

## CREATING A INFORMATIONAL CADASTRAL SYSTEM FOR THE UNINCORPORATED AREAS

Mihaela CARDEI<sup>1</sup> Dan PADURE<sup>1</sup>

e-mail: cardei\_mihaela@yahoo.com

### Abstract

This paper is dedicated to a current issue in our country, which is the inventory of properties in the territorial administrative units. Along with the inventory has been achieved also transposition of analog textual information (on paper) in digital format, a process that brings a number of benefits, among which we can mention: the access to information can be done from anywhere, some information can be password protected and only certain people can access, data is accessible anytime, digital information can be easily updated. The general objective of this paper is the development of a database as the central element of Cadastral Informational System, which is a structured collection of data and informations, which is necessary and also sufficient to satisfy user requirements.

**Key words:** cadastral identifiers, property title, properties, informational system

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 data base used by the local public administration. The aims required in a first stage specialised research correlated to studies made up to the present, worldwide. During the second stage of the project there was created a graphic and bibliographic database at the level of parcel 46 from Holboca village, county of Iasi.

The purpose of this paper is to highlight the necessity to create an Informational System and to implement it in the local administrative departments. The great volume of information included in the plans held by the city halls, the perishable attribute of the analogic media, the problematic handling and difficulty in analysing and interpreting the information are only a few of the disadvantages of non-implementing such a Cadastral Informational System.

The accomplishment of such a system, in a unitary concept for each administrative division would allow the inclusion of all data on national level, making it easier to obtain synthesis reports on the stage and evolution of the land register in each administrative division, on the structure of the property titles, on the economical value of the lands and buildings, all so necessary in the current transition stage.

For the accomplishment of the main aim of the project, there have been considered the legal

regulations, abiding by the main laws supporting the system of property registration as well as the technical regulations from the cadastral sector. Hence, the project implementation was presented in three different stages:

- research and gathering the graphic and written cadastral information;
- make the topographic measurements;
- process the information and elaborate an experimental model for parcel 46.

The importance of the project was highlighted firstly by the major objective led in by the creation of a relational database which would meet the requirements of the public community and would manage properly the legal data related to the properties.

### MATERIAL AND METHOD

This paper concentrates on a current issue faced in our country, namely the inventory of the lands from all administrative divisions. At the same time with the inventory, the analogic information (on paper) was processed in digital format, a process which brings a series of benefits, out of which we can mention: the information can be accessed everywhere, some information can be protected by password and only a few people can have access to it, the data can be accessed anytime, the digital information can be updated easier.

The general objective of this paper is the creation of a database, as a central element of the Cadastral Informational System, in the form of a well-structured collection of data and information,

<sup>1</sup>“Gheorghe Asachi” Technical University of Iasi, Romania

necessary and sufficient to meet the demands of the beneficiary.

The specific objectives of the project are defined by the following aspects:

- create a database with information on the owners and the properties they have.
- create a Cadastral Informational System using a type of GIS software
- make the connection between the digital platform and the database and the accomplishment of the Cadastral Informational System.
- use and make searches in the database.
- draw conclusions on the basis of the searches made.

## RESULTS AND DISCUSSION

In order to accomplish the aim of the paper we have analysed parcel 46, part of the unincorporated area of Holboca village, county of Iasi. We have identified, in the overall cadastral map on a 1:10000 scale, the delineation of land plot 750 as part of the 46 parcel under the category of agricultural land. Parcel 46 is situated in the western part of Holboca village, bordered at the north by DE 626, at the south by DE 747, at the east by DE 478 and at the west by DE 752. The surface given by the measurements is 173.3229 ha. Parcel 46 is divided into three parts, delineated by a road in use.

### The Accomplishment of the Cadastral Informational System

For the accomplishment of the Cadastral Informational System we have used different types of data, held by the City Hall and the Cadastre and Real Estate Publicity Office. There were needed the following materials:

#### A. Graphic data

- cadastral map on a 1:10000 scale, for the unincorporated area of Holboca village, county of Iasi, finished in 1989.
- map of parcel 46, from the database held by the village hall of Holboca.

