CONSIDERATIONS REGARDING THE ACQUISITION OF INFORMATION USED IN CADASTRE

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Abstract: *This project aimed to contribute to the studies and research undertaken for the accomplishment of a Cadastral Informational System which could contribute to the development and implementation of a unitary database used by the local public administration. The aims required in a first stage specialised research correlated to studies made up to the present, nationwide. During the second stage of the project there was created a graphic database at the level of Darmanesti village, county of Suceava, using a specialized software.*

Keywords: *cadastre, digital plan, properties, software.*

1. Introduction

The requirement that the decision makers should know and understand why and to what extent the use of technology becomes essential for the decision making process is one of the fundamental needs in order to develop the information strategies. Many of the institutions which are subordinate to the local administration adopt information strategies which are based on the implementation of complex computer networks while the IT applications are designed and created in such a way that they can be used by those who use them directly. The MapSys software is a reliable alternative for the purchase and use of information at the level of the local public administration.

This paper aims to highlight new aspects entailed by the creation of a graphic database, at the same time underlining the differences between the types of properties in different periods of time, all these based on cartography and topography documents. Thus, there will be taken into account the cadastre works implemented in 1855 by the Austrian Committee, there will be highlighted the differences appeared during the collectivization (1959-1962) on the topographic maps on a 1:25000 scale, then the changes appeared until 1980, so that they finally present the current day situation.

We consider that this is an updated issue and the contributions previously brought were mainly theoretical and descriptive. Nowadays, the people who want to find out information on the properties and lands from Darmanesti village rely on incomplete and old data since the only document available is the cadastre from 1880, the maps drawn during the communist regime and a few sporadic real estate registrations which do not offer a single and complete vision on the village.

In this paper, the authors present an experimental model for a graphic database, in a developed application in MapSys, based on information from scanned, georeferencing digitized maps and plans. The analysis started from the sources offered directly by the local authorities, the maps already existing at the Cadastre and Real Estate Office in Suceava, as well as the maps from the county archive.

2. Presentation of MapSys software

MapSys is a software designed by GEOTOP under the guidance of PhD Professor Gherasim Marton. This software is based on the old ArcSys software and it plays a main role for an efficient processing of the geographic and information data.

The MapSys software is mostly used by private companies, working in topography, geodesy and cadastre while some of the state institutions or administrations we could mention are the county offices, the National Office of Cadastre, Geodesy and Cartography, town halls, Institutes of Design and Administrative Offices in the Urban Planning network.

MapSys 9 is the latest version launched by GEOTOP, it is also a GIS software including enough functions to create and manage the digital maps as well as the spatial data sets, to process the raster images or the aerial photos, to generate the digital model of the land and last but not least, to protect and monitor the consistency of the spatial data.

When used on the Internet, MapSys 9 makes it possible to display the web maps as a graphic layer in the current projection, thus offering an unlimited source of theme maps continuously updated. The new MapSys 9 has an increased functionality for all the design and use of spatial information stages.

The operations in digital image processing are helped by intuition graphic functions. In order to specify the geodetic reference point for the works, the user can choose new or already configured coordinate systems, being able to immediately change the data by indicating the destination coordinate system.

The possibility to generate excerpts and define the differential access to the software functions and data as well as to index the undertaken operations allow a well-informed processing, in the case of using MapSys 9 in a computer network. The creation of the digital model of the land allows the presence of level curves and coloured hatch surfaces. The 3D models can be designed and visualised in interactive functions, in a separate window. The thematic layer function allows the creation of complex thematic maps and dynamic representations, based on the features of the topological objects.

MapSys 9 Software presents the following main functions: data purchase and processing, topology, analysis. As it includes the GIS basic elements, the information included in the database can be accessed by internal or external functions, such as: forms, charts and other end-products offered by the MapSys and MS-Office functions, standard queries (selection, conditioned search), external search, thematic maps with key.

3. Creating a graphic database

This paper aims to bring a contribution by means of the studies and research undertaken for the creation of the Cadastre Information System to the development and implementation of a single graphic database for the local public administration. In order to accomplish all the objectives, the first stage included a theoretical documentation in the field correlated to the research undertaken until now, on a national level. During the second stage, part of the project we proposed, there was created a graphic database for Darmanesti village, Suceava county, with the help of a specialised software.

In order to accomplish the aims, there should be taken into account the following aspects: there is required a single source of information, the doubled information should be excluded, all the interested beneficiaries should have quick access to it and the information should cover the whole area of interest.

3.1. Presentation of the area under study

The administrative division called Dărmănești, as well as the village is situated in the east of Suceava county, approximately 15 km away from Suceava town, 16 km away from Radauti town and 22 km away from Siret town. It includes six villages which lie on the hill slopes, thus being protected from the overflows and floods of Suceava river flowing in the southern area of the village and of Hatnuta brook, flowing from the northern to the southern part of the village; the six villages are called : Călinești Vasilache, Călinești Enache, Dărmănești, Măriței also known as Mărițeia Mare, Dănila and Mărițeia Mică.

