GIS Projects and Systematic Land Registration in Romania – Brasov Case Study

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Key words: cadastre, land registration, land book

SUMMARY

Land is one of the most valuable assets of a country. In Brasov, one of the biggest cities from Romania with over 300 000 habitants interest in land is high. Municipality, as the tax authority, is one of the stakeholder for which land is the main source of incomes. However, taxes are better collected when the registration of land is complete and integrated in one database.

In 2006, Brasov Municipality started a GIS project to create a spatial database that involves ortophoto production, field survey, buildings cadastre, utilities network cadastre, 3D City Model and digital cadastre correlation.

The presentation focuses on bridging nowadays digital cadastre and Land Book cadastre since 1800's from Austro-Hungarian occupation.

Land book and land book plans conversion, data interpretation, Land Book allocation and Data Validation are the main activities of this phase. Technical aspects are strongly connected with legal and juridical aspects.

However, data interpretation is the key factor for the success of the project. Dealing with two different systems, from different ages, from different cultures was the biggest challenge of the project. The newly developed procedure of data correlation, applied for first time in Romania, describe how the local authorities and private companies dealt with this challenge.

Last part of the presentation will draw the obstacles and bottlenecks faced during the project, from both legally and technically aspects.

Furthermore, the integrated geospatial database complexity was increased with the requirements of INSPIRE Directive standards compliance.

In conclusion, we will demonstrate that a GIS project is a prerequisite for systematic land registration.

TS05C - Spatial Data Infrastructures III, 5289   1/12
Ionut Savoiu, Ciprian Savoiu, Mircea Popa, Georgeta Chitac
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1. LAND BOOK CADASTRAL SYSTEM

Land is one of a country's most important assets. Land and building account for between half and three quarters of most countries' national wealth (World Bank, 2006).

In former Soviet Union, or Latin America, or Eastern and Central Europe, "you will see many things: houses used for shelter, parcels of land being titled, sowed, and harvested, merchandise being bought and sold. Assets in developing and former communist countries primarily serve these immediate purposes. In the West, however, the same assets also lead a parallel life as capital outside the physical world. They can be used to put in motion more production by securing the interests of other parties as "collateral" for a mortgage, for example, or by assuring the supply of other forms of credit and public utilities" (de Soto, 2003).

In Romania, land registration was realized in two ways, through transcription and inscription books or the land register books. The system based on the transcription book (documents of transcriptions and constitutions were fully transcribed in the register) and inscription book (with reference to privileges and mortgages only) have an individual character, because registers refer to the owner and not to the property. Land registration in land book system use parcel as a base for registration being more suitable and convenient. The system of revocable land record book has been in place since July 1st 1999, when Law 7/1996 became operative. The juridical and technical functions of land registration are complementary and ensure a smooth implementation of the systematic land registration. The juridical function is accomplished through the identification of the owner and the registration in the register. The economic function of the systematic land registration helps fixing the value of property, a prerequisite in establishing and collecting taxes by the courts of law, notaries and other tax collecting institutions and in establishing the amount of legal redress in cases of expropriation (Zaharia, 2006).

The Decree Law no. 115/1938, existing in Transylvania, Banat and in the North of Moldavia imposed the land registration system based on land books. This is a real recording system which takes into consideration the parcel and a very precise manner to identify it. A complete registration is performed through such system, which means that the system requires the compulsory registration, in the land book, of all the legal acts and deeds regarding immovable assets.

Also, the real nature of the records, based on which the interested parties and third parties are capable to find out the legal status of an immovable at any time (owner, encumbrances, mortgages, legal proceedings, liens, modalities affecting the right gaining and capacity of the parties, etc.) should be noted.

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Ionut Savoiu, Ciprian Savoiu, Mircea Popa, Georgeta Chitac
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2. TRANSITION PERIOD

The transition from command to market-driven economies in Eastern and Central Europe has resulted in an urgent need in those countries for cadastral and land information systems to encourage effective land markets, which in turn support economic development (Williamson, 1997).