#### B. Written data:

- property titles issued according to Law no 18/1991, Law no 1/2000 and Law no 247/2005.
- land plot report taken from the digital archive of property titles archive – a DDAPT application.

### Creation of the graphic database

In order to create the parcel plan for Parcel 46 from Holboca village there was used the TopoLT software which is included in the AutoCAD Map platform, an essential kit for the cadastral mapping. This software allows operations which are very useful in cadastre: captions, multiple line drawing, inventory of the coordinates,

report the coordinates, insert symbols according to codes.

The order of the owners in the parcel is that of the analogical map and the surfaces are taken from the property titles. The final result is a digital map of the parcel which will be saved as a .dxf.

### Creating the written database

The database plays a very important part in the accomplishment of a Cadastral Informational System, hence there should be paid special attention when creating it.

Starting from the report downloaded from the DDAPT application, this was later checked and completed. Each property title was checked in order to see if the data mentioned there are the same with the data included in the report. The database was completed with information on the neighbourhood, this information being necessary for the searches to be made in order to discover the correct and incorrect titles.

While checking the titles there were noticed mistakes in spelling the name of the owner in the analogic map and the property title. There were identified name variations such as Ion - Ioan, Constantin – Costache or Costachi, Bacăuanu – Băcaoanu, but as there was not available a database which includes documents to identify the owners, we could not know which variant was correct. There could be discovered other errors of the cadastre identifiers such as part of the parcel or land plot.

At the end of the process of checking the titles and the parcel map on paper there were left a few titles which were doubled: the titles had been issued by the deceased owner and then by the legal heir or even twice on the same owner.

The owners who do not possess a title but have a validation certificate were also included in the database, while those who do not possess any certificate are mentioned as holders.

### Uploading the graphic database

The drawings exported from Autocad as .dxf files were also attached a system of coordinates (in this case, Stereo 1970) using the ArcToolbox application, later they were imported in ArcMap. The graphic objects imported by the ArcMap application are automatically grouped in a database which includes data on the surface, the geometrical figure and a unique identifier.

### Uploading the written database

The database will include information on the owner, the type of property title, the number of the title, neighbourhood and surface. The structure of the database is presented in *table 1*.



Figure 1 Parcel 46, excerpt from the cadastre map

Tabel 1

**Structure of the database**

Name of the column	Description
No	Ranking of the owner in the parcel
County	Name of the county
ATD	Name of the village as part of the cadastre division
Type of Title	Certificate which proves the quality of owner (property title, property certificate, sale/purchase contract)
Number of the title	Number of the property title/certificate
Number of the cadastre division	Number of the cadastre division
Parcel	Number of the parcel in the cadastre division
Category	Category of the parcel
Owner_Holder	Owner of the property
Neighbour_North	Neighbour at the north
Neighbour_South	Neighbour at the south
Neighbour_West	Neighbour at the West
Neighbour_East	Neighbour at the East
Surface_certificate	Surface of the property in the property title
Duplicate	Titles with the same owner or cadastral identifiers (if this is the case)

The imported written database can be an Excel file, the link with the graphic information being made by the unique identifier in ArcMap. This link is required in order to correlate the information in the written database to the graphic charts.

The link between the two databases is checked by selecting a record in the text database and making sure it is the same in the graphic database. Then, the written information about a certain land plot can be also accessed by the HTML Popup window.

**How the database is used**

The final aim of a Informational system is to offer the users correct and detailed information in the shortest time. In order to make analyses there are used different types of queries, for example the ArcMap application uses the SQL type – (Structured Query Language). After the search is launched, a new window is opened in which there can be typed a command line or the user can select the usual operators such as LIKE, AND, OR. The result of the query will be shown in the graphic window as well as in the database.

