Managing data during the update of the Hellenic Cadastre

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Abstract. Since 1994 the establishment of the Greek Cadastre took place. One of the basic procedures for the compilation of the Greek Cadastre is the construction of the Cadastral database which contains data about the topographic background, the cadastral maps, the land tenure, the special data. Firstly, in this paper there is a brief presentation of the structure of the database, meaning the logical units, plus the files that compose the base.The basic principles of the Greek cadastre, as a new land law determines them, include the necessity of updating the cadastral data. Besides, the need of maintenance and constant update of a huge project like cadastre, which demands so much time and money to integrate, is obvious. Update it's an essential part of the project, because without it the cadastral data are no longer valid. This paper is about the management of the update procedures of the Hellenic Cadastre. That means, that this paper indicates the exact effects on the files of the cadastral database each time a change takes place. It also examines one characteristic example. This paper is a first approach of an issue that Hellenic Cadastre will have to face very soon.

1. Introduction

Cadastre was established in Greece in 1994, and it's becoming a reality nowadays. The whole Greek area will be mapped, and every single land parcel will be recorded. Furthermore, all the persons and all the legal rights will be recorded.

Greece is covering an area of 132000 millions m^2 from which 22500 millions m^2 are already under cadastral registration. Greece is consisted of 5921 Organizations of Local Development (Municipalities and Communities), from which 1187 are already under cadastral registration. So far the budget rises to 102 billions drachmas, which is approximately 340 millions $. The 75% of the whole budget will be funded by the European Union, and the rest 25% by the Greek government. The Ministry of Environment, Physical Planning and Public Works is responsible for the realization of the Hellenic Cadastre.

A project as big as the Hellenic Cadastre, which has a huge size and budget, and will take more than 15 years to be fully completed, would be useless without update and maintenance. Those will keep the cadastre exact, complete, reliable and valid every single moment. With them the cadastre can provide safety and guarantee about the cadastral data to each citizen.

The Hellenic Cadastre is a uniform, public, systematic and updated Information System, which contains information about all the land parcels of the country. This includes the geometric description of the land parcels and the registration of all the interests exercised on each land parcel.

The main properties of the Hellenic Cadastre are (*Arvanitis 1998*):

- *Uniformity*: The Cadastre is compiled and updated based on unique standards for the total area of the country.
- *Public Character:* The State has the responsibility for the compilation of the Cadastre and it will guarantee the contents of the cadastral books and maps.
- *Update:* All the transactions are registered into the System at the time they occur.
- The *basic unit* of the registration is the *land parcel* as it is described into the legal documents.
- The *geometric description* of the land parcels is achieved by the *cadastral maps,* which are based on a unique Geodetic Reference System.
- The various *land interests* are registered into the *Cadastral Indexes* and finally into the *Cadastral Books*.
- *The cadastral identification number (land parcel Identifier)* is used in order to connect the different kind of information.

Since 1856 a Deeds Registration System is in operation in Greece. This System called "Transcription and Mortgages System" has its origins to the relevant French System. There are 393 decentralized offices known to the people as "Mortgages Offices" from which 19 are stipendiary registries, and the rest 374 are unsalaried. This system keeps data only about the land tenure, using ownership titles. It doesn't have any cadastral maps at all. By making the Cadastre a reality the cadastral database and cadastral maps will be created. By updating the cadastral database, the whole procedure will be automated, and the cadastral maps will be updated as well.

2. The update of the Cadastre

The cadastral data should, for each moment, be reliable and they should render with a proper way the legal rights, which are exercised, to each land parcel, as well as the position, the shape and the area of a land parcel. This can be achieved by registering each change that happens to the cadastral data. This procedure is called update.

The update is giving to the Cadastre a dynamic character and so the Cadastre has every time the ability to play its role to the development of each country at local, regional and state level.
The basic principles of the Cadastral Update are the follows (Arvanitis 1996):

- All the data that are included inside the database should be new and updated. This principal is obvious for a valid and proper cadastral system.
- The old data should be kept in back up files called historic data.
- The exact date that the change is happening is very important and it should be written down.