Romania as an Eastern European Country (EEC) in transition has a huge lag of information about the quality of the individual properties, including the property rights. After 1990 many private properties rights were instated to their pre 1940 situation. These new registrations require a well-functioning cadastral system.

3. MUNICIPALITIES SUPPORTS LAND REGISTRATION

Romanian Cadastral and Land Registration Agency (ANCPI) is the authority that record, update and register the cadastre and land registration registers. Nowadays in Romania the cadastre and land registration system is made sporadically and there is no administrative unit that has a complete and integrated evidence of land.

In 2006, BLOM Romania acquired a contract for Brasov Municipality with the objective to create an integrated and complete spatial database that involves as well ortophoto production, field survey, urban cadastre, utilities network cadastre, 3D City Model and Land Book conversion. One of the important phases of the project is Land book and land book maps conversion, data interpretation and Land Book identification because it represents the prerequisites for systematic land registration. In this process technical aspects are strongly connected with legal and juridical aspects.

Brasov Municipality through GIS project implement a modern solution to manage geospatial data and simultaneously with hardware and software infrastructure improve services for citizens. Project purpose is to build a system that uniquely manage existing geospatial data, answer to the requirements that involves geospatial data in all municipality departments, assure the required, correct and in time information for decision staff and provide information's to the people.

The project involves the following actions:

– Develop the technical solution to manage geospatial data based on elementary product and dedicated software application modules created by the supplier for the municipality;

– Build the software, hardware and network infrastructure for data handling;

– Implement the GIS project in all the municipality departments where the geospatial information will be used;

– Consultancy, training and support for municipality staff

– Data conversion, field survey and ortophoto production to populate the geospatial database with up to date and accurate data

– Land Book conversion and integration with modern cadastre.

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Bridging the Gap between Cultures
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Project builds a geospatial database for Geographical Information System (GIS) of Brasov Municipality and creates different layers using existing data and updated data from photogrammetric product, laser scanning and classical survey.

In almost 2 years Brasov Municipality, one of the major municipality in Romania with approximately 16 000 ha and almost 300 000 citizens, has a digital and modern spatial database that offer a clear picture of all plots in Brasov.

The new digital cadastral map is accurate, precise and contains updated information about the area and owner of each plot.

Figure 1 – Brasov digital map

4. DIGITAL MAP AVAILABLE FOR CITIZENS

In 2009 Brasov become the first municipality from Romania that has an integrated and complete digital cadastral map. Furthermore, the municipality did an important step in the process of modernisation and transparency when made the digital map available for citizens and public institutions through the web.
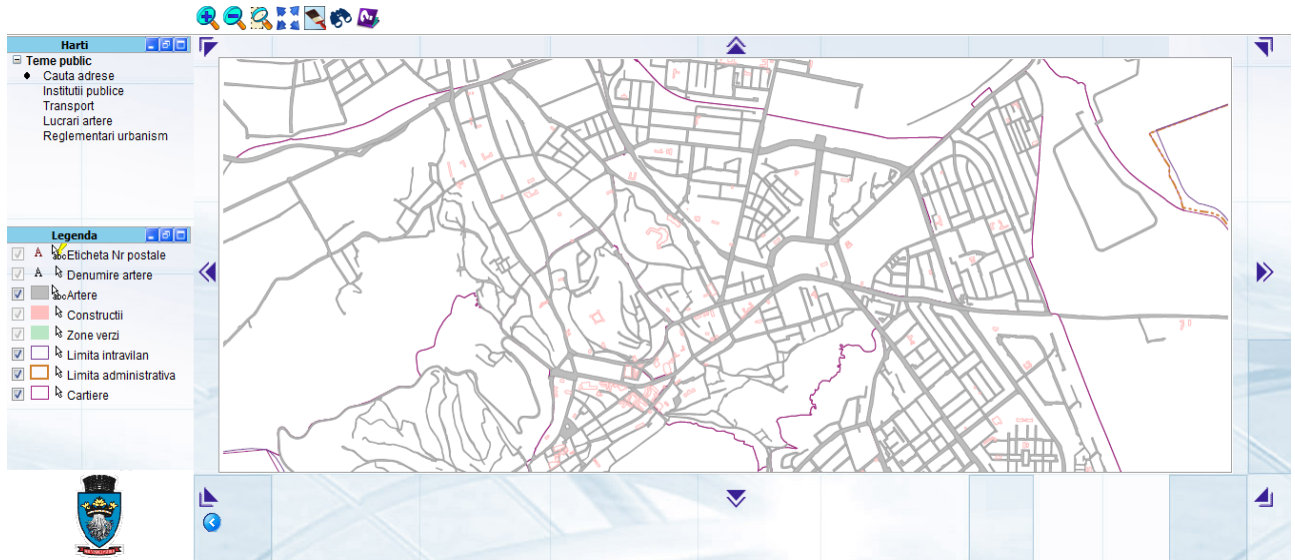