For the newly created application there have been made queries so as to find the titles which included the wrong parcel or land plot, wrong neighbours, to see if there are any duplicates or if there are any owners who do not have a property title or if there are any spare parcels.

a. *The query for the parcels without a property title*

The query for the parcels without a property title had 4 results/records.

b. *The query for the property titles which include the wrong lot*

By means of the SQL type query we could identify the property titles in which the land plot

was written wrongly. The result outlined 5 titles.

c. *The query for the property titles in which the parcel was written wrongly*

In what followed we made a search for the property titles which included the wrong parcel. The result outlined 5 titles.

d. *The query for the titles related to the neighbourhood details*

In order to identify the neighbourhood details and track the mismatch between the neighbours written in the property titles and what the real neighbours are (as in the analogic parcel map) we made queries to see if the neighbour on the north from title "i" coincides with the owner from the title "i+1" and the neighbour on the south coincides with the owner from the title "i-1" and the neighbours on the west and east coincide with DE 748, DE respectively.

The search in which the titles would not present any error: wrong land plot or parcel, no mismatch between the neighbours written in the property title and the analogic parcel map had a rather unsatisfactory result: less than 50% of the titles were correct. The result of the search in case of titles which present at least one error from the one mentioned above summed up 134 (figure 2).

DANCEANU V CATINCA	LEAHU GR ANICAA	BABULEA A VASILE	DE 748	DE 752/1
LEAHU GR ANICAA	PADURARU MARIA,IONITA ELENA	DANCEANU V CATINCA	DE 748	DE
PADURARU MARIA,IONITA ELENA	GAVRIL V CONSTANTIN	LEAHU GR ANICAA	DE 748	DE
GAVRIL V CONSTANTIN	LEAHU GH NECULAI	PADURARU MARIA,IONITA ELENA	DE 748	DE
LEAHU GH NECULAI	DANCEANU ST DUMITRU,MASTALERU	GAVRIL V CONSTANTIN	DE 748	DE
DANCEANU ST DUMITRU,MASTALERU	DANCEANU ST VASILE	LEAHU GH NECULAI	DE 748	DE
DANCEANU ST VASILE	DANCEANU ST DUMITRU	DANCEANU ST DUMITRU,MASTALERU	DE 748	DE
DANCEANU ST DUMITRU	CHIRILA L MARIA	DANCEANU ST VASILE	DE 748	DE
CHIRILA L MARIA	MITTELU DUMITRU	DANCEANU ST DUMITRU	DE 748	DE
COZIANU C D MARIA,COZIANU C D ELE	BOTEZATU T NICOLAE	CHIRILA L MARIA	DE 748	DE
BOTEZATU T NICOLAE	MITTELU GHEORGHE	COZIANU C D MARIA,COZIANU C D ELE	DE 748	DE
GRIGORAS GH MIHAIL,MITTELU I AURE	BACAUANU ILEANA,BACAUANU GH C-TI	MITTELU DUMITRU	DE 748	DE
BACAUANU ILEANA,BACAUANU GH C-TI	BACAUANU GH CONSTANTIN	MOST MITTELU	DE 748	DE 752/1
BACAUANU GH CONSTANTIN	IONITA M GH DUMITRU	BACAUANU ILEANA,BACAUANU GH C-TI	DE 746	DE
IONITA M GH DUMITRU	BACAUANU P AUREL	BACAUANU GH CONSTANTIN	DE 748	DE

Figure 2 Logical scheme to identify the mismatch between neighbourhood

e. *The query for the parcels which had several property titles*

During the check of the property titles we noticed that there are parcels for which two property titles were issued, one of these being a duplicate.

The duplicate titles were introduced in the database in a new column entitled "DUPLICATE". The query had a result of 6 parcels for which two titles were issued (Figure 3).