We tried to classify the different procedures of the cadastral update in different categories. This classification is based on some main characteristics like the form, kind and the amount of cadastral data that affected by every procedure. So the update categories according to this classification are:

- Update based on the form of the basic elements. These could either be spatial (about the shape of the land parcel) or descriptive (concerning the land tenure, the land owners personal data).
- Update based on the kind of the object that is updated. The objects could either be land parcels, persons, legal rights, or combination of them.
- Update based on the effect of the alteration of the elements. The alteration could either be correction, deletion, adding of new elements, or combination of the above.

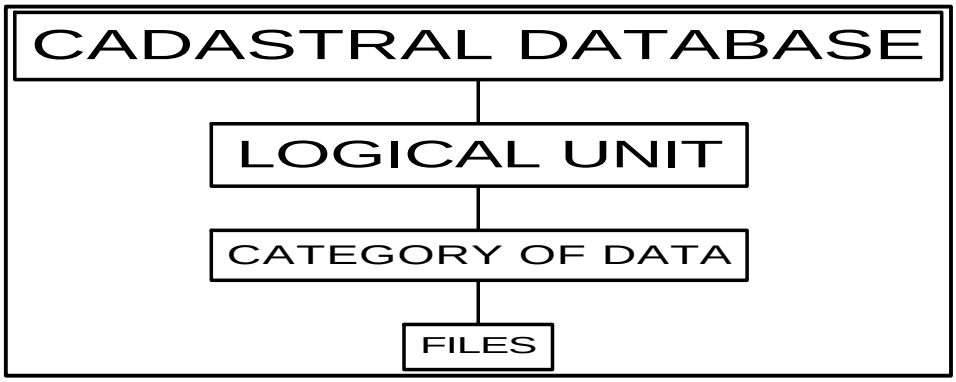
- Update based on the amount of the objects that are updated. More specifically, the update could involve one object, a few objects, or a big amount of them.
- Update based on the area that is being updated. In that way there are mass changes that involve a big amount of land parcels which cover a large area, or specific changes that involve certain land parcels.

3. The Cadastral Database

One of the main components of the Hellenic Cadastre is the Cadastral Database. All the collected data concerning persons, land parcels and legal rights are recorded in the Database. All the data that create the cadastral maps are included in the cadastral Database. All the descriptive data are included in the Database as well.

Practically, that means that all the cadastral updated procedures are changes in the cadastral Database.

The cadastral Database is structured hierarchical, according to the next schema:

