Design of a Model for Managing Public Property in Greece

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Abstract

This paper aims to exploit the possibilities of applying international standards and more specifically the Land Administration Domain Model (LADM), approved as an official International Standard on 1st November 2012, for the administration of public properties. Public property registry and the Hellenic Cadastre (HC) need to share standardization requirements, to handle in a clear way, all rights, restrictions and responsibilities (RRRs), thus improving services provided by the two systems. The adoption of the LADM is an opportunity for Greece to reorganize its land information registries based on model driven architecture and to gain the benefits.

The LADM provides an abstract conceptual schema with three basic packages parties, rights-responsibilities-restrictions and spatial units, with the latter having one sub-package (surveying and spatial representation). The methodology followed in this research first examines the HC Data Model with LADM, and then the migration of the basic entities to LADM classes is proposed. As evidenced, the model complies with the LADM, providing a basis for an effective land administration system that comprises both private and public land properties.

Keywords: Land Administration Domain Model (LADM), Public property, Hellenic Cadastre (HC), Land management

1. INTRODUCTION

The design and development of the Hellenic Cadastre (HC) is an ongoing project since 1995, progressively replacing the existing mortgage registries. According to recent regulation (Law 4164/2013, Gov. Gazette 156/A´/09.07.2013), the HC intends to safeguard the public property, by recording legal, technical and other relative information and associated rights. Due to the current financial crisis, there is a delay in the process of the Hellenic Cadastre, but it is expected to be accomplished by 2020.

Taking this situation into account, there is a need to standardize the process of land management, introducing a model for the effective management of the public property in Greece. That means improving the structure of property rights, restrictions and responsibilities (RRRs), as well as all relative stakeholders, in a direction of harmonizing with international land administration systems and standardization processes in this field. The management of public properties in Greece was so far insufficient, greatly affected by the lack of an adequate registration system for the immovable state property.

This paper aims to exploit the possibilities of applying international standards and more specifically the Land Administration Domain Model (LADM), for the administration of public properties in Greece.

The first section of this paper presents the current situation of standardization process, focusing on the field of land administration. Furthermore, the LADM is introduced, clarifying why it is a well-suited model for managing the public properties in Greece. A short reference to the HC Data Model is presented at the last part of this chapter.

An enhancement of the Hellenic's Cadastre data model to comply with the LADM requires the "migration" of HC data model entities to LADM classes. The core entities of the HC data model

need to be transferred to LADM classes, while the creation of the "*Basic Administration Unit*" is required, as it does not exist in the current data model. Adopting LADM leads to the classification of RRRs, which will result to a more rigid structure and efficient administration of all rights, restrictions and responsibilities in HC data model. This process is described at the second chapter.

Finally, the proposed model was developed aiming to cover the core entities of the HC system and more particularly to be applied to the public property. The model proposed is presented at the end of this chapter through one case study. The last part of this paper presents the results of the analysis and ends with a discussion and concluding remarks concerning the proposed model.

2. STANDARDISATION PROCESS IN LAND ADMINISTRATION

There is a growing need worldwide for appropriate land administration systems and standards in land information. In the domain of land administration, standardisation concerns the identification of parcels, documents, persons, stakeholders, surveying and administrative data, maps, and other issues.

Many countries lack of a coherent national approach to land administration field, which constitutes an essential component of national administrative portfolios. With the term "Land Administration" we define the management of land tenure, land-use, land valuation and land development *(Enemark et al, 2005)*.

In the developed world, standards are required in land administration for adequate information exchange and data acquisition. At the European level, INSPIRE directive identifies 34 different geo-information themes, including cadastral parcels, which should be (and currently are) harmonized *(Lemmen et al, 2011)*.

Nowadays standardization has been an increasingly accepted process in the fields of land management and land registries all over the world. Therefore, in Greece, it is time to plan for the future, chart a course for redefining the data model of the HC and replacing components of the existing system. A new data model could facilitate the provision of data to internal and external users in a more flexible format for the community's needs.

