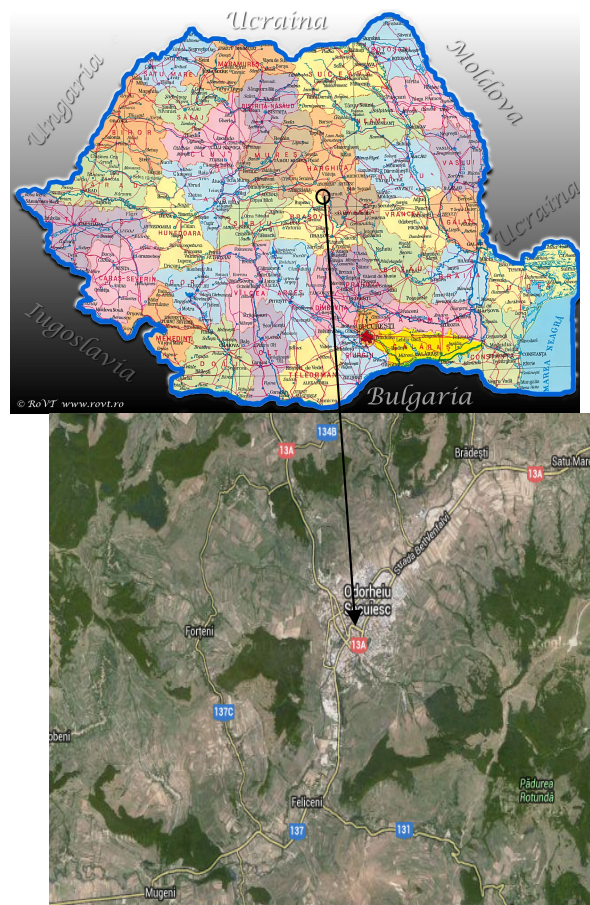


Fig.2 Satellite images of Odorheiu Secuiesc city [2]

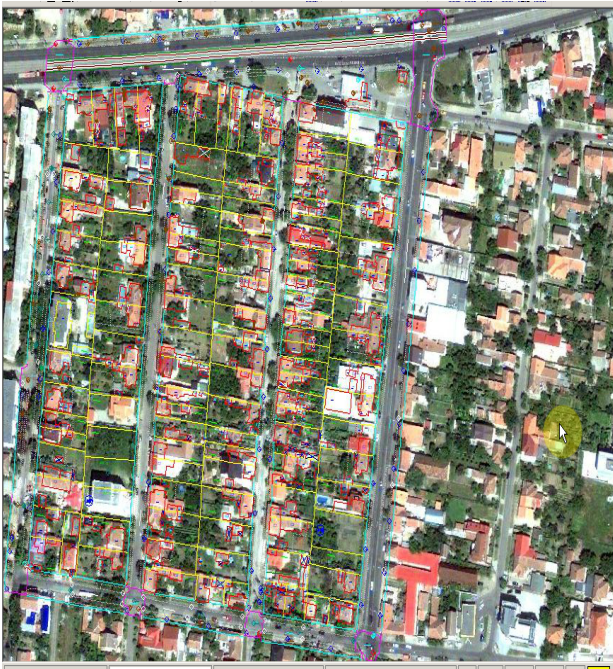


Fig.3 Odorheiu Secuiesc city Master Plan extract [2]

The Town Hall of Odorheiu Secuiesc is the first institution from Romania starting the GIS for urban purpose (figure 3).

The described application, as part of the Urban Planning Cadastre is developed to promote efficient resolution of land use and zoning conflicts and regulate various aspects of land use based on its comprehensive assessment from the aspects of the expected outcome of Urban Planning implementation from economic, spatial organization, social and political point of view.

4 Results and discussions

Until recently, collecting and using information in the field was a paper-based process with multiple points of data entry without accessing to real-time information. [3]

This database is made out of documents, technical data and spatial information, made available to all departments within Odorheiu Secuiesc City Hall, and by developing and implementing an information system specific to the urban and real estate domain and also in urban databanks; the local administration has a major advantage:

- ✓ **Planning Service** - Use the intra-urban digital cadastral map, allows editing and releasing plans and also other plans for requested cases, even at the time of application (figure 4).

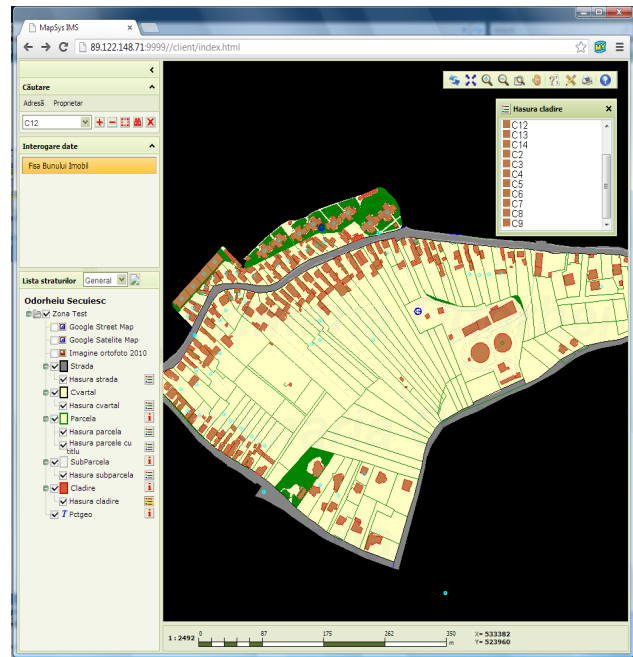


Fig.4 Example of Digital cadastral map of the intra-urban Odorheiu Secuiesc city [2]