Figure 2 – Brasov digital map on web

Although on the web is no information about the owner and area of plots due security reasons existent in Romanian legislation the citizens and the public institutions can benefit from other information's like postal address, transportation network, public institutions map, urban planning regulations and others.

5. LAND BOOK CADASTRE IN ROMANIA

In the Austro-Hungarian administration of Romania the Austrian officers realized a complex project of mapping all the land that they have to administer. During this process they have introduced the German style of cadastre with Land Books and Land Book maps.
Cadastral and land registration system in Romania is sporadic that means it is made at the request of the interested parties. Similar situation is in Brasov Municipality where only about 30% of the total area is registered.
Although in the urban cadastre project initiated by the Brasov municipality all the parcels have been surveyed and a complete and integrated digital cadastral map has been created it is not yet possible to register it. In order to have a mass registration some other steps are required like public campaign awareness, land book conversion, data publication, claims analysis, etc. Nevertheless the first step through systematic registration is done.
Land book conversion is required due to the fact that this is the last information from ancient

TS05C - Spatial Data Infrastructures III, 5289   5/12
Ionut Savoiu, Ciprian Savoiu, Mircea Popa, Georgeta Chitac
GIS projects and systematic land registration in Romania – Brasov case study

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times with a complete coverage of the city. In order to identify the legal situation for each plot on the area that is not covered by the sporadic database of the OCPI it is required a research on Land book cadastre from 1800's.

Financial reasons keep the Brasov municipality away from the mass registration but they still wish to get as much as possible using the urban cadastre project. That's why they have introduced as a stage in the current project the land book conversion.

6. LAND BOOK CONVERSION PROCESS

The process of Land Book conversion requires qualified staff, attention and a lot of hard work. I have divided the process of conversion in the following activities:
– Land book maps scanning
– Land book maps georeferencing
– Land Book data collection
– Land Book textual database creation
– Data integration and software application
– Land book maps and digital actual cadastre overlay and analysis
– Quality control and data delivery

6.1. Land Book maps scanning

In the OCPI office Blom specialists has identified around 250 land book maps for Brasov Municipality. Most of them are in a quite bad condition due to the age and requires special attention. In the process each individual map has been carefully prepared for scanning in order to avoid more deterioration of the map. The entire process took around 1 month of daily map preparation and scanning. Due to the fact that the maps are old and sometimes updated with a pencil we made some image quality enhancement activities.