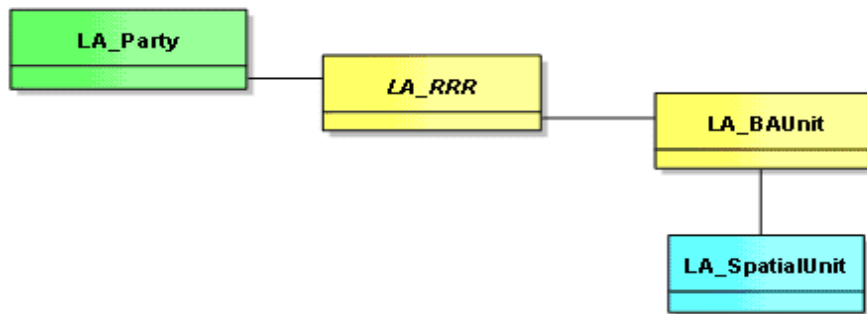### 2.1. Land Administration Domain Model (LADM)

Figure 1: The core model of LADM. (Source: Text of ISO/TC211 19152:2012.)

The LADM was approved as an official International ISO Standard on 1st November 2012 (ISO 19152:2012). It covers basic information-related components of land administration (including those over water and land and elements above and below the surface of the earth). The model provides a conceptual schema with three basic packages and one sub-package:

1. parties, which means people and organizations that perform transactions,
2. basic administrative units, including rights, restrictions and responsibilities,
3. spatial units, mostly parcels and the legal space of buildings and utility, surveying and spatial representation.

As other models, the scope of LADM is limited, cannot model the whole world. However, certain object classes outside its scope are relevant and should be referred to. There is the possibility to create external classes when needed and use population registers (or other sources) as an external reference.

2.2. The Hellenic Cadastre Data Model

The Hellenic Cadastre (HC) project is being implemented over the last few years. The registration concerns all the rights exercised by the owners to their properties, including the public ones. The fact that the public property is not yet recorded in its whole on a national scale means that there is no knowledge for its extent and value, leading to infringement from individuals.

The HC collects information on property objects, which is in reference with the land-par e; and is analyzed on the two-dimensional registration system. The development of the HC relies on a cadastral survey, at a regional scale, which is defined as the process for recording real property or other registrable rights of a person (or legal entity) in this area and the association of these rights to land parcels as depicted, after being checked and technically processed, on cadastral diagrams.

After the completion of the cadastral survey of a region, the system of "Registrations and Mortgages" is gradually replaced by the system of "Operative Cadastre". In this way, the locally competent Land Registry Office operates as a temporal Cadastral Office and undertakes the operation of the Cadastre for the region surveyed coming under its area of competence. At a later level, the temporal Cadastral Offices will turn into permanent ones.

The existing HC Data Model is not based on international standards, but it has been created in accordance to the Hellenic State's needs, thus adjusting to the Hellenic data. The HC's descriptive and spatial information is organised in a property-centered base, thus search can be done either by the property's National Cadastre Code Number (KAEK) which is unique to each property, the address or the beneficiary name.

The model, currently, registers both geometric and descriptive attributes, in raster (Large Scale Orthophoto and Very Large Scale Orthophoto data) and vector formats (boundaries, buildings, points of interest, etc.) together with their 2D topology and their corresponding databases. Information related to the owners, general stakeholders, rights and document resources, complement the relevant data.

The cadastral database is composed by the conceptual and logical model. The first is organized in reference with the land parcel, containing the rights applying on the parcel. It is designed using Entity Relational (ER) diagram, which separates the object of interests in entities (it is not presented here due the big size). Furthermore, during the logical design, the conceptual model is translated into the logical model, which means a data model of a specific DBMS type (Stoter and van Oosterom, 2006). The logical model is stored in a relational database containing additional object-oriented applications (Tsiliakou et al, 2013).

3. METHODOLOGY

In our research, a number of standards have been investigated in order to find the most appropriate to be matched with the Hellenic data model, e.g. ISO 19115, Social Tenure Domain Model (SDTM). The LADM was considered as the most appropriate as it covers land registration and Cadastre in a broad sense, including source documentation and spatial and administrative components. In Greece, many real and personal rights exist as well as customary and informal rights, restrictions and responsibilities, which can be represented in LADM classes.

