ASPECTS ON THE ACHIEVEMENT OF THE DATABASE OF A CITY LAND REGISTRY INFORMATION SYSTEM

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Abstract: *The land registry information system shall manage the territory in order to ensure sustainable development and shall be flexible to support legal, technological and new registration related modifications*

Real estate properties are changing over time as a consequence of real estate transactions and other human performed activities as well as of nature actions as regards area, shape, commissioning, intended use, legal situation. To catalogue and record these changes a great amount of information is used and continuously updated.

This work describes several aspects related to the establishment of the database which ensures enhancing the efficiency and performance of information systems of various users, unit coordination and security of land registry data.

Key words*: land registry, database, information system, real estate.*

1. Introduction

The database plays an important role within the information system of the land registry and contains spatial and textual information to be managed, and data models. Moreover, the way the system conveys, transfers and changes information with other information systems is also important. Internet, data modelling standards and programming languages have greatly contributed to the implementation at national and international level of sustainable land registry information systems.

The data and information the land registry information system offers to public local administration provide for the records of real estate lands and registration of property and the determination of an accurate duties and charges system. It also plays an important role in the development of real estate market, urban planning, environment protection, etc. The information system may be accessed by the citizens and it ensures correct information and transparency and helps eliminating bureaucracy [2].

2. Database achievement

The databases of the land registry information system (*Fig. 1*) are set up by collecting information on current technical, economical and legal data from the Land Registry Office. The information is completed as follows [2]:

- delimitation of the territory to be registered and marking of urban land boundary according to Act no 7/1996 on Land Registry Office and Real Estate Publicity;

- updating or preparing the digital cadastral plan which is the basic support of the cadastral works;
- identification of real estate owners;
- complete the information contained in the "Property Chart" with: data on land, functional features of the buildings, existence of public utility systems, including their type within the buildings and at the land level, others' requests made by the beneficiary which need site works or declarative data filing;
- collecting detailed data and information on the constructive characteristics of the buildings and, upon request, additional elements on the land geotechnical features in order to evaluate the land and buildings on technical criteria, as well as provision with information needed to establish the minimum land concession price in accordance with the legal provisions;