Figure 3 – Land Book map

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Ionut Savoiu, Ciprian Savoiu, Mircea Popa, Georgeta Chitac
GIS projects and systematic land registration in Romania – Brasov case study

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Bridging the Gap between Cultures
Marrakech, Morocco, 18-22 May 2011

6.2. Land Book maps georeferencing

The process of georeferencing has been difficult and required about two months of work for 2 specialists. One of the main issues that we deal with is the maps that contain the so called "medallion". A "medallion" on a land book map is a more detailed map of a specific area on an original map. In order to be able to georeference the "medallion" we cut it from the original map and save it as a new image. The name of the file has been linked with the name of the original map for verification purposes.

Figure 4 – Land Book map with "medallion"

6.3. Land Book data collection

The German cadastral system of Land books has been introduced in Brasov almost 150 years ago. Land book represents the basic unit in land registration where the parcels are registered not the owners. In Romania, Land Book encloses three parts: A part with information about the parcel, B part contains information about the owner and C part contains transcripts concerning the dismemberments of the right for property and other obligations as well as juridical facts, personal rights, real estate's pursuits.

In the A part is recorded the identifier, called topographical number, that links the textual land book with the land book maps. This is the only way to make the association between the land books and the land book maps. Furthermore information about the area of the plot is recorded for each topographical number. The old land books might contains even 300 topographical numbers that means we can have also around 300 plots in that land book.

In the very beginning all the data has been recorded in only one land book. Land book number 1 has more the 650 pages with more the 3 000 topographical numbers. Most of them have

Ionut Savoiu, Ciprian Savoiu, Mircea Popa, Georgeta Chitac
GIS projects and systematic land registration in Romania – Brasov case study

been converted into new land books but there are still positions that are active.

Nowadays in Brasov Municipality we have almost 60 000 land books. In the last stage of the urban cadastre project we have to collect all the information from A part contained in all land books.

Firstly we have decided that the best option for data collection is to scan all the land books and then send into mass production. Due to legislation restrictions we haven't been able to take out the land books from the OCPI neither to find a possibility to scan them inside the OCPI office.

In this situation we have been forced to find another method to collect all the information's from the land books. After official discussions with the President of ANCPI and the Director of OCPI Brasov we identified that the most appropriate method to collect all the data from the Land Books is using the ANCPI product called "Land Book Consultation".

In this process of "Land Book Consultation" we request ANCPI and OCPI for a special permission that allows us to use the computers for data collection because normally this is made on paper sheets.

I have built a team of 10 land book experts, with experience in "Land Book Consultation" that has been placed in an office inside OCPI building. In the mean time a template for an excel sheet has been created and agreed with the municipality.

								ECHIPA
			EVIDENTA CONSULTARE CARTE FUNCIARA MUNICIPIUL BRASOV					
Nr crt	Numar CF	Numar ORDINE	Numar TOPO	SUPRAFATA	Adresa - Strada	Adresa - Numar	Adresa - Apartament	OBSERVATII
1	801	5	11235/4	55,63(STG)	INTRE DRUMUL STUPIN SI CANALUL TIMIS			
	801	14	11233/1, 11234/1, 11235/1	642,7				
2	802	1	573/1	142,2	LUNGA	222		
	802	1	573/2	77,4	LUNGA	222		
3	804	SISTATA						
4	805	4	571/II-572/II	835,5	LUNGA	210		
5	807	SISTATA						
6	809	1	877	394,2	LUNGA			
	809	1	878					
7	810	5	12206/2/2		INTRE GHIMBAV SI DRUMUL CRISTIAN AP.2			
8	811	15	9306/3/4/2	264,0	LANGA DRUMUL SIN PETRU			
9	813	5	9304/1/1/1/1	293(STG)				ARABIL 16
10	817	SISTATA						
11	820	13	9429/1/2/2	690				
		17	9429/1/2/1/3	510				
		23	9429/1/2/1/9	510				
		25	9429/1/2/1/11	510				
		25	9429/1/2/1/12	510				
		31	9429/1/2/1/17	510				
		32	9429/1/2/1/18	510				
		34	9429/1/2/1/20	510				

Figure 5 – Data collection template

The team worked on regular schedule of 8 hours/day for about 2 months until they complete the "consultation" for all 60 000 land books.