LADM has the advantage of using packages and therefore it is possible to develop and maintain these packages in a more or less independent way for specific conditions. Furthermore, it provides stereotype classes for data sets which are outside the scope of LADM, e.g. in Greece, for taxation and address indexing of owners that can be included in land administration, realized in external classes.
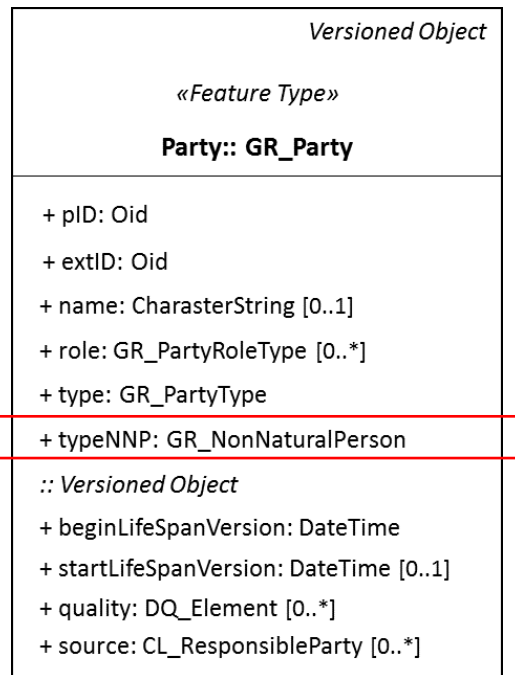
3.1. Proposed model

Figure 2: The proposed model for the management of Greek public property and the class "GR_Party".

For the design of a proposed model for managing the State Property in Greece, certain changes were implemented to the core classes of LADM. As also presented at the figure above, regarding the proposed *GR_Party* class, there was a need to create an extra field for nonNaturalPersons, (i.e. attribute *GR_NonNaturalPerson*) as there are many organizations, authorities, ministries, etc. that should be registered as Parties in the new system. In order to register more information related to parties (such as date of birth, date of death, ID number, etc.) 2 external classes, named: *External::ExtNaturalPerson* and *External::ExtnonNaturalPersons*, were created.

The administrative package is very important for the proposed model as there are many rights and restrictions registered at the HC related to the public property, which constitute the main tool for its management. The part of rights, restrictions and responsibilities at the proposed model is exactly the same as the one at the ISO 19152. Only the field «*leaseType*» was added, as it is the second most common right, after the ownership affecting the state property. A code list was also created for the possible values of the field «l*easeTyp*e».

Last but not least, at the Spatial Unit Package a new class was added, named «*LandUseType*». For the Hellenic Cadastre it is important that the land uses of the parcels will be registered in the system since it affects the value of the parcels. It should be also mentioned that there is not yet, 3D visualization of the buildings, while some problems still exist on the 2D visualizations. This deteriorates by the fact that in Greece there are many authorities that relate to cadastral data and their communication has not been fully achieved.

