SPATIAL PLANNING – MODERN TOOL OF URBAN MANAGEMENT AND CONTROL

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Abstract: An urban community has to assimilate and promote a strategic vision regarding its future development. If we consider the transformation of an urban, rural or any combination of both of them, like a continuous process, we have to lake into account steps of planning: strategic, spatial, and economic. Designing a dynamic framework for planning and development, based on spatial information like Geographic Information System (GIS), it can be created the master plan of any populated area, such as Metropolitan zone of Timişoara presented as a study case.

This concept implies the elaboration of an informatics system integrated at the level all Town Halls-as components of the Metropolitan area. Its practical result should be an interactive system of spatial data to which, a future WEB platform should be associated.

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.

Keywords: GIS, Metropolitan area, spatial data, planning

1. Introduction

Many of public administration aspects (health, infrastructure, planning, development, disasters management, security, environment protection, education, culture, entertainment), or private (resources and facilities control: transport, telecommunications, electricity, etc.) involve geo-spatial data for which information systems provide updated means of management. Geo-spatial information gives decision a wider perspective, facilitating coordination on community level or administrative unit.

Geographic Information System (GIS) is an assembly of people, equipment (hardware), programs (software), algorithms and procedures (methods) which ensure the processing, management, manipulation, analysis, modelling and visualisation of spatial data in view of solving some complex problems regarding planning and territory management.

GIS is an operational instrument irreplaceable in urban management, which assures authenticity, actuality and the objectivity of assessments in founding, expressing and implementing decisions and urban control.

An eloquent example is the information system "GIS URBAN" – implemented in 1998 within the City Hall of Timisoara, the capital city of Timis County.

2. Aims and backround

During its evolution in Romania, geodetic activity, especially cadastral works deled with many economical and political changes and obstacles.

That's why, nowadays, the most important task of the new cadastral policy is to assure the informatization of this activity, related to general and multipurpose cadastre, to provide a complete evidence of lands and buildings in order to design the territory in a convenient way.

In time, it's role remained just the same, but the methods, technical tools and principles in organization changed a lot due to the progress in informatics and technology specific to geodetic work and also due to the inner conditions of the Romanian society.

The main quality of a modern cadastre is represented by the use of digital data at any level of the process.

Transformation of the present informational system into database system supposes the organization of all information into separate files, which are closely related one to another.

The primary data processing for computation of the land surfaces for a property is quite simple at this first level but it becomes very difficult due to the huge number of parcels and owners and also to the existence of a great amount of corrections in the adjustment of the territory.

Designing a dynamic framework for planning and development, based on spatial information like Geographic Information System (GIS), can be created the master plan of any populated area.

The Master Plan is part of a larger process implying the use of Geographic Information Systems in order to develop an urban quarter. In this sense, the Master Plan is much more than a document for spatial development orientation; it is, above all, a strategic vision of the city based on directive principles that make a coherent combination of respect for natural balances, economic efficiency, market forces and social equity.



Fig.1. Timişoara Master Plan scale 1:5000

Timisoara is a large economic and cultural town in Banat region, in the west side of the country. It is also the capital of Timis county.



Fig.2. Timişoara – positioning and statistics

In recent years, Timisoara has enjoyed a significant economic boom as the number of foreign investments has risen constantly.

The idea of generating a unitary information system managed by the Town Hall of Timisoara started in 1996 with immovable cadastre which lasted in 2004.



Fig.3 Disposal of the Cadastral Sectors in Timisoara



Fig.4 Example for Cadastral Sector no.21

In the process of updating the database for urban cadastre, the field campaign from 2007 was organised involving the university –staff and students. The results completed the information database from the Urban Department of the Local Administration Agency.



Fig.5 Property Sheet

The process of completing and updating the database is a continuous one, at present in Timisoara there are performed projects regarding the town cadastre, transportation, green and cemeteries cadastre.

Today, the Cadastral 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.



Fig. 6. Timisoara urban GIS – extract

The update of the digital plan is made on the basis of the photogrammetric plan, 1:500 scale using the existing records, parcelling projects, urbanism certificates, documentations available in the archives, documents on land retrocession, and modifications of infrastructure, as consequence of systematization, etc.

Updating the Information System and its applications continue permanently improving solutions in:

- *Property information*: where, all communities have access to the national property system, or systems that permit property planning and administration, also illustration of community properties;
- *Demography:* within this area are lots of databases for the total population, old care, social care, school children etc.;
- Public Utilities Planning and Management: GIS systems for this area were among the first to be developed, and area is also well supported with such systems. In Timisoara, most of the inquired communities use GIS systems for this purpose;

- *Transportation Planning:* concerning transportation planning, there are some national projects, but in local communities there are hardly any GIS systems in use, although there are many traditional data base systems such as traffic flows, traffic capacity, traffic accidents etc.;
- *Natural Resource Management:* for ages, paper bound thematic maps have been used to point out the occurrence of natural resources. Such maps have naturally been easy to translate into digital maps and thereby easy to implement in GIS systems. This kind of systems are frequently used in the communities;
- *Environmental Protection:* the number of GIS systems is rapidly growing, due to the increased need of control and the environmental consciousness among the population ;
- *Urban and Regional Planning:* most of communities use GIS systems for urban planning. This is natural as the information content in the map is the basis for urban planning.