The southern border of the division is Suceava river, the village of Todiresti is the eastern neighbour whereas the border towards Patrauti village is the forest which belongs to Patrauti forest division and Bradului brook. In the western part there is Granicesti village and in the north Serbauti village founded in 2003 according to law no 171, it used to part Calafindești division.

The area of the division is approximately **5142 ha** out of which Dărmănești village covers around **1832 ha** on one side and the other of E85 motorway; the village of Măriței, the most important one in the division covered approximately 1730 ha, the village of Dănila 509 ha, the village of Mărițeia Mica 256 ha, the village of Calineși Enache 510 ha and the village of Călinești Vasilache 305 ha. The administrative borders vary depending on the surfaces of the strip ground outside of the built-up areas and the number of inhabitants who own lands in the area; thus, a series of lands near the northern border towards Șerbăuți village were taken out of the area of Dărmănești division and included in Șerbăuți.

There are issued more than **2500 property certificates** in the area of Dărmăneşti division and they prove the rights of the owners. Nevertheless, most of the property owners are no longer alive but they handed in the property forms soon after 1990, according to the vesting deed provisions included in Law 18/1991. Their inheritants completed the inheritance papers and procedures in a very small number, consequently a great number of people among those who are not registered in the Real Estate Register will have the legal right of posession on the lands and households within the built-up area, for five years.

The situation for the lands outside the built-up areas is connected to the accomplishment of the land parcel maps while the law requires the authentic property documents should be registered, namely property certificates, inheritance certificates, partition certificates or purchase papers. However, the inhabitants of the division, in a great number, use the lands consequently to obtaining some papers signed with witnesses, eventually sealed and signed at the village hall and under these conditions, it is very difficult to identify all the land parcels and registered or unregistered owners, since the right of user was handed over through 3 or 4 non-authentic papers while the initial evidence or owner had been lost.

The current administrative division covers a surface of approximately 5142 ha which are divided according to the usage and property certificates as follows: 2.850 ha of arable land 775 ha of pastureland, 34 ha of grass lands, 5 ha of orchards. The forests and the other forestlands cover approximately 1.005 ha. The running and still waters cover 98 ha and other fields 375 ha. These data refer to 2006 and act as informing papers.

These data do not reflect the current day reality of the administrative division and certainly not the situation registered in the systematic cadastre implemented since October 2012. However, the registers were kept by the Local Council and they were put to use in 2006 at the rquest of the National Agency of Cadastre and Real Estate Publicity.

3.2. Graphic data acquisition

a. Georeferencing scanned maps and plans

The raster graphics resulted after scanning the map or plan are inserted and processed in MapSys, as regards the dimension, the brightness, contrast and colour features. The visualizing options indicate an order previously established by the user in case the raster image and the vector have overlapped (transparency) and for greater processing speed of the raster graphics, some of the visualizing features might be excluded.

After these preliminary operations, the raster image is georeferenced by changing the coordinates from the graphic area of the screen to the real coordinates system in the field. In order to do this, first there should be established all the features and characteristics of the area under study.

The basic geometrical entities which are needed to operate in the vector system are *the point, the line or the curve and the polygon.* The points represent topographic details with certain coordinates (eg: geodesic triangulation point) or objects on the field which are too small to be presented on a scale, considered adimensional elements specified in rectangular coordinates (X,Y).

Georeferencing is the process by which a digital map is associated to real geographic coordinates. There are applications for which it is not necessary to switch to geographic coordinates, as it is enough to use a system of Cartesian coordinates. In other words, georeferencing means establishing with high precision the geographical coordinates of certain places and pinpointing them on the digital map, in the end the other points are automatically estimated according to the processing formulas. This type of operation is also called continuous georeferencing.

In the raster case we do not have any system of coordinates defined by the image. Georeferencing means pinpointing with maximum precision certain pixels dispersed on the image to which there are associated the geographic coordinates previously known in the software. The geographic coordinates of the other pixels will be estimated using the conversion formulas as well.

Consequently, the resolution of the image presents a greater importance than establishing the coordinates. Mention must be made that the resolution of a digital image is given by the maximum display on the surface of the land to which corresponds one pixel. We can say that the precision of pinpointing the pixel to which are attributed the geographic coordinates is related to the resolution of the image.

Thus, the graphic database will be created on 1: 2800, 1:25000, 1:5000 scales and the current day cadastre maps which will be digitized will be the starting point for the cadastre documents to be created later on.

b. Digitization of the scanned maps and plans

The greatest quantity of maps and plans which can be used by the administrative office are the graphic maps drawn in time. Their use in the automation process of the cadastre works strictly depends on the conversion of the plans in numerical, respectively digital form. The operation of bringing these plans in numerical form is called digitization. The technology used for this purpose are called *digitization devices*.

Digitization is the process of acquiring data from maps and other plans. The graphic information gathered from the already existing topographic maps was processed in **MapSys** through the digitization process on the screen. Digitization is the method by which data are acquired by converting the information on a map/plan into digital vectorial format.