It is noted that the proposed LADM code lists were implemented to adjust with national legislation.
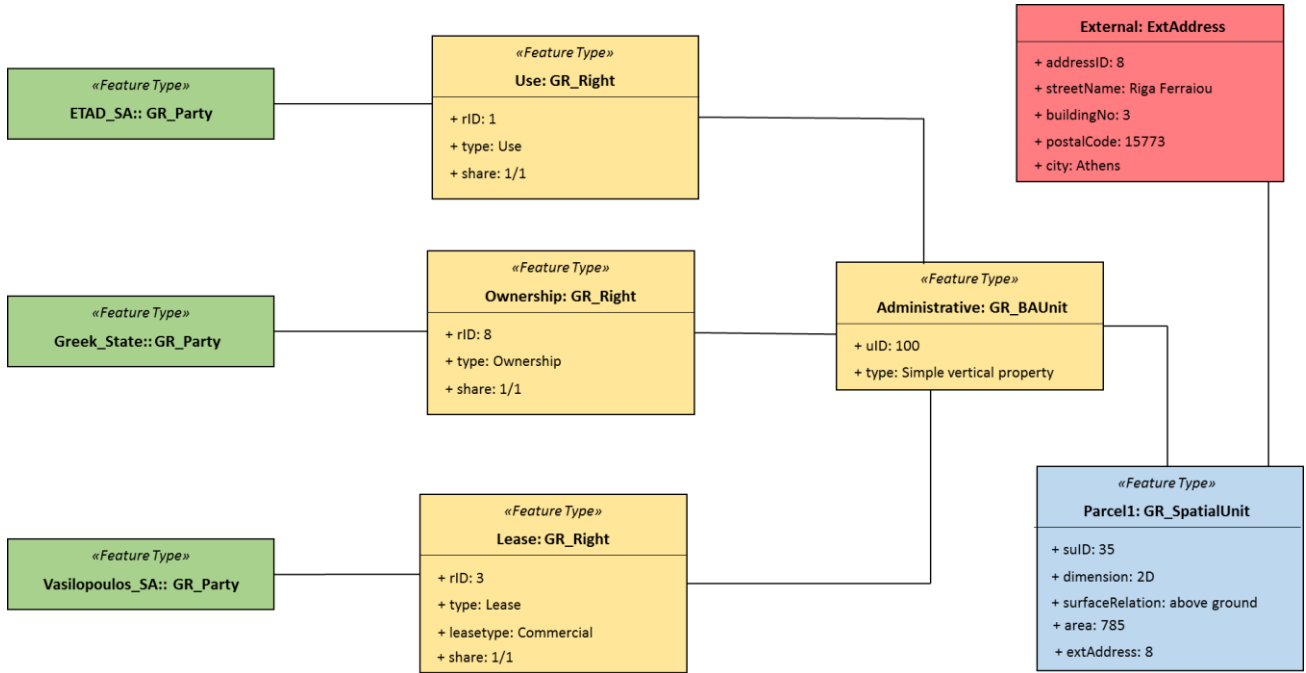
3.2. Case Study

Figure 3: Implementing the proposed model at a case study.

This is a case study a property located in Ilioupoli, Athens, was implemented at the proposed model. This property owned by the Greek State and in particular by a company named ETAD S.A., has three rights: ownership, lease and use. It is a complex issue as all the parties should be implemented in different classes and linked with external ones. A great benefit is that each party has a unique "pID", which helps to recognize it each time that it appears in the system. The same goes for the rights, e.g. ownership has ID *rightID:1* and lease, *rightID:2*. According to ISO191552:2012, the field "*timeSpec*" should be completed by the values mentioned on ISO8601_Type.

3.3. Results of methodology

The proposed model facilitates the management of land related data, reduces data duplication and improves data integrity. In particular, the model may support the conversion of paper-deeds into digital format and their reorganization according to internationally accepted standards. Therefore, by implementing the proposed model, all maps, drawings and relevant documents will be digitized and stored at the "*AdministrativeSource*" class, solving one of the current difficulties. This is a big step towards the development of an e-Cadastre in Greece, diminishing the time and costs required for the transactions, and simplifying the whole process, enabling up-to-date data in real-time.

Furthermore, the model addresses the existing interoperability problems between the different authorities, which are responsible for the generation or use of cadastral data. In terms of modeling land administration systems, this new data infrastructure provides exchangeable data, compatible processes and accessibility to the users in a safe mode. Last but not least, from the proposed external classes registries about the non-physical parties can be created, together with all the relevant information.

4. CONCLUSIONS AND DISCUSSIONS

Over the last few years the international discussion has shown increased interest to standardized structures that can be incorporated in the architectural design of cadastral systems. (Elia E., 2010) The possibilities of adapting LADM offer interoperability and extensibility to the land administration systems, provide solutions for the legal representation of the ownership and facilitate the provision of data to internal and external users, providing improved responses to the community's needs. The ongoing process of the HC coincides with the introduction of the LADM. The comparison between the entities of the Hellenic Cadastral Data Model with LADM classes indicated that there is compatibility between them and that LADM can be used as a basis for the proposed model in order to manage the public properties.

Presently, more than ever, the good management of public properties has a strong impact on the progress and the wellness of the country. The paper-based system, whereas exists can be replaced by a data model based on the LADM, ensuring a more effective management of the public properties. The future work of this paper comprises the implementation of this conceptual schema into a database, or a data exchange format. In direction, a further exploration of the model's possibilities may contribute to exploit its 3D capabilities for registering spatial units that relate to building parts, such as apartments. Finally, some modification at the relevant legal framework is required in order to simplify the process and time needed.

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