Using Internet Map Server (IMS), data from the real estate (FBI) can be accessed, which contains all the information about cadastral utilities, road network, tax areas, green areas, etc., data required for daily work of zoning permits granting and in particular, to inform quickly the citizens.

We have developed specific applications for efficient management of street numbers, house numbers, properties and owners accurate assessment, simplifying enormously management (figure 5).

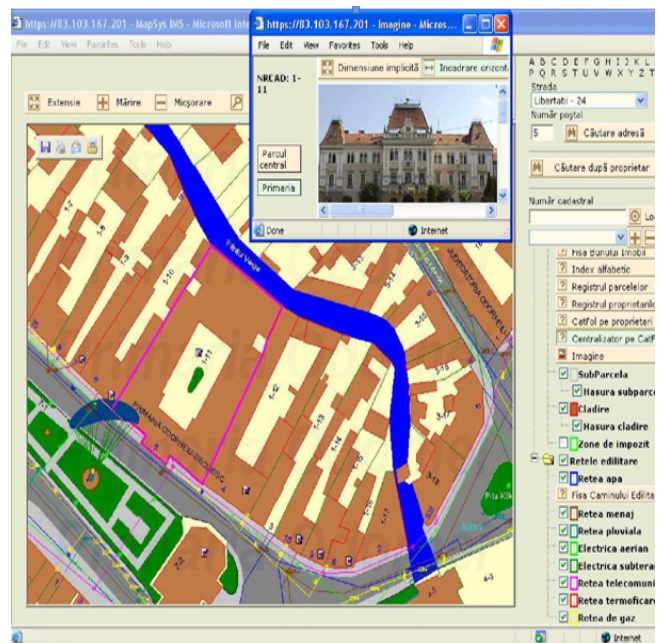


Fig.5 Accessing real estate information's using MapsysIMS [2]

- ✓ **Heritage Service** - Management of cadastral and land registry to an accurate identification, heritage data management and of the public and private properties belonging to the City Hall (figure 5).

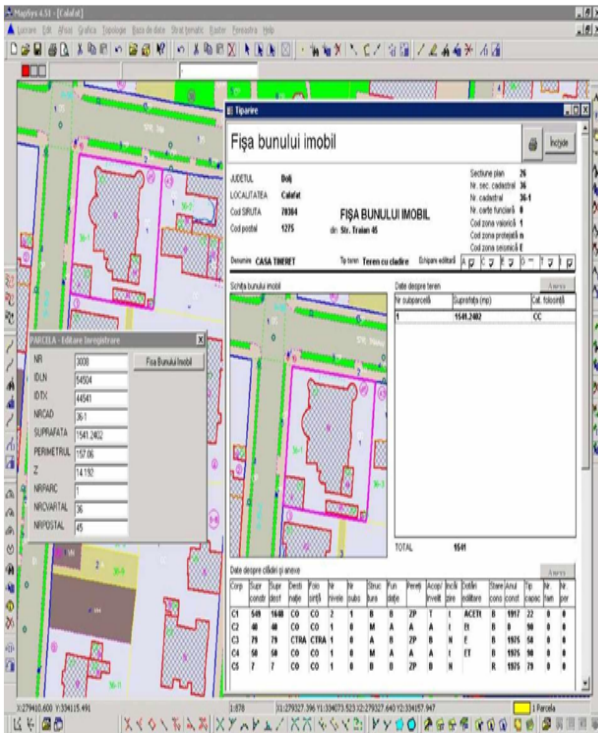


Fig.6 Example of Cadastral and land Registry data Management [2]

- ✓ **Communal Service** - This utility realizes the edilitar records, through the "Edilitar dorm" data sheet (FCE) application, of road system, green areas and parks (figure 6).



Fig.7 Example of Edilitar dorm data sheet [2]

- ✓ **The Cadastre Office** - manages the digital cadastral map (Odorheiu Secuiesc city zoning) and the data bank (BDCU), and also edits and delivers different plans (figure 7).

