Proposals to Set up a Geographic Information System for Locality Management

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***Abstract**: The Geographic Information System for the administration of the localities is imperatively necessary taking into consideration the complexity of the issues and the permanent adoption of decisions with a large area of influence in space and time.*

To implement the Geographic Information System for the administration of the localities improving the existing Information System turning it into a practical Information System without the modification of the organizational and institutional legislation.

Taking into account the large diversity of data used by a great variety of users, it is imperatively necessary to classify data in interest categories, to be collected and to be introduced by specialized institutions.

An absolutely necessary condition for the utilization of various sources is the accomplishment or the acquisition of proper programs which, essentially, provide data conversion (land, plans, registrar, and computerized data base) into a database of the informational system for the administration of the localities.

The methodology of this process must take into consideration a unitary structure of the synthetic indicators at the localities level and the analytic indicators at each parcel level.

The constitution and the achievement of a Geographic Information System for the administration of the localities suppose the existence of an endowment regarding the resources, the methods, the human resources as well as an important financial effort.

The need of a geographic information system

The locality (region, town, city) is an extremely complex social, economic, territorial, historical and cultural structure whose management and upkeep raises many problems and involves permanent decision making with different areas of influence in space and time.

The efficiency of decision making depends on an exact and complete knowledge of the region, which implies the existence of an appropriate information system, namely of a technical and organizing compound comprising a team of experts, equipment, methods and regulations that collect, verify, transmit, stock, analyze and present the data and information pertaining to a territorial area.

Certainly, this system has already been set up and it is not to be recreated from nothing or to be restructured radically.

Practically, all the bodies and institutions that contribute to the well-being of a locality have their own information and management system that allows them to fulfill their tasks to a certain extent and with certain efficiency.

As it can be noted from enough examples and situations, the current data management system presents a series of shortcomings influencing the efficiency of decision making, causes delays in solving problems, malfunctions of the relationship between the citizens and the administration, with a high degree of uncertainty regarding the direct and side effects of a certain decision, with over dimensioned safety coefficients that cover estimation errors; all these translate as a waste of human efforts and of material resources.

This situation is generated by several factors, some of which, that are technical and in direct connection with the topic of this paper, we mention below:

- Old information registration and reference technology;
- Lack of topographical reference;
- Data redundancy;
- Lack of analysis functions.

Premises and requirements

The main element at the basis of the new method to set up the locality management database is the computer with the intention to turn the current information system into a practical computer system without changing the organizational framework.

The proposed management system is based on space data and starts from the assumption that there is topographic basis necessary to report these data.

Another assumption is that the database will be jointly used by several institutions and bodies that govern the normal development of activities in a locality.

Considering the diversity of data that the multiple users utilize, it is necessary that the data grouped according to interest categories should be collected and introduced by several specialized institutions (the City Hall, the Statistics County Division, the Local Agency for Cadastre and Land Registration, the Public Utilities Companies, the Sanitary Divisions, etc.)

In order to prevent resource waste and differences of adjustment, the following are needed:

- A single topographic support;
- Mutual data access;
- Coordination;
- Planning;

Stages of information system development

We can basically identify the following major stages to set up and organize a geographic information system:

- set up the topographic base;
- collect and report (register) data;
- track changes in the territory and modify them in the database;
- draw reports.

Certainly, each stage implies resources, logical and staff.

Topographic Base Setup

The topographic base is represented by the digital map. The digital map implies proper equipment and specialized processing software as well as a material and human effort.

In order to create the digital map, there are two major activities:

- carry out geodetic and topographic surveys in order to update the topographic base;
- scan and digitize the extant maps that are true to the reality and comply with the technical norms regarding the precision, scale and content criteria.

Stages of topographic base development:

- chose the system of coordinates
- create the support network;
- planimetric network;
- altimetric network;

- create the topographic map.

Collect and report (register) data

The data required for locality management cover an extremely wide range so that only one institution cannot possibly collect and register them all. Thus, the main institutions that collect and store data for locality management are:

- The City Hall;
- The Statistics County Division;
- The Local Agency for Cadastre and Land Registration;
- The Public Utilities Companies;
- Private Service Companies;
- The School Inspectorate;
- The Sanitary Divisions;
- The Chamber of Commerce.

Also, the following need to be recorded for each data or data category:

- The main owner;
- The users;
- If there are any access and/or use restrictions.

The system's efficiency and its well function depend on the collaboration between various data owners and beneficiaries that are necessary to locality management.

Tracking changes in the territory and introducing them into the databases

In general, the institutions that hold primary data should also take the responsibility of tracking any changes that may occur in the territory, of recording them and communicating them to the other users.

Drawing reports

When the system is drawn, there is a certain number of standard reports necessary for database management and for generating new reports, set by the users.

