RESEARCH ON DEVELOPING 3D CADASTRE IN ROMANIA

Laszlo Beata, Ana Ciotlaus

Faculty of Horticulture, University of Agricultural Science and Veterinary Medicine Cluj-Napoca, 3-5 Mănăştur Street, 400372 Cluj-Napoca; beacska.laszlo@gmail.com; aciotlaus@yahoo.com

Abstract. Urbanization presents a problem for our country because of the current population density in certain cities, and because we know that land resources are limited. Land values in city centers are becoming larger that is why exist the need to effectively manage land resources by exploiting the land and property land. Globally there is a trend to adopt and use 3D technologies to improve land management and property. In the general cadastre on land and property management trend is to implement 3D cadastre. The introduction and use of technology to improve the management of land and properties depend on the structure and current relationship of institutions through which these processes menus. In this paper we describe the evolution of 2D cadastre in Romania and the possibility of developing the 3D cadastre.

Keywords: 3D cadastre, land administration system, GIS, cadastral data sources, database

INTRODUCTION

Definition of General Cadastre described with Law no. 247/2005 is "general cadastre is the unitary and compulsory system of technical, economic and legal buildings all across the country; By building means one or more adjacent parcels, with or without construţtii belonging to the same owner, The means the area of land plot with the same category of use, out of the general cadastre system is meant for the entry in the realty advertising. "

Cadastre can be defined as a registry that keep records of real estates. During the time he meant land resources inventory by human activity to determine taxation buildings.

Evolution cadastral activity in our country has experienced several stages. Its introduction in 1974 was made a part of the territory of our country after the system used by the former Austro-Hungarian empire. After World War meant just to measuring the lands and newly created parcels. During this period the national higher order geodetic network was built, maps were made for defense and have made numerous surveying.

With the entry into force of Law no. 23/1933 was adopted introducing the modern cadastre uniform throughout the country in terms of regulations the geodetic networks, plans and cadastral registers. In 1955 merges farmland to agricultural collectivisation occurred because rules in the communist period. After the revolution in our country in 1991 cadastral activity was limited to the application of the Land Law no. 18/1991 which was updated register land in zoning for land owned by former agricultural production cooperatives and agricultural associations. The land was regained to the rightful owners.

By applying general cadastre and real estate publicity Law since 1996 uniform regulations are introduced across the entire country. Are new concepts to achieve uniform correlation modern cadastre activities in the field of cadastre, geodesy and cartography.

Complexity of accounting and inventory lands and other properties (water, forests, buildings, etc.) has developed gradually along the times because the technical, economic and legal needs. Today they add requirements and needs related to the use of resources in the context of sustainable development and environmental protection.

Today cadastre is an information system for all land and real estate, regardless of their destination and the owner. It consists of the general cadastre and special cadastres, called today and domain specific information systems.

The nationally efforts made by introducing general cadastre, program that is running today, the current trend is the introduction of 3D cadastre because its significant advantages. Looking to the future introduction is a necessity and will depend on European policies or other state cadastre trend.

MATERIAL AND METHOD

Since 2004 established The National Agency for Cadastre and Land Registration (ANCPI), a public institution, which has as a priority the development and improvement of an effective registration system throughout the country, according to European standards. This institution wishes in the future to develop a coplex computerized database, unitary, but also accessible and easy to maintain in the field of cadastre and real estate publicity.

The agency has the authority, at the county level, of 42 cadastre and land registry offices (OCPI), local of 132 cadastre and land registry offices (BCPI) and the National Centre for Geodesy, Cartography, Photogrammetry and Remote Sensing (CNGCFT).

ANCPI developed a centralized application for managing real estate in Romania called "e-Terra", which provides spatial data standardization at national level in terms of land and buildings, creating a uniform and consistent database (www.ancpi.ro).