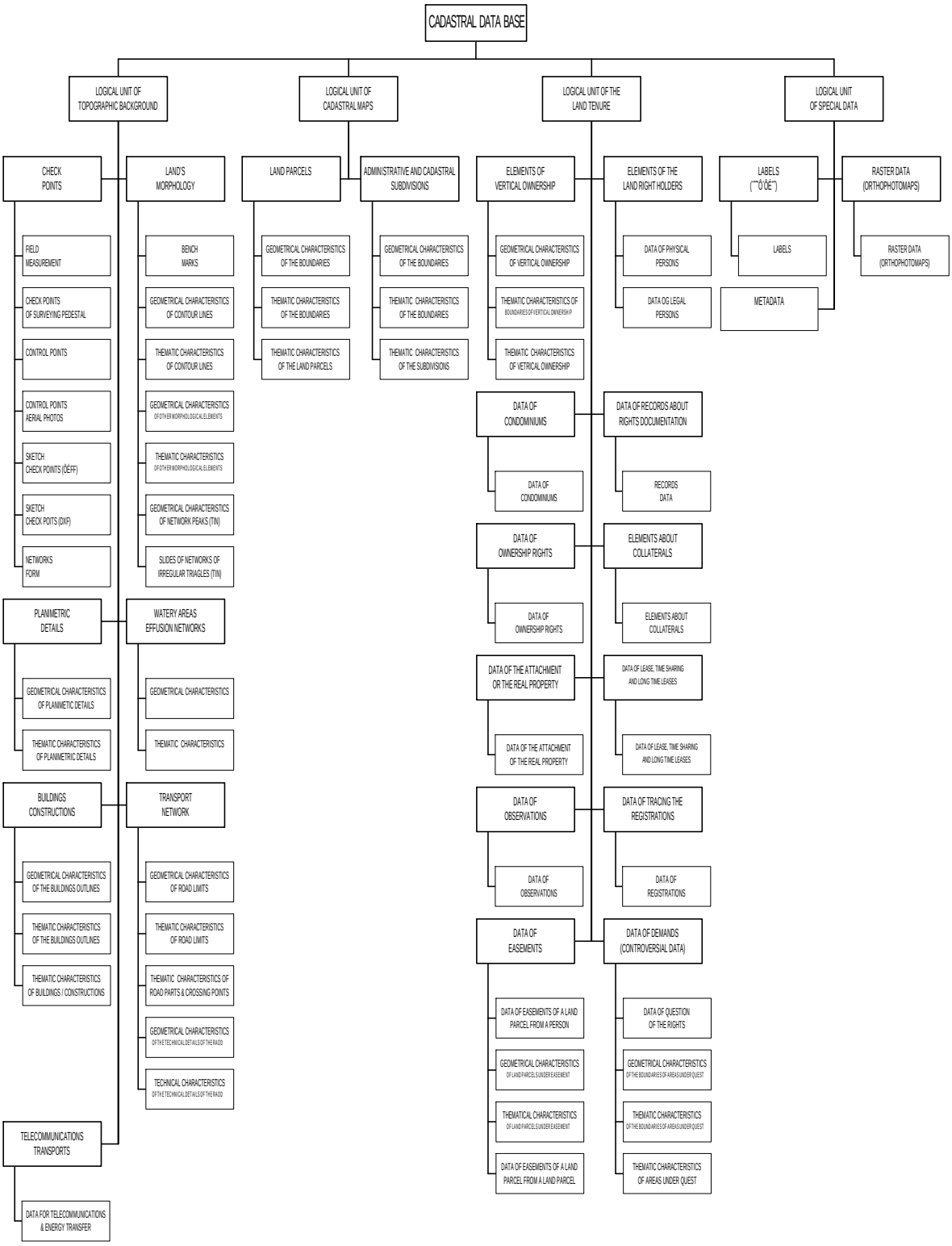


Schema 1:The Structure of Cadastral data Base

The logical units are the following four:

- Topographic background.
- Cadastral maps.
- Land Tenure.
- Special Data.

Each logical unit consists of several data categories. Each category consists of one or more files. (HEMCO, 1997). The whole, analytical form of the Greek cadastral Database is shown to the diagram of the next page.



Schema 2. The Logical Schema of the Cadastral Database

4. Managing the Cadastral Data

In order to achieve a proper management of the cadastral data during update the Hellenic Cadastre, it's necessary to predict each possible update procedure. For each case, there must be an action plan determining how the procedure should be faced and which are the exact changes at the cadastral Database's files.

The suggested model in order to have a successful solution of each update procedure is the follow:

- Exploration of the reasons that lead to the update procedure
- Examination of the legal status
- Designation of the spatial schema of the update procedure
- Finding the general consequences of this procedure
- Building of a diagram of the actions needed for this procedure.
- Design the Logical Schema of the Data Base Changes
- Execution of the update procedure.

Each updating procedure and the way that this will be faced should be predicted. For reasons of economy of this paper, only one typical update procedure will be analyzed. Therefore, the following chapter examines in an analytical way an update procedure, which is the subdivision of a land parcel.

5. The subdivision of a land parcel

5.1 Reasons

A land parcel can be subdivided to two or more different parts, which will be new, independent land parcels.

The reasons that could lead to the subdivision of a land parcel, most of the times, are the followings:

1. So that each one of the landowner, could own an independent land parcel in which he will be the exclusive owner. This is a usual case between heirs.
2. In order to achieve a bigger value. This was a very usual phenomenon at Greece, during the 70's. Real estate agents used to fragmentize land parcels and then shell it, making huge credits. After that, the law in many different Greek areas forbade the fragmentation, and the subdivision was permitted only under several conditions.
3. In order to have the right to build a bigger area, comparing to the area before the subdivision.
4. Because the owner wants to convey a part of the land parcel and not all of it.