Such reports are tables, of which we mention:

- Lands according to their use category;

Group	Service Category	Code	Number of parcels	Area -m^2-
Farm land	Tillable	1.1	0	0
	Hay-fields	1.2	0	0
	Orchards	1.3	0	0
	Pastures	1.4	0	0
	Vineyards	1.5	0	0
Total				0
Constructions		1.7	39	23565
Other fields	Water, reed	1.6	0	0
	Roads	1.8	0	0
	Forests	1.9	0	0
	Unproductive	1.10	0	0
Total			0	0
Overall Total				23565

- Parcels according to available public utilities;

Public utilities	Number of parcels	Area -m^2-
Water supply **A**	236	54663
Sewerage **C**	187	37168
Heating systems **t**	45	11554
Electrical power **E**	236	54663
Natural gas **G**	108	23414
Phone network **T**	187	37168

- Land register of parcels ;

No.	Land register no. of the estate	Address of the estate/place name	Estate group code	Destination group code	No. parcel	…	No. cadastral party
0	1	2	3	4	5		12

- Buildings according to type of property;

Types of property	Number of parcels	Area -m^2-
Government Public Property **N**	4	12534
Local Public Property **L**	16	33107
Government Private Property **S**	0	0
Local Private Property **A**	13	15644
Private Property of Physical Persons **F**	172	127580
Private Property of Legal Persons **J**	31	38936

- Buildings according to height category;

Building, height	No. of buildings	Built area	Total area
Ground floor			
Ground floor + 1			
Ground floor + 2			
⋮ ⋮			
With basement			
Without basement			
Total no. of buildings			

We also have to take into consideration the graphical representations (diagrams) and the map representations, meaning theme maps generated according to the information in the database.

Database structure

The database of the proposed information system contains two large data categories:
- Graphic data that make the digital map;
- Text data (attributes, non graphic) that are quantitative or qualitative characteristics of the objects in the field and represented on the digital map.

The graphic data are vectors and organized on several theme levels, and namely:

a) The support geodetic network
One level, type of data - point
Characteristics:
- type (planimetry, altimetry, common);
- marking type (boundary stone type, mark signal, benchmark);
- surface coordinates;
- surface precision (standard deviation coord.X, Y);
- elevation precision;

b) Traffic arteries
1. Level traffic junction (road crossings), type of data - point
Characteristics;
- Identification code (one for each locality)
- name (in squares)

2. Level road axes, type of data – line (uniting two road junctions)
Characteristics:
- name;
- direction;
- maximum weight;
- vertical outline cargo;
- coating type;
- number of lanes/direction;
- maximum speed/direction.

3. Level of made-up roads, data type – polygon
Characteristics:
- type (bridge, footbridge, pier, deck …);
- car category, pedestrian, mixed);
- outline.

c) Parcels
One level, type of data- polygon
Characteristics:
- Cadastral number ;
- destination;
- use category;
- type of property;
- owner;

- area (determined);
- area (recorded in legal documents);
- post address.

d) Constructions
One level, type of data- polygon
Characteristics:
- address;
- building name;
- destination;
- area (determined);
- area (recorded in legal documents);
- number of inhabitants;
- no. of levels;
- owner;
- value;
- condition.

e) Public network
Level junctions, type of data - point (representing network junctions: connections, ramifications, etc.)
Level transportation means, type of data – line (representing transportation line route).

f) Zoning
For each zoning we can consider a sole level with polygon type data.
We speak of two main categories:
1. Hierarchic zoning, where the polygons of a territorial division have to be contained in the polygons of a higher territorial division.
2. General zoning, where the outlines of a territorial division are no longer contained in the outlines of another.
Test data, also called attributes, refer to a certain graphic entity (point, line, polygon) that it characterizes.
In order to allow a coherent organization of the database, in order to achieve mass memory economy and to easily use the system, it is recommended that when possible, text data should be encoded. For instance, for the building type, a code of one letter could be used (A, B, C, or D)
Between the different categories of files and registrations, graphic and text, which make up the database, several mutual relations are established, thus ensuring coherent information and coherent connections among them.