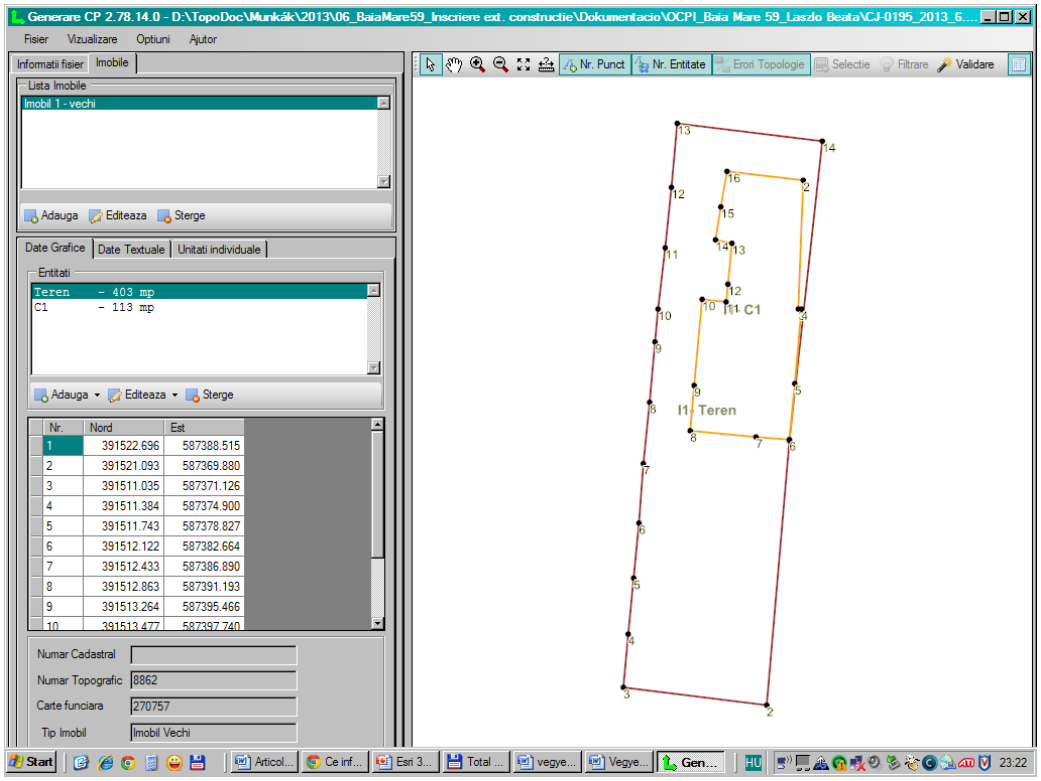


Fig. 1. Database in the "e-Terra" aplication

Electronic land register is generated using the program and contains information on:

- serial number of the building or the land
- address
- building surface
- destination
- categories of use
- construction
- building plan with the neighbors
- property description
- coordinate inventory location for each property separately.
- name of the owner
- legal act or fact which is the title of ownership
- servitudes constituted
- legal facts, personal rights or other legal relations, and actions regarding the property and
- ownership inscriptions on divisions and tasks (right usufruct, use, utilization, habitation, servitudes).

EXTRAS DE CARTE FUNCIARA
pentru INFORMARE

ANCPI

Oficiul de Cadastru şi Publicitate Imobiliară CLUJ .Biroul de Cadastru şi Publicitate Imobiliară Cluj-Napoca

Nr.cerere	54420
Ziua	26
Luna	04
Anul	2013

A. Partea I. (Foaie de avere)

CARTE FUNCIARA NR. 52337
Comuna/Oras/Municipiu: Chinteni
Nr. CF vechi: Nr. 1751
Nr. cadastral vechi: 190/9,191/9
(provenita din conversia de pe hârtie a CF Nr. 1751)

TEREN intravilan
Adresa: Chinteni, nr. 9C

Nr crt	Nr.cadastral Nr.topografic	Suprafaţa* (mp)	Observaţii / Referinţe
A1	52337	Din acte: 449; Masurata: 449	-