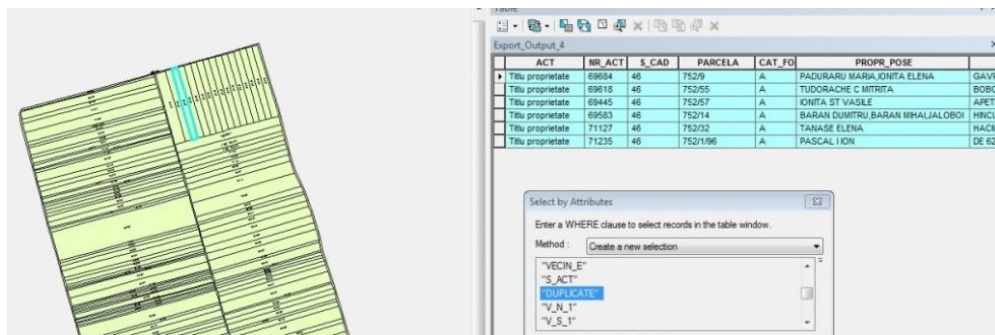


Figure 3 Result of the duplicate title query

f. *The query for the parcels with two certificates of ownership*

At the end of the check for the property titles in comparison with the analogic parcel map we noticed that there are parcels for which there were not issued any property titles. After consulting the cadastre engineer from the city hall, we discovered there are people who own a validation certificate and this paper was introduced in the database. The people who did not present any type of property certificate were mentioned as holders. The search highlighted the people who have a certificate and those who are holders, respectively.

g. *Search for the areas at the disposal of the Local Committee*

Out of a total of 173.3229 ha from 46 cadastre division from Holboca ATD there was left an area of 1 ha, land at the disposal of the Local Committee of Land Register and this area was recorded as "Reserve". The query showed the position and surface of this reserve.

h. *Identifying the errors from the property titles*

The analyses of the 232 property titles pointed to a series of irregularities, namely errors. The errors in typing or filling in the information appear either due to the lack of experience of the people working at it or due to the lack of a well-structured database regarding the properties from some towns and villages held by the local councils. We could mention a few of the errors in writing such as misspelled names of the owners, wrong land plot or parcel, wrong neighbours.

Types of errors:

- Errors due to a poorly structured database or the lack of necessary information. Thus, the lack of cadastre maps, parcel maps, poor professionalism of the public servants specialised

in cadastre working for the local councils lead to the appearance of serious errors. For these reasons, there are errors related to the land plot on which the property lies (there was written the wrong plot). As regards the parcel mentioned in the title, there can be found errors such as: wrongly written parcel or parcel with no ranking in the lot.

- Errors due to the mismatch between the analogic parcel map and the property title as regards the name of the owner, the parcel or the lot.

- Errors regarding the mismatch between the neighbourhood details written in the property titles and the neighbours from the parcel map.

- Errors which regard a duplicate title issued for the same area, on the name of the same owner or rightful heir, errors due to the lack of a database held by the local or county councils.

The results of the SQL type queries were presented in a suggestive manner, namely in charts. Thus, for the surface of 46 parcel, there were issued 232 property titles and 2 certificates of property. The difference remained is owned by someone who does not have any kind of property certificate, while 1 ha is at the disposal of the Local Committee of Land Register.

Then we discovered that out of the total of 232 property titles, 134 present errors in writing, 92 are correct and 6 are duplicates of other titles.

## 2. Uploading the newly created Informational System on an online platform

The group of programs offered by the Environmental Systems Research Institute includes an on-line application which allows the users to upload GIS content on a platform which can be accessed by anyone who is connected to the internet (Figure 4).

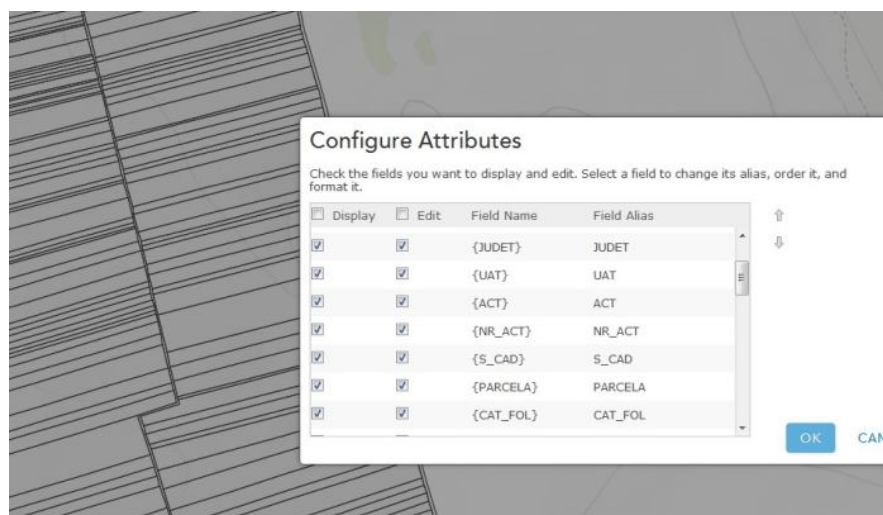


Figure 4 Selecting the active fields in ArcGIS Online



Once the content was uploaded, the application offers options in visualizing it as well as choosing a basic layer (topographic mapping). The author of the content can select the fields from the database which will be displayed at the selection of a graphic object.