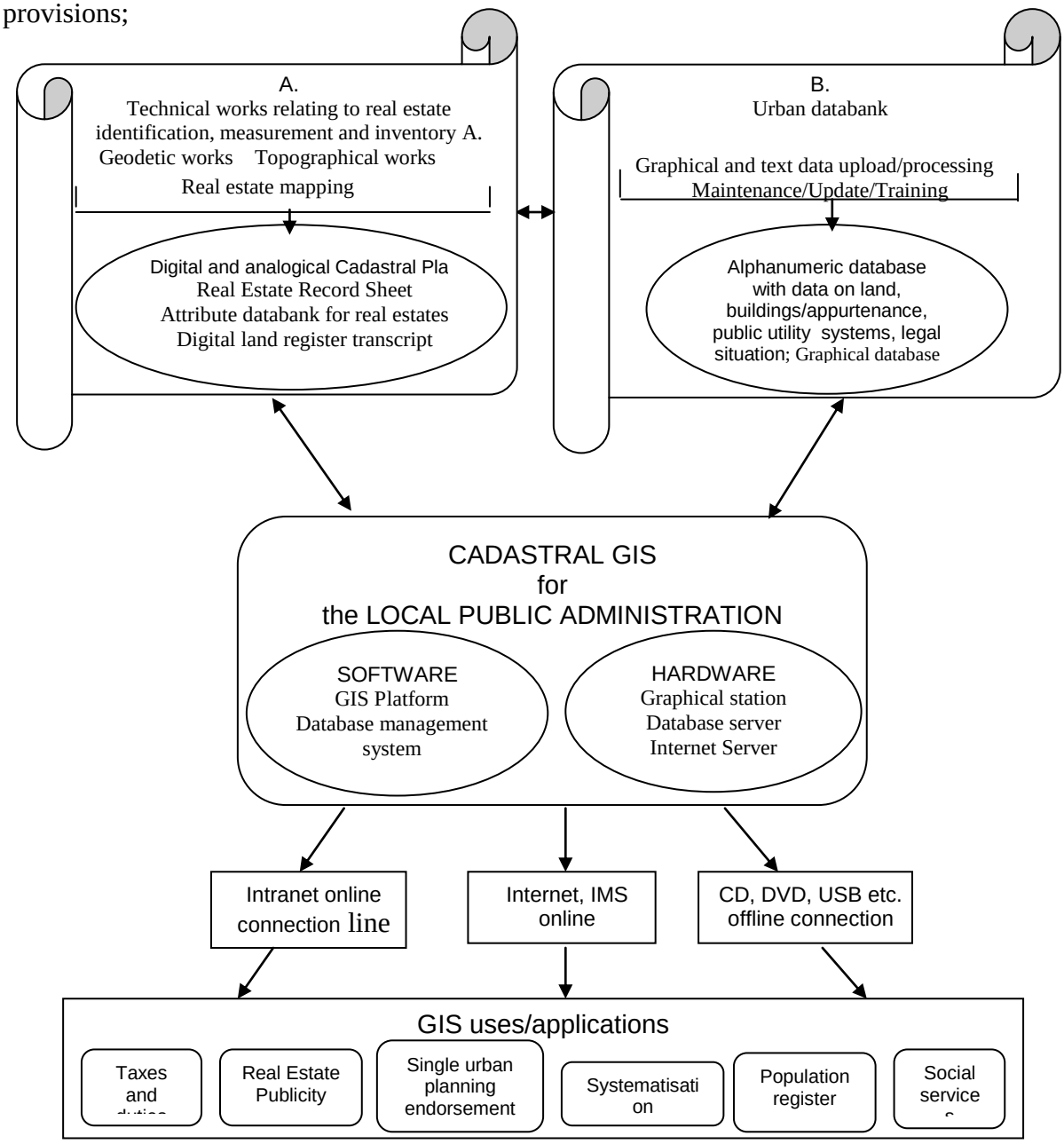

Fig. 1 – Structure of land registry information system [2]

The graphical database of the land registry information system is created in digital format. All entities defined in the technical regulations must be recorded.

After having been collected on site the data must be entered the database as attributes necessary to maintain the information system of the land registry. The attributes connect each spatial feature to the corresponding textual data in the attribute table [3].

The textual data on real estate property and owner may be obtained from:

- titles issued in accordance with Act 18/1991;
- property layout plan with indication of borders to adjoining properties prepared for real estates in order to be recorded in the Real Estate Register;
- documentation made as per GD 834/1991 and agreed by Land Registry Office and Real Estate Publicity;
- interviews made by the contractor on site in the case of the real estates without documents or without one of the above-mentioned document.

After being collected the data are validated and verified.

All data is summarized in database reports – cadastral registers which are the basic documentation of the cadastral works.

The creation of the databases is the most important and time consuming stage since the quality and accuracy of the results depend on the integrity, consistency and precision of the databases [4].

The data provided for by the ortophoto map, the already existent plans, site measurements and the data extracted from documents or following the interviews, site identification enable the achievement of the graphical and textual database of the informational system of a city land registry.

3. Database design

In the phase of database design decisions are taken with regard to the data structures and existent interdependence relations. Database design consists of the following: identification of data layers and their corresponding attributes, establish storage parameters for each and every attribute, registration of coordinates. Therefore:

The identification of data layers and their corresponding attributes refers to determining the data to be included in the databases, a process performed in several steps:

- Identification of geographic elements and related attributes is determined by geographic analysis and realization of digital topo-geodesy products. There are attributes specific to each geographic element depending on the analysis criteria.
- Organisation of data layers is realized according to the types of data and thematic organisation of the graphical elements depending on significance, respectively. The data layers are organized so that the punctual, linear and polygonal elements are stored in separate data layers. The factors influencing the organization of geographic elements in data layers vary according to the context of the developed application.
- The data layers are identified by collecting data layers in a single basic map or separate maps. In these cases the creation of original map separate for each layer is easier. The necessary geographical elements stored as X, Y pair of coordinates in the digital database together with the corresponding attributes are obtained following digitization.