B. Partea II. (Foaie de proprietate)

CARTE FUNCIARA NR. 52337
Comuna/Oras/Municipiu: Chinteni

Inscrieri privitoare la proprietate			Observaţii/ Referinţe	
41070/ 29.03.2013				
	Act notarial nr. 273, din 28.03.2013, emis de CIACOI CLAUDIA DANIELA			
B2	Intabulare, drept de PROPRIETATE, cumpere, dobândit prin Convenţie, cota actuala 1/1		A1	
	1	DOMOKOS ENDRE, căs.cu	-	
	2	DOMOKOS ORSOLYA TEREZ, bun comun		

C. Partea III. (Foaie de sarcini)

CARTE FUNCIARA NR. 52337
Comuna/Oras/Municipiu: Chinteni

Inscrieri privitoare la sarcini	Observaţii / Referinte
NU SUNT	

Anexa Nr. 1 la Partea I

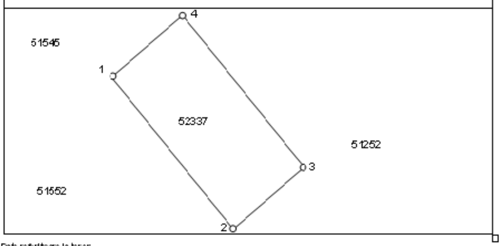
CARTE FUNCIARA NR. 52337
Comuna/Oras/Municipiu: Chinteni
(provenita din conversia de pe hârtie a CF Nr. 1751)

TEREN intravilan
Adresa: Chinteni, nr. 9C

Nr. cadastral	Suprafaţa măsurată (mp)*	Observaţii / Referinţe
52337	449	

* Suprafaţa este determinata in planul de proiecţie Stereo 70.

DETALII LINIARE IMOBIL



Date referitoare la teren

Nr crt	Categoria de folosinţa	Intra vilan	Suprafaţa (mp)	Nr. tarla	Nr. parcela	Nr. topografic	Observaţii / Referinţe
1	arabil	DA	Din acte:- Masurata:44	-	-	-	Teren intravilan,

Lungime Segmente

1) Valorile lungimilor segmentelor sunt obţinute din proiecţie în plan.

Punct început	Punct sfârşit	Lungime segment** (m)
1	2	28
2	3	16
3	4	28
4	1	16

** Lungimile segmentelor sunt determinate în planul de proiecţie Stereo 70 şi sunt rotunjite la metru.
*** Distanta dintre puncte este formata din distantele cumulate ce sunt mai mici decât valoarea 1 metru.

Fig. 2. Electronic land registry

The 2D cadastral registration of the parcels and construction is represented by their footprint.Data from geodetic and topografhic mesurements made of in a unitary coordinates Stereo 70 system and using precision equipment.

Using measurements of the height of buildings, the respective floors we can accomplish representation in 3D space. Therefore we can determine the volume levels of construction and their spatial visualization.

2D objects are related and represented in the field by their position unitary in the adopted coordinate system. Representation of 3D objects need to take the same coordinate system in order to maintain the relationship between them.

The general cadastral and special cadastre registration of buildings in 3D in the future is necessary because in some cases the 2D representation of the buildings can not be presented in accordance with reality.

RESULTS AND DISCUSSION

ArcGIS software developed by ESRI, is a program available that allows us to represent objects in 3D as polygons overlapping and also let you identify, search, analysis and visualization the parcels. Using current geodetic and topographic measurements and with the existing database from the National Agency for Cadastre we can accomplish 3D cadastre by introducing the additional performance measurements regarding to height. These should be applied both above the ground targets and those under that level. ArcGIS ArcScene application program allows to represent cadastral targets in 3D based on topographic surveying measurements in the established coordinate system. At the same time performs a comprehensive database on the basis of introduced cadastral data.