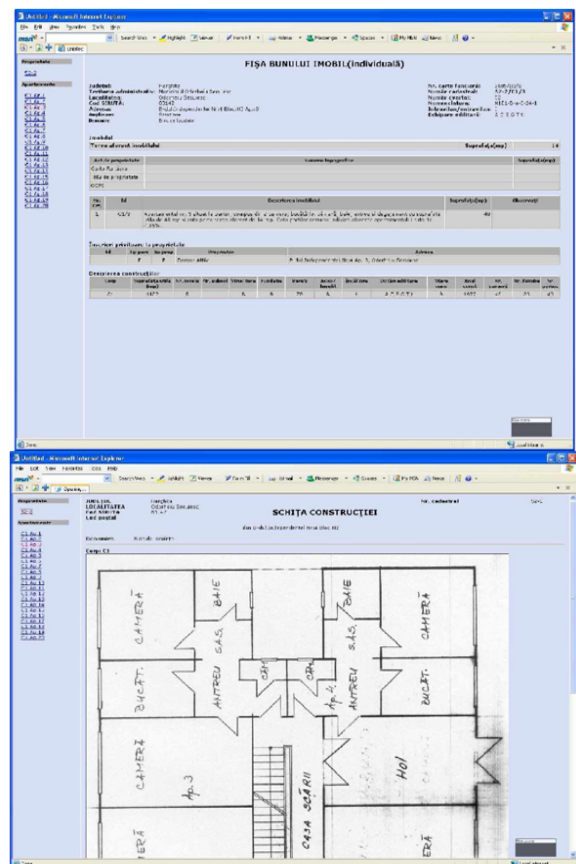


Fig.8 Building Outline, resulting from databank [2]

✓ **The Agricultural Bureau** - One of the advantages of the Agricultural Bureau is provided by different applications developed for the office, such as (figure 8):

- » "Ownership Register "application means that in this application the search can be done using various criteria: the ownership number, owner, cadastral number, etc. and the land parcel or certain areas can be visualized on the digital map.
- » "Soil "application establishes the pedagogical category or categories of a land parcel, which are necessary to identify the tax criteria for extra urban farmland.

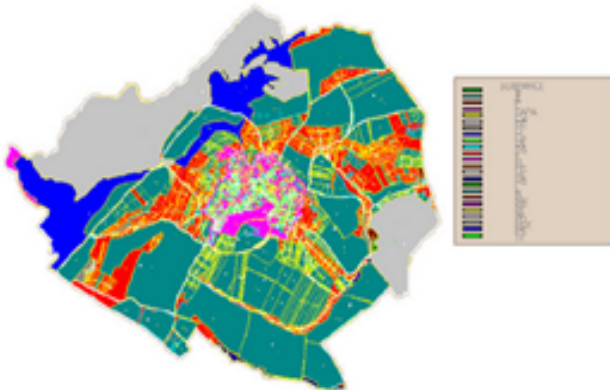
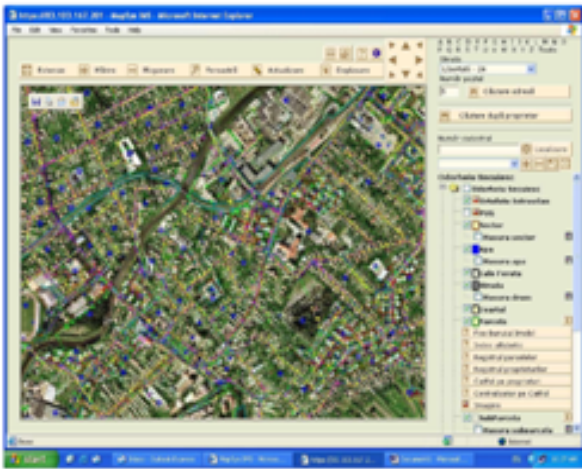


Fig.9 Example from Soil application [2]

This existing digital map is very helpful in the issuance of the manufacturer certificate.

GIS as modern technology of analysis and graphical-textual database processing method is very important element in environment resources management. This is a particular crucial purpose in case of multifunctional spatial system. [4]

The quality of the data in an information system depends on a series of factors regarding the system characteristics, training level of the personnel who use it, quality and the way of data acquisition, the

data processing, data analysis and the upgrading of the information. [5]

Other localities in Romania, who developed GIS applications in urban management, are: Timișoara, Bucharest, Cluj-Napoca, Oradea, etc.

The implementation and use of GIS technology in an organization represents a long process. Being a relatively new area in Europe, too, one of the main obstacles for successfully implementing and using it within the area is the lack of knowledge. [6]

Although, conceptions of cadastral systems and land administration are different among the countries, their basic function is similar, namely systematic and official recording of property rights in urban land management. [7]

5 Conclusion

Developing this urban management system and document management application with digital map support, represents a modern computerized technology of data and workflow management - specific for administrative institutions at local, regional or county level.

This technology is designed equally to other organizations that are engaged in the geographic information management or any category of information that are related to a certain level of geographic location.

The benefits of our Urban GIS application are:

- Increasing efficiency;
- Generate revenue;
- Accuracy improvement;
- Efficient collaboration between public agencies;
- Time saving;
- Money saving;
- Resources management;
- Public participation enhancement;
- Tasks automatization.

In the light of the new cadastre policy of ensuring the automatization of all general and field-specific cadastre activities – putting out a complete inventory of all the terrains and buildings for the purpose of a convenient territorial organization, maintaining environmental standards, using knowledge from different sources of cadastre and GIS – the updated conception of the urban GIS database for the Odorheiu Secuiesc city municipality represents a great advancement.

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