In this process we faced a second issue with the old land books written in Hungarian and/or in German. Our specialist has to know as well Romanian, Hungarian and German.
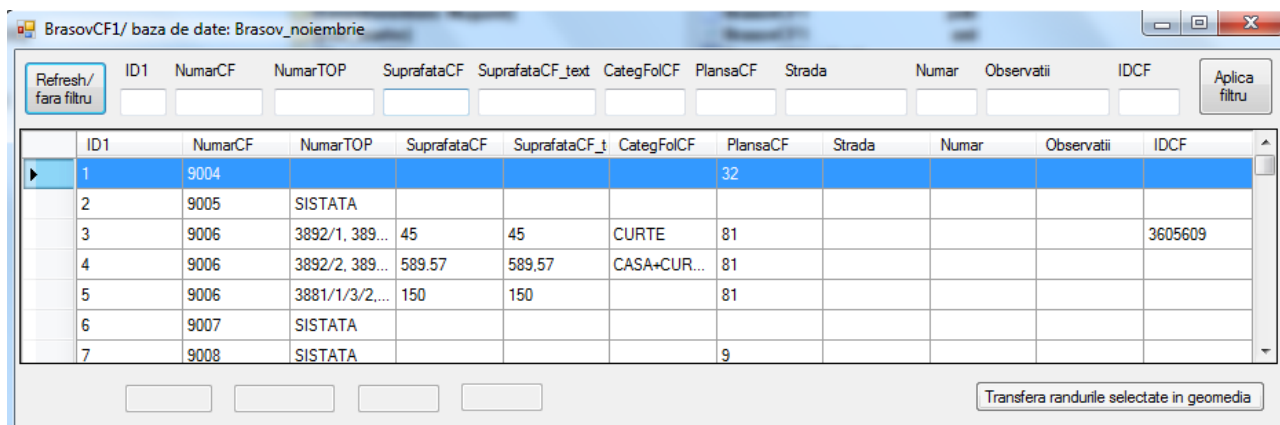
6.4. Land book textual database creation

By the end of the process of "Land Book Consultation" we had 5 excel sheets (the 10 land book experts were grouped in teams of 2, one reading and other writing) with data from all land books of Brasov Municipality.

A programmer from Blom joined all the excel sheets in a textual database.

Ionut Savoiu, Ciprian Savoiu, Mircea Popa, Georgeta Chitac
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Marrakech, Morocco, 18-22 May 2011

6.5. Data integration and software application

In order to be able to take the advantages of the valuable textual database we created a dedicated software application that allows us to query the textual database and automatically create the join between the graphical part and the textual part.

Figure 6 – Land Book software application

6.6. Land book maps and digital actual cadastre overlay and analysis

The next stage of land book conversion process, land book maps, land book textual database and digital modern cadastre data overlay has been a tough process. As the entire process of data collection required about two months for complete finalization, the process of data overlay and analysis took about 4 months.

Land book experts and specialized computer operators stayed together and make a complete analysis of each individual plot.

First of all, the specialized computer operator overlay the georeferenced land book map with the digital layer of parcels. Due the complexity of situations that we meet I categorized in four categories: registered parcels, flats building, extravilan (outside built-up area) parcels and regular cases. Each of these categories has to be treated separately as there is no general solution.

Topographical number(s) (old identifier) one's identified will be used to query the land book database to determine the land book from where it belongs. The specialized computer operator or/and the land book expert, based on how difficult is the situation, will check the area, land use description and address if available. Once all the checks are made a decision will be taken.

The most difficult cases that have required more attention and a lot of archive research are in the second category, flat buildings and the adjacent parcels. That's because in 1800's when these maps have been done there have been no flat buildings and the parcel shape was totally different.