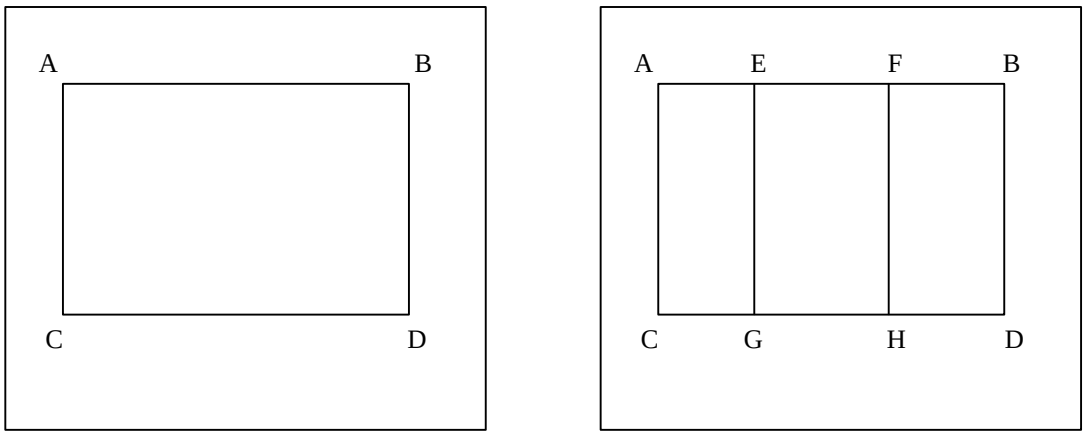
5.2 The Legal Status

The subdivision is taking place with a deed. The following checks are necessary for the deed:

- If the land parcel came from land division or land consolidation, that respects Former State Lands, then it cannot be subdivided.
- If the land parcel have any other type of ownership origin, then it can be subdivided.
- If the land parcel is a building plot then it can be subdivided if only, after the subdivision, the new land parcels, are plots that have the minimum area and frontage defined by the law. In that case it's necessary to get a certification by the urban planning office, that the subdivision is allowed, plus a plan by a surveyor showing the new land parcels.

5.3 The Spatial Schema

At the next schema a land parcel (a) is subdivided to three other land parcels (b). Of course this schema it's only an example of the subdivision.



(a) (b)

Schema 3. Land parcel Subdivision

5.4 General Consequences

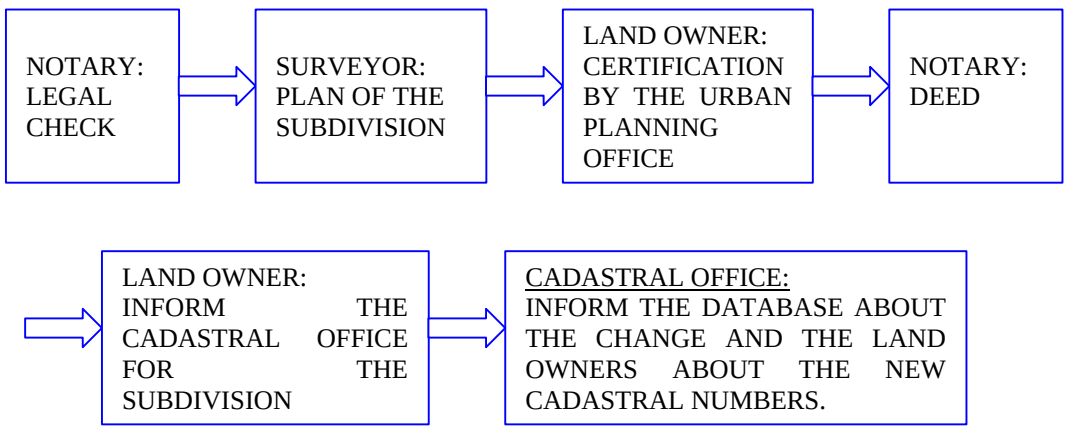
When a land parcel is subdivided to two or more new land parcels, then the old parcel doesn't exist anymore. Practically, that means, that the identification number of the old land parcel is no longer valid, and two or more new cadastral numbers are given to the new land parcels, for which there will be created new records in the cadastral Database.