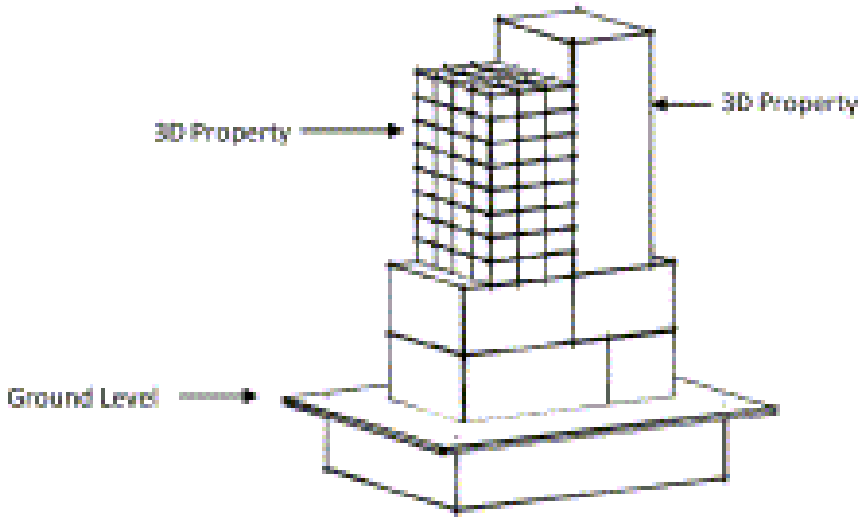


Fig. 3. 3D representation of buildings according to the ground level (www.esri.com)

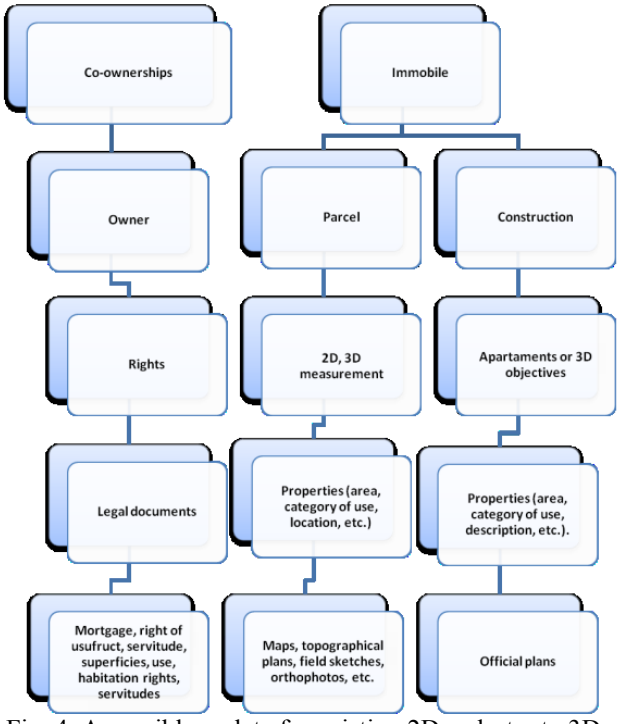


Fig. 4. A possible update for existing 2D cadastre to 3D cadastre

CONCLUSIONS

The data obtained and provided from ANCPI are important since we are used by the local government, in the real estate and the national and international business.

By developing the "e-Terra" application data will be accessible online through the geoportal. The Geoportal it will be developed by ANCPI based on ESRI technology (www.ancpi.ro).

In many countries there are already exist legislation to regulation the 3D property registration, but don`t exist a complete technical GIS solution for handling 3D properties. The main focus was on 3D visualization and less for 3D functionality.

REFERENCES

1. Bjornsson C., Nick L., 2011, ArcGIS for Land Records: Current Status and Future 3D Considerations, 2nd International Workshop on 3D Cadastres, 16-18 November 2011, Delft, the Netherlands
2. Boş, N., Iacobescu, O., 2009, Cadastru şi cartea funciară., Ed. C.H. Beck, Bucureşti
3. Ekberg F., 2007, An approach for representing complex 3D objects in GIS applied to 3D properties, Thesis for Degree of Master of Geomatics, University of Gavle
4. Gh.Tămăioagă, 1990, Cadastru, Institutul de Construcţii Bucureşti
5. Ying S., R. Guo, L. Li, B. He, 2012, Application of 3D GIS to 3D Cadastre in Urban Environment 3rd International Workshop on 3D Cadastres, Shenzhen, China
6. www.ancpi.ro
7. www.esri.ro
8. www.ocpicluj.ro