The ArcGIS Online platform is useful because it allows practically anyone who is interested in the content to see it, without having to install any software while the information is visualized by means of a browser (Figure 5).

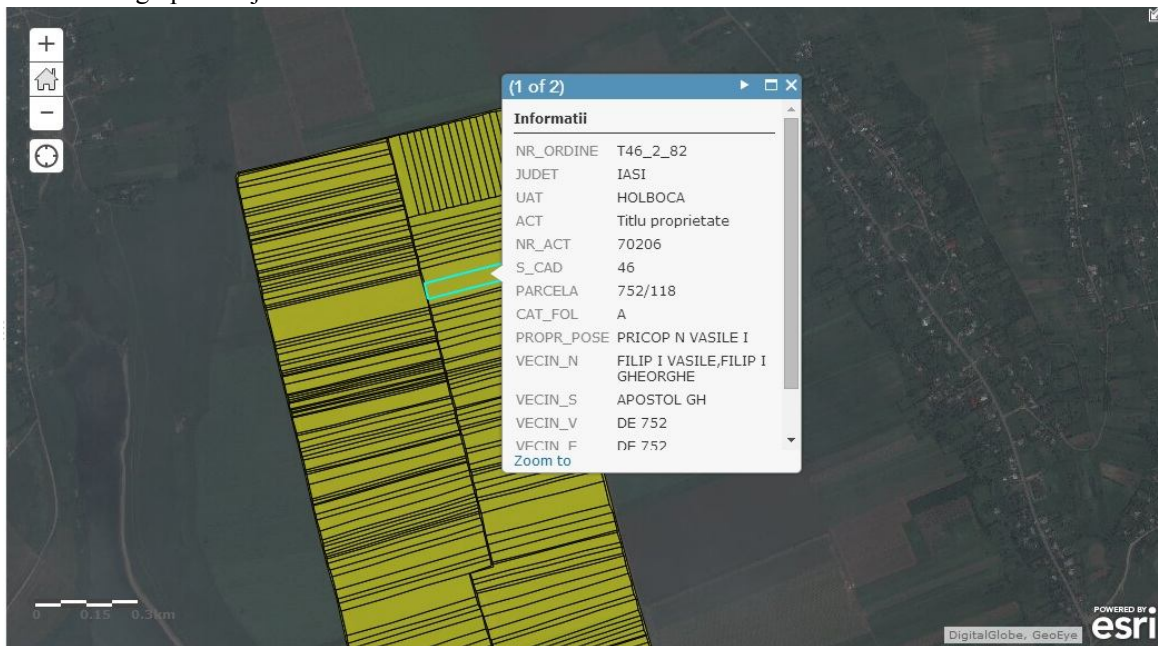


Figure 5 Vizualizing the informational system created in the ArcGIS Online application

## CONCLUSIONS

This paper presented the stages which should be completed in order to design and implement an application which is based on a cadastre and legal database. We considered a very clear and logical presentation of the work method as well as of the stages required for its development, starting from the design stage to the final usage, so that this paper could meet the main demands for which it was conceived.

The tackled theme is even more important considering that it has a direct influence on the practical work imposed by the Cadastre and Real Estate Law and this is basic requirement for the accomplishment of a proper legal frame. This frame is also imposed by the necessity to efficiently use the financial resources, to establish a unitary system of recording the property, precise delineation and legal provisions for all the property owners at the level of the administrative and territorial divisions throughout the country.

The application highlighted the great number of property titles which include errors

related to the neighbourhood, the name or surname of the owner or more serious errors which regard the cadastre identifiers which had been wrongly introduced in the property papers.

We consider that the legislation in force should be updated, the property titles should be corrected in a shorter time, in an administrative manner.

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