Due to the functions used to increase the graphic information, digitization using the screen brings more advantages as the pinpointing precision is better. Digitization using the screen space uses the scanned and georeferenced map/plan as starting point.

There have been digitized the maps on 1: 2800, 1:25.000, 1:5000 scales as well as the cadastre maps, thus obtaining the border lines of the built-up areas, of the roads, buildings and waters.

c. Queries in the database

Queries are used to take out data from maps or plans and they represent a simple method of finding information from the already existing databases. Queries can be made for data which are included in the database or for data resulted after certain analytic operations. Queries in the GIS applications are requests to find specific information from the graphic and alpha-numerical data made using certain selection operations.

The creation of the *thematic maps* is the process by which the features of the cartographed objects are displayed using graphic elements which make the maps more efficient and easier to read. A thematic map can be accomplished starting from the information related to the graphic features of the source objects which are attached or from the topological data. The functions of the automated cartography on themes make possible the creation of thematic maps based on features, object data, block attributes or values of the external databases.

Considering that maps, with the real meaning of the word are on a scale larger than 1:25000 (including this one), and spread plans to a maximum of 1:10000, they can highlight the following aspects:

- a change in the water flow due to natural erosion, high water discharge and others, as well as artificial causes, such as urban planning, damming, sewerage systems, so on.
- modernization of roads and their expansion as a consequence of increased population;
- widening of the inhabited areas;
- drainage systems to increase the arable lands;
- creation and modernization of the railroad and its outbuildings (sidetracks, yards, stations, block stations, engine sheds, platforms and so on), the expansion of the highways and roads to the railroads;
- complex building works – bridges, viaducts which shorten the ways or avoid the old riding ways;
- administrative, religious, industrial, small scale manufacturing buildings and others.

All these led to the deactivation of large agricultural fields. This happened especially during the communist period when the agricultural cooperatives brought together mainly the lands outside the built-up areas and they exploited the fields in a unitary way thus changing the split-up aspect of the land and built new roads which were gradually modernized. With the same aim of increasing the agricultural turnover there were built dams, sewerage and drainage systems thus changing the geographical features of the land. There were also decreased the built-up areas on surfaces reduced to a maximum area.

After 1991 the lands were given back to the former owners and the split-up appearance could be noticed again, most of the times to the detriment of a viable development of the village and even more, to obtain small profit or gain profit for a short period of time.

By comparing the data obtained in for the four years included in the study, may notice the following significant changes related to:

- lands with buildings (Table 1 și Fig. 1):

Table 1. Lands with buildings

Anul	1855	1961	1980	2012
Suprafață (%)	**21,63**	**28,78**	**45,56**	**56,16**

- arable lands (Table 2 și Fig. 2):

Table 2. Arable Lands

Anul	1855	1961	1980	2012
Suprafață (%)	**45,36**	**41,36**	**35,82**	**24,05**

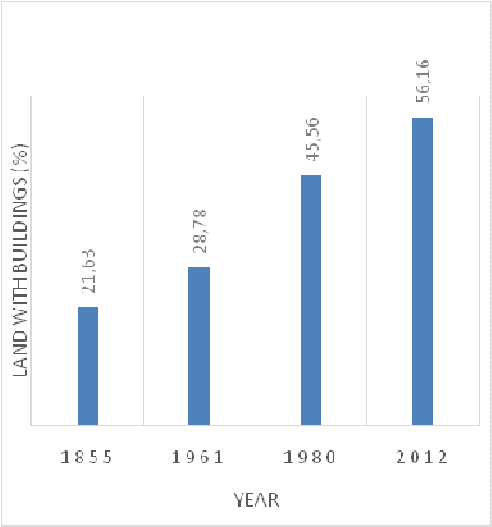

Fig. 1 Evolution of lands with buildings

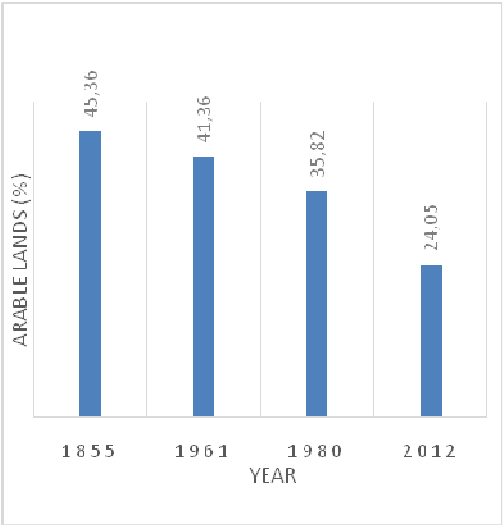

Fig. 2 Evolution of arable lands

4. Conclusions

In conclusion, the open access to information, actually meaning that every citizen can have access to the information he might need by means of the modern technology, generated new means and procedures of offering and spreading information services and products.

Information can be obtained in the most diverse forms of presentation and spreading. There aren't any fields (from those considered traditional to the most modern ones) which do not depend on information, which do not take into account what is going on in the world. In this context, we can highlight both aspects of spreading the information as well as having access to it due to the great number and wide variety of information services and products.

5. References

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