5.5 Actions Diagram

In order to subdivide a land parcel, the following actions are needed:
First of all, the legal check should take place. If the subdivision is permitted, then the necessary certification by the urban planning office, plus a plan by an engineer showing the new land parcels after the subdivision, are needed.

After that, the notary should compose the deed, and the beneficiaries should inform the cadastral office about the subdivision. The cadastral office should inform the Database about the changes and the beneficiaries about the new cadastral numbers.

All those actions are shown to the next diagram (Koukopoulou 1999).



5.6 Changes in the Cadastral Database

During the subdivision of a land parcel, a few changes in the Cadastral Database take place. Those changes are shown to the schema of the next page.

When subdivision is happening, a land parcel doesn't exist anymore, so the records about it are erased. At the same time, two or more new land parcels are created, and new records concerning them are created as well.

The changes at the Database are the followings:

At the logical unit of Topographic Background, at the category of planimetric details, all the files are influenced (We suppose that new topographic characteristics are added like walls or fences). For each new line of the cadastral map, created by the subdivision, a new record is added to the following files:

- The file of Geometrical Characteristics of the planimetric details.
- The file of the Thematic Characteristics of planimetric details.

At the logical unit of Cadastral Maps, at the category of Land Parcels, the three files that the category is consisted of are influenced. Those are:

- The file of the Geometrical Characteristics of the boundaries of the land parcels. For each new line a record is created.
- The file of the Thematic Characteristics of the boundaries of the land parcels. For each new line a record is created.
- The file of the Thematic Characteristics of the land parcels. The record concerning the old land parcel is deleted. For each one of the new land parcels, a new record is created and a new cadastral number, a new address, plus a new referring point it's been given.

At the logical unit of the Land Tenure, at the category of the data of the records about the rights of documentation, the file about the data of records is influenced. For each one of the new land parcels, a new record is added. The record concerning the old land parcel is deleted. Of course, if a new land parcel belongs to more than one landowners, then the new records are as many as the titles.

At the logical unit of the Land Tenure, at the category of ownership rights, the file of the data of the ownership rights, is influenced. The records referring to the old land parcel are deleted, and new records are created about the ownership rights of the new land parcel.

Furthermore, it's often that before the subdivision, the persons which owned vertical the land parcel. In that case, the vertical ownership does no longer exist. As a result, at the logical unit of the Land Tenure, at the category of elements of vertical ownership, records are deleted in the following files:

- The file of Geometrical Characteristics of the boundaries of vertical ownership.
- The file of Thematic Characteristics of the boundaries of vertical ownership.
- The file of Thematic Characteristics of vertical ownership.