Furthermore in some cases we have involved as well the staff from the OCPI and municipality

TS05C - Spatial Data Infrastructures III, 5289   9/12
Ionut Savoiu, Ciprian Savoiu, Mircea Popa, Georgeta Chitac
GIS projects and systematic land registration in Romania – Brasov case study

FIG Working Week 2011
Bridging the Gap between Cultures
Marrakech, Morocco, 18-22 May 2011

to track the history of parcels in order to be able to identify the land book situation. Nevertheless, we succeed to identify the land book number and the topographical number for more 90% of the total number of parcels.

6.7. Quality control and data delivery

The last stage in land book conversion process was the quality control and data delivery. Each parcel has been carefully check by an experienced land book expert and approved to be delivered to the client.
In some cases specialists from Municipality and OCPI participated in the quality control process assure the high quality of the data.

7. PROJECT RESOURCES

Project costs have been evaluated at 1 million Euros. In the project Blom involved a highly skilled team of 1 Project Manager, 2 Technical Coordinators, 2 Programmers, 10 Land Book Experts, 5 Land Administration Experts, 30 Specialized Computer Operators and 40 Surveyors.

Furthermore, specialists from OCPI and Brasov Municipality have been involved in the project for a better understanding of the process, for training purposes and to improve their knowledge about modern digital cadastre.

8. CONCLUDING AND REMARKS

In the last 5 years in matter of land administration Romania has important achievements like unified system of cadastre and land registration and integrated database in all counties (although registration is sporadic). In this process municipalities had an important contribution through urban cadastre projects, utilities networks projects, etc. An important role has been played by the private surveyors companies like BLOM Romania that contributed with highly skilled and experienced staff, modern technologies and continuous support in matter of technical and legal issues in all processes.

Land Book conversion plays a key role for systematic land registration in Romania for the reason that is the latest legal documentation when all the parcels have been inventoried. Similarly with the Danish Cadastral Database where the "resulting property framework from the enclosure movement formed the basis for the new cadastral maps established in the early 1800's........Each map normally includes a village area and the surrounding cultivated areas. As a result, the maps were "island maps" and not based on any local or national grid. These old maps have been maintained over time with subdivisions and cadastral alterations" (Williamson, Enemark, Wallace, Rajabifard, Land Administration for Sustainable Development).

BLOM Romania applied similar technologies for Land Book conversion in Brasov for reconstruction of 1800's Cadastre Maps in a digital environment.

Romania's (similarly with the Danish case) "establishment of a digital cadastral database has provided the opportunity for combining the cadastral identification with the topographic information to support efficient management of land RRRs in a sustainable way." (Williamson, Enemark, Wallace, Rajabifard, Land Administration for Sustainable Development).

Brasov municipality increased administrative capacity once the project has been implemented and response time at population requests decreased.

One of the biggest achievements of the GIS project, Land Book digital database creates a bridge between the cadastre introduced by the Austro-Hungarians and modern digital cadastre. Every historical research takes only few minutes and all the data can be easily overlaid.

Being in trend with the current developments Blom built the geospatial database compliant with the INSPIRE directive criteria. Brasov becomes the first city that manages a modern database and starts the initiative to link it with all public institutions (OCPI, utilities network companies, etc.)

However, Brasov Municipality creates all the prerequisites to introduce systematic land registration. The process of systematic land registration is the next recommend step to be followed to solve all the legal issues of land registration.

A key factor, database maintenance, requires attention from Brasov Municipality because a database without maintenance is useless.

TS05C - Spatial Data Infrastructures III, 5289   11/12
Ionut Savoiu, Ciprian Savoiu, Mircea Popa, Georgeta Chitac
GIS projects and systematic land registration in Romania – Brasov case study

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Marrakech, Morocco, 18-22 May 2011

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TS05C - Spatial Data Infrastructures III, 5289   12/12
Ionut Savoiu, Ciprian Savoiu, Mircea Popa, Georgeta Chitac
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