# Expanding the Legal/Administrative Package of the Cadastral Domain Model – from Grey to Yellow?

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**Key words**: cadastre, modeling, legal aspects, land rights

## SUMMARY

In version 3.0 of the cadastral domain model (Lemmen et al, 2003) we did not elaborate the legal/administrative package very much. We treated the class RightOrRestriction as an association class between Person and RealEstateObject, both of which are 'unpacked' by making them abstract classes with specialization classes in their respective packages.
In this paper some first ideas on how to expand the legal/administrative side of the model are presented. Firstly this is done through no longer treating the class RightOrRestriction as an association class, but putting it in between Person and RealEstateObject. Secondly more attention is given to rights and restrictions that have no direct relation to a person, but where the prime beneficiaries are one or more other RealEstateObjects or are not clearly identifiable. Thirdly RightOrRestriction is made into an abstract class with specialization classes within its package. Attention is paid to the questoin whether derived rights have to be registered as restrictions to one person or as rights to another person. Fourthly a third 'R' (of Responsibilities) is added. Finally it is suggested that certain specializations of RightOrRestriction always coincide with certain specializations of RealEstateObject, and that another way of packaging (only showing such a combination) would be very useful. More work on, and actual UML modeling of, these first ideas will follow soon.

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## 1. INTRODUCTION

### 1.1 Current model

The core of the cadastral domain model as presented in figure 1 of (Lemmen et al, 2003) is a formalized representation of the often used figure relating the three 'classes' to each other (like (Zevenbergen, 2004) where 'owner', 'right (title)' and 'parcel' are connected, but several variations have been used before). The core model consists of the classes Person, RightOrRestriction and RealEstateObject, whereby RightOrRestriction forms an association class of the relation between Person and RealEstateObject.

In version 3.0 of the cadastral domain model (Lemmen et al, 2003) we did not elaborate the legal/administrative package very much. Whereas the classes Person and RealEstateObject are both 'unpacked' by making them abstract classes with specialization classes in their respective packages, the legal/administrative package only contains three refinements of RightOrRestriction. Firstly the mortgage was made into its own class, that is primarily related to a right or restriction (and through that only indirectly to a real estate