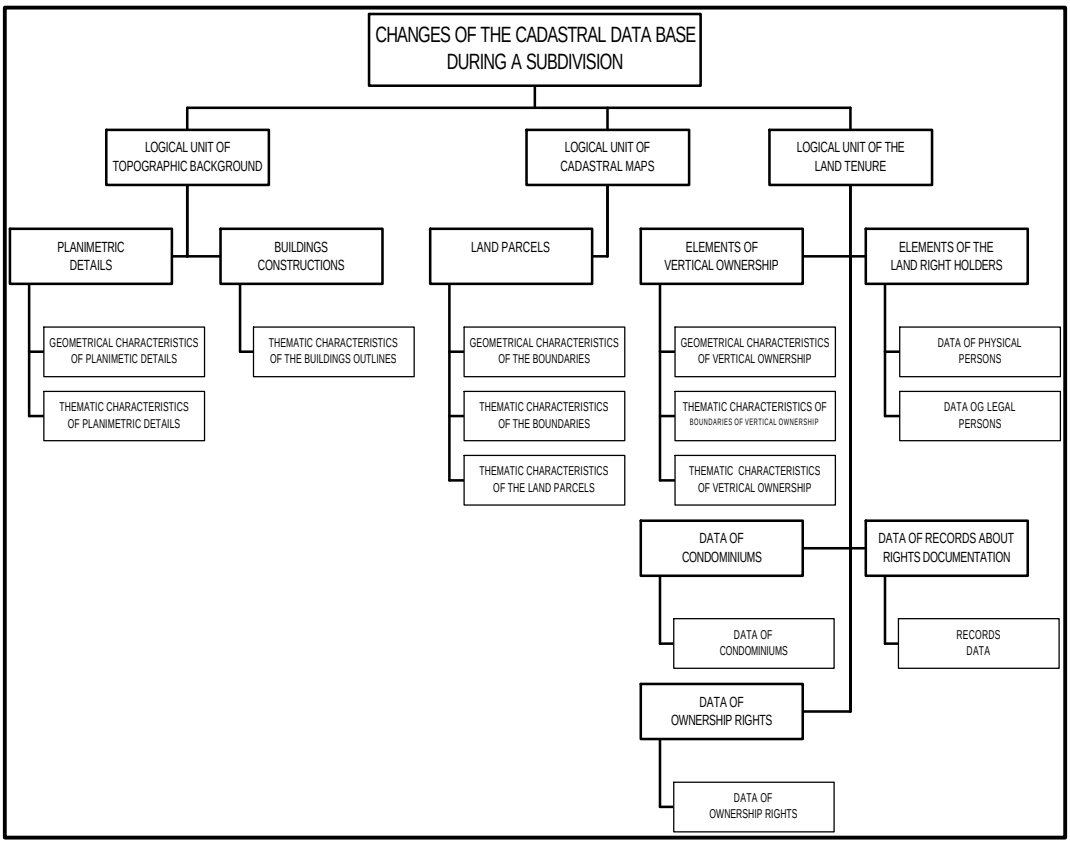
One more check that has to be done in the case of subdivision concerns the landowners. Practically, that means, that if the old land parcel had an owner who is no longer a landowner to any other land parcel, then all the records referring to him should be deleted. Moreover, there is the possibility that with the creation of new land parcels, new landowners will appear who own no other land parcel. Then, new records should be

created about them. So, in the logical unit of Land Tenure, at the category of elements of the Land Right Holders, new records may be added, or old ones may be deleted in the following files:

- The file of the elements of legal persons.
- The file of the elements of natural persons.

Finally, it's necessary to check out if the old land parcel had one ore more buildings inside of it. In that case, there must be a research about which one of the new land parcels includes the building. For this new land parcel, at the logical unit Topographic Background, at the category of Buildings and Constructions the following files will be influenced:

- The file of the Thematic Characteristics of buildings and constructions. In this file the fields that will change are KAEK, which is the cadastral number, and BLD_NUM, which is the number of a building inside a land parcel.
- If the building has more than one floors, then at the logical unit of Land Tenure, at the category of the data of condominiums, the file of data of condominiums is influenced at the following fields: KEK, BLD_NUM and PCNT_COWN which is the percentage of condominium.



Schema 4. Changes of the cadastral database during a parcel subdivision (Part of the Logical Schema)

5.7 Execution of the procedure

The next phase is the execution of the update procedure as we mentioned at the suggested model. In order to fulfill this prediction all the involved persons and organizations may be activated. The designation of the final forms those will cover all the administrative actions, is of course a basic presupposition for this

activation. The design of the proper software utilities is another important step and the distribution of the actions between the staff is the final one.

All these procedures may follow some basic principles (FIG 1995):

- Security
- Clarity and Simplicity
- Timeliness
- Fairness
- Efficient and Effective Access
- Low Cost
- Sustainability

6. Conclusions

With this paper we tried to give a first approach about the management of the update procedures of the Hellenic Cadastre. The update of the Cadastral data (Spatial and non Spatial) is a very important issue of the Cadastral Operation because this procedure helps the Cadastre to be always current and reliable. We proposed a model in order to execute an update procedure. With the presentation of a characteristic example all the complexities of the Cadastral Database are explained. The management of the spatial and non-spatial data of the Cadastral Database is shown with this indicative example. We believe that this model will be useful in order to fulfill the needs of the Hellenic Cadastre. This general model may be accepted with the proper alterations as basis from other cadastral systems as well.

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