ARTERIES

Name	Code	Post Numbers	Dimensions	Coating Type

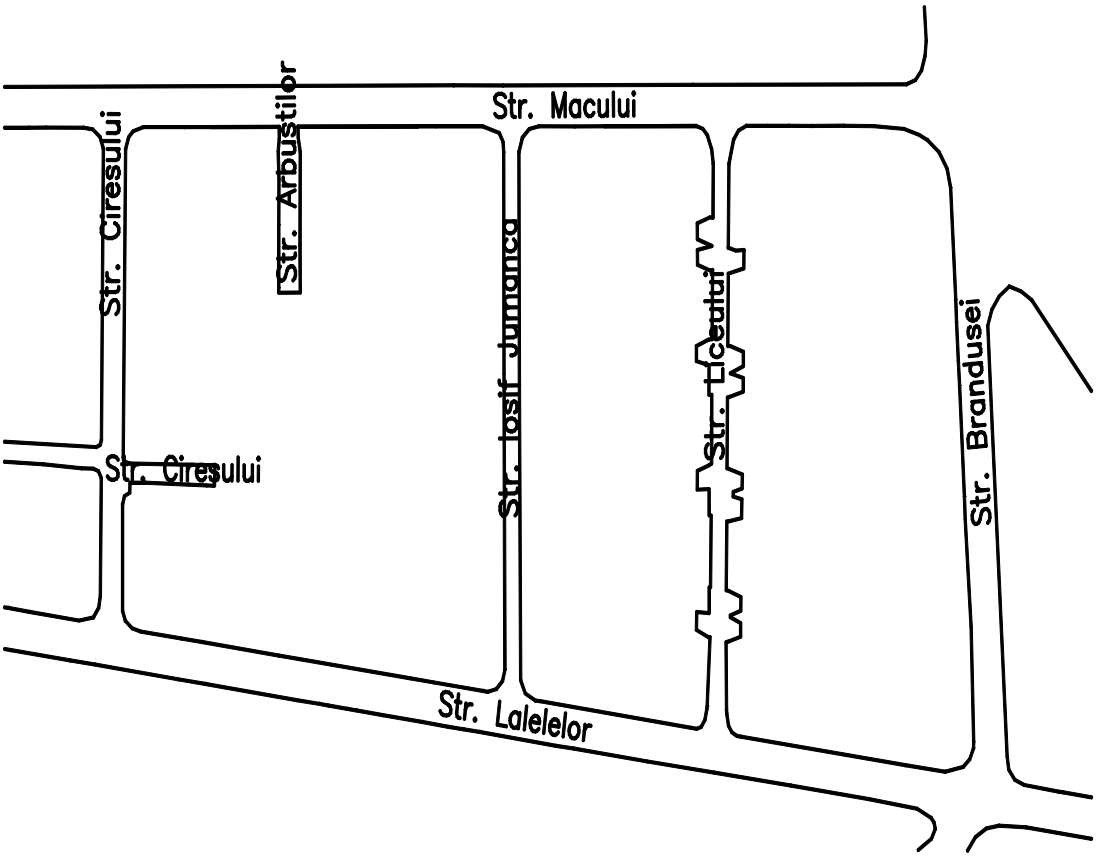

Fig. 1 Artery level

OWNERS

Name	Address	Cadastral Party	Code	…….

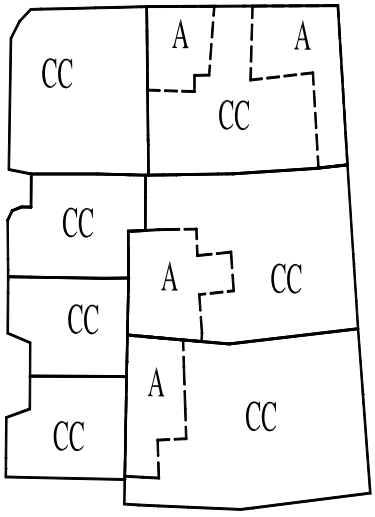

Fig. 2 Parcel Level

BUILDINGS

Dest.	Use	No. floors	Type of building	Owner

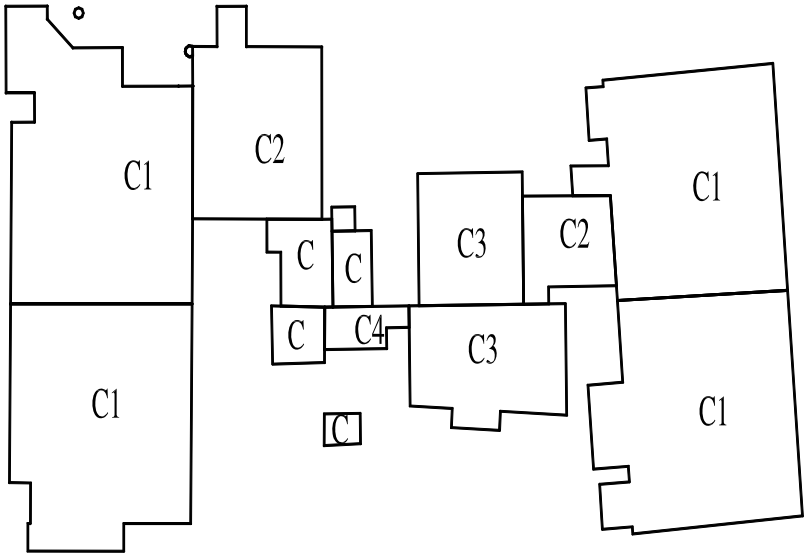

Fig. 3 Building level

Conclusions

The Geographic Information System for locality management is of extreme necessity in view of the complex problems and permanent decision-making with various areas of influence in space and time.

The Geographic Information System for locality management transforms the present practical information system without changing the organizational and institutional framework.

Considering the great diversity of data that multiple users utilize, it is necessary that all the data grouped according to categories of interest should be collected and introduced by several specialized institutions.

A necessary requirement for using various sources is the creation or purchase of adequate programmes that in essence ensure data transformation (field, maps, register, computerized databases, etc) as the database of the data system for locality management.

The methodology should have in mind a unitary structure of synthetic indicator sat the locality level and of analytic indicator sat the parcel level.

The Geographic Information System for locality management implies material, logical and human resources as well as an important material effort.

References

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