The storage parameters for each attribute are established by:

- Coding since some attributes may be stored as a code more efficiently and easier than a character string or numerical values description.

On database design it has to be therefore considered that the graphical elements may be grouped in more classes in coded format.

- **The storage of data** must consider the memory space necessary for each element since large data volumes require large storage space. For the numerical fields the number of needed figures and decimal places must be determined. The smaller the file size is, the less memory space for an attribute is required.
- **The data dictionary** is a list that keeps the name of attributes and description of attributive values, including a description of each code, if necessary. The data dictionary for the database is a reference element in the development of LIS specific project in order to ensure transfer of information between systems.

Recording of coordinates refers to memorizing the special position of the data layers in the structure of the databases. When the data in a certain layer combine with the data in another layer the same coordinates data must overlay exactly. If the coordinates are registered at poor accuracy, relative movement issues occur.

A land information system (LIS) uses external databases, which enables processing large quantities of information, for example in Microsoft Access. The design of databases consists of structuring the data in tables, defining attributes to table fields and data types in each field, relating the tables, loading the data in tables.

The database design is achieved by establishing the organisation and codification of attributes. For example, the end-use categories are identified for each property and recorded in the Property Chart by means of codes.

The database of a city contains alphanumeric information which is integrated in tables.

The databases tables are created to reduce data redundancy and allow for their relationing [1]. The information is grouped in distinct categories such as: data on owners, street classification, nomenclature of administrative units, nomenclature of places, etc. The table design consists in defining its fields and the types of data adequate for each field (*Fig. 2*). Each table to be designed must contain a unique identification code (internal key), name of fields (attributes) and an external key (if relating to another table). Each field may be provided with options to be selected from a drop-down box.

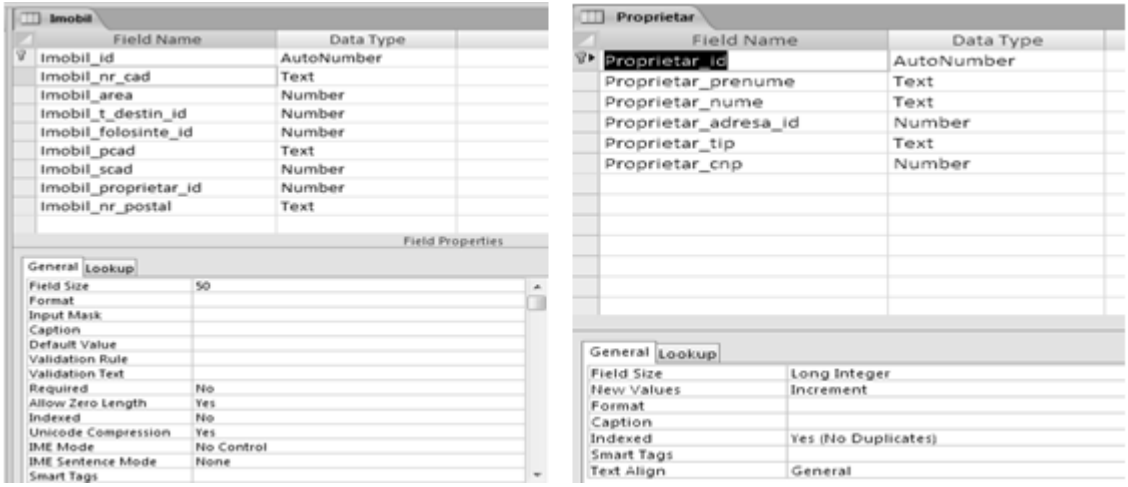

Fig. 2 – Boxes of designed tables: Property and Owner

Figure 2 shows how the tables are created: with the name of the field attributes, type of data for each attribute and properties for each field.

Relating tables consists in creating connections between the tables of the database in order to create forms and to load errorless data. Three types of relations may be achieved within the tables of a database [2]: one-to-more, one-to-one, more-to-more.

The achieved database uses the one-to-more type of relation. For example, the relation one-to-more connects the table Cadastral_sector and table Property, meaning that a cadastral sector has more properties.

The diagram showing the relationing of all database tables is presented in *Fig. 3.*

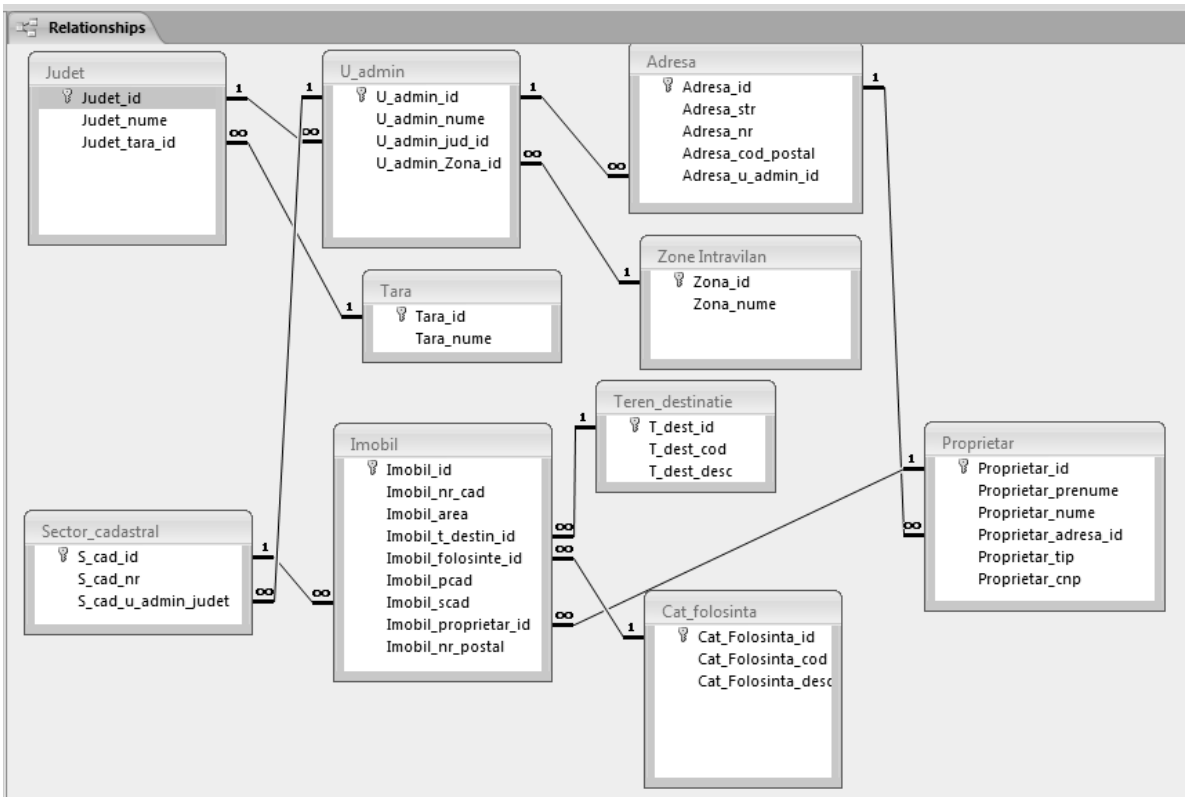

Fig. 3 - Relating the database [2]

The forms are intended to limit the access to the database tables and eliminate the errors in the data insertion process. A form has been created for each table. A table has been selected (Owner) and then its fields have been chosen. If the table contains an external key (Owner_Address_id), in order to facilitate the data loading procedure, select the table Address and then the fields which contain the address and number of owner. To this end the tables have been related by means of the one-to-more relation. The other forms have been designed following the same stages.

After having designed the forms, the alphanumeric data of each table must be loaded: open the form and enter the data in its columns. For the table to be related the external key code is automatically entered by selecting the name of the code located in the column of the second related table [1]. The other forms have been loaded as shown in *Fig. 4.*

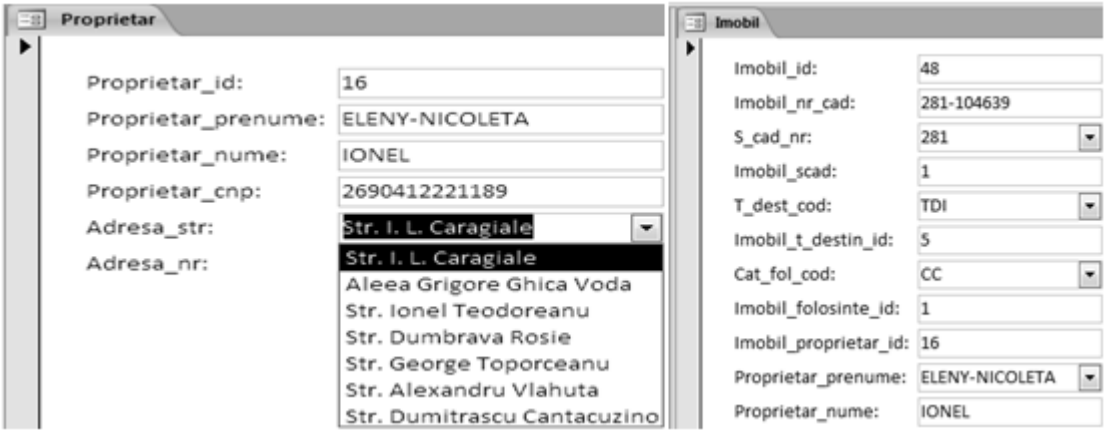

Fig. 4 – Data loading of tables Owner and Property using forms Owner and Property, respectively

The database tables populated with alphanumeric data contain such data as: country and neighbouring countries, surrounding counties, city and neighbouring administrative units, lands within the built-up area, cadastral sectors of the built-up area under study, end-use categories of lands, properties and owners and their addresses [1].

The interrogation of the textual data is a data selection process according to certain criteria. Further to interrogation a new database table is created. From all related tables only the necessary information is collected in order to attach and connect the textual database with the graphical data (*Fig. 5).*

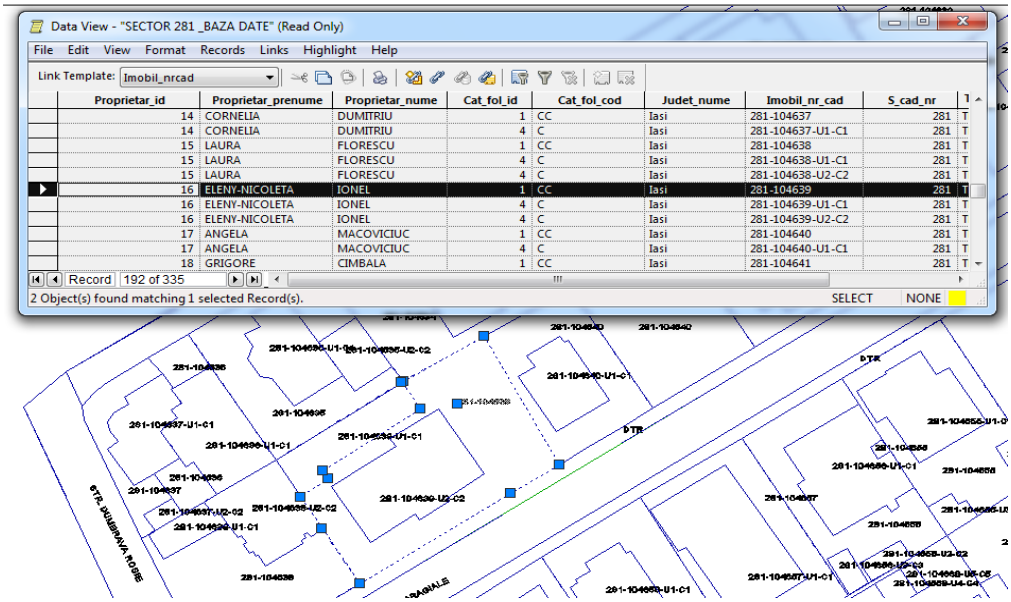

Fig. 5 – Connection between the table records and graphical data

The connection between a graphical object and a file of another application is made by the hyperlink function. This function may associate the drawing only one external file of image, jpg., tif., gif., bmp., png. type, such as: property imagine *(Fig. 6)*, title, owner photo, etc.

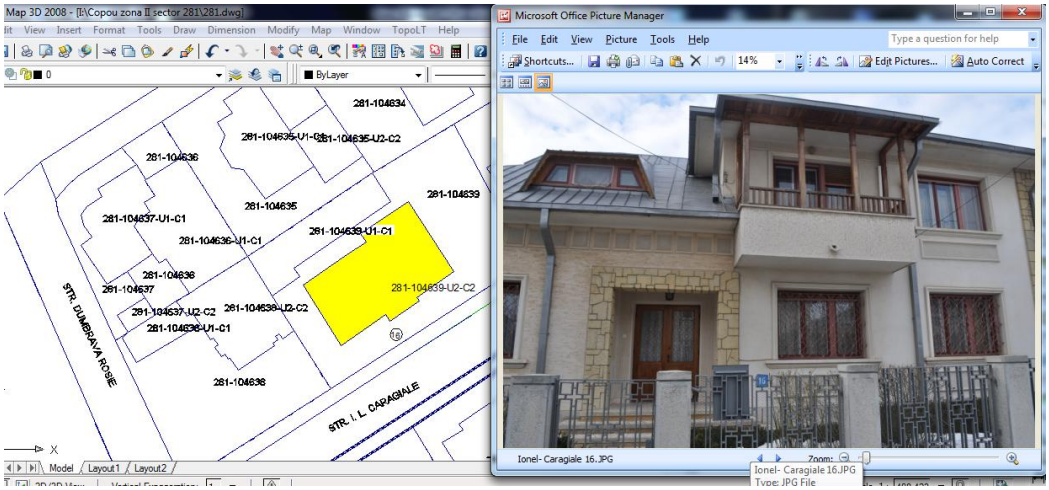

Fig. 6 – Hyperlink between the graphical frame on the digital cadastral plan of a building and its photo in jpg. format

The architecture, building stage and actual technical condition of the building are visualized by means of that image. The file may be modified, processed and saved while keeping the hyperlink with the object in the drawing.

The simplicity of the relating database structure enables easy formulation of interrogation by relational languages. They are very flexible and give the possibility to larger categories of users to use databases.

The **relational data model** offers such advantages as interrogation, retrieval and data integration mechanisms, but is limited as regards data types likely to be implemented in the Relational Database Management Systems (RDMS). The models ensure the assumption that new data types introduction is possible and may extend the standard interrogation language (SQL) so that to interact with special data types [2].

The achievement of a database aims at making available real and complete data on properties to interested parties in any moment. The final cadastral reports (property cadastral register and owners, possessors and other holders alphabetic register) represents a general image on the databases. The cadastral registers are essential reports of the information system of the land registry and contain important information organized under tables, grouped in useful ways and being very easy to be followed.

Since the reports contain confidential personal data, the database is secured and the access to information is made by means of a password entered by a limited group of empowered persons.

4. Conclusions

The land registry information system ensures the storage and close-linkage of a large range of graphical and textual data and coordinates such activities as property management, collection of taxes and duties, city planning, territorial systematization, etc. providing for possibilities to improve the effectiveness of the entire administrative infrastructure.

The features of the geographical information systems and databases management systems have progressed due to the presence in many fields of activity of the geographical information systems, the large volume of information to be managed and traded and interoperability and standardisation of information. Thus the databases have progressed from the utility type to the multi-user type [5]. The development trend in the domain of databases tends to orientate towards applications field.

5. References

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