The Urban Planning Cadastre is a key element of a unified regulatory system which also includes adoption of special urban planning legislation on regional levels of management and development of modern zoning methodology and ordinances. An important role of the Cadastre is to build a legal and technological foundation for an enforcement system of land use regulations for all owners (including real estate, environment, infrastructure, utilities regulations, etc.), table 1.

Expected applications of:	Potential users of Urban Planning Cadastre						
Cadastral Information	administration	nlanners	investors	realtors	land	communities	legal
Cadastral Information	aummistration	planners	mvestors	r cantor s	owners	communities	system
issuing orders for physical planning, surveying, land resources assessment	X						
adoption, coordination and control on implementation of projects and target programs	X						
acquisition of data for research and project works in urban and regional planning for land use		X	X				
evaluation of investment options into various kinds of territorial economic development	Х	X	X		X		
assessment of basic land prices for taxation and fees for resource use	Х	Х	X	X	Х		
conflict resolution regarding land use and zoning regulations	Х		X	X	Х	X	Х
informing community and private owners about the land use and real estate regulation	X				X	X	
registration of property rights or renting agreements regarding land and real estate	Х		X	X	X		X

Table 1.Potential applications and users of Urban Planning Cadastre

Depending on the extension of municipality and the development tendencies, the Town Hall of Timisoara is currently working on a third edition of the General Town-Planning Scheme.

Its main goal is to ensure the harmonious development of the town with controlled growth.

Timisoara metropolitan area includes the settlements situated at 30 km distance from it. The development decisions for this area are taken by the Metropolitan Consultative Council.

Specific strategies in Timisoara Urban Agglomeration: infrastructure, housing, retail/commercial, industry and services, parks and environment protection, social balance, history, Universitary, sport and leisure, GIS.

This concept implies the elaboration of an information system integrated at the level of all Town Halls-as components of the Metropolitan area.



Fig.7. Timisoara Metropolitan area-proposal



Fig. 8. Spatial development scenario for Timisoara urban agglomeration (2005-2050)

The objectives of implementing the Metropolitan Area project can be seen through the following four steps:

- City Diagnosis;
- Detailing of Urban Strategies;
- Design of the new Master Plan;
- Detailing the Proposed Land Use Map

Benefits of using GIS in local administration include the following:

- 1) Increase efficiency;
- 2) Generate revenue;
- 3) Improve accuracy;
- 4) Automate tasks;
- 5) Promote efficient collaboration between public agencies;
- 6) Save time;
- 7) Provide decision support;
- 8) Manage resource;
- 9) Save money;
- 10) Enhance public participation.

Main steps for digitizing and data validation:

- Geo-referencing
- Load parameters (Layer definition)
- Vectorizing
- Digitizing text elements
- Topology
- Correction

3. Results and discussions

After the completion of all the graphic and alphanumeric data, these are integrated in the data banks which can be interrogated later using Internet Server.

By using Internet Server, the value of your geo-data can be multiplied by providing it globally to those who need them, when they need them, as soon as the administrator of your data and the potential users are connected to the Internet. For local network-based Intranet networks the same configuration and browser settings apply as for the Internet.

At urban and out-of-urban high stocked areas the multifunctional exploitation rule of resources can concern nature resources (water, soil, etc.) and human resources (technical infrastructure, housing etc.). The sustainable development of specified spatial systems stands for economic-social and ecological equable development. It results in a creation of more and more complicated and effective systems, thus a creation of multifunctional systems, which have a high economic, social and ecological effectiveness.

The consequence of the sustainable development implementation is a necessity of spatial system designing; Geographic Information System (GIS) can be such a tool. It gives quick access of updating and analyzing of spatial database. A GIS is capable of integrating large amounts of geographic data from different sources and is able to respond to non-routine questions. As a result, it can be a most powerful instrument in development of any Information Management System.



The realization of different engineering projects in different living areas, in order to establish an accurate organization of the lands and of the exiting building fond, as well as the design of various prospective plans in the urban and rural development, require a series of works, in order to obtain the best possible accurate record of all the existing buildings and of the lands which they occupy.

The purpose of town planning cadastre is to provide exact data on the situation of the urban fond in order to satisfy these tasks:

4. Conclusions

The described applications, as part of the Urban Planning Cadastre were 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:

- *economic*: Urban Planning Cadastre will continue to stimulate the adoption of national and local laws regulating land and real estates markets, and will provide information support for such markets with a comprehensive account of spatial organization in the assessment of land value and determining taxation rates;
- *social and political*: the uniform system of land regulation and equitable treatment of different groups of owners and land developers will lead to stabilization on the social and political arena, improving business climate for international investments;
- *spatial organization*: the currently spontaneous process of land use will be placed into the framework of realization of adopted projects of regional planning and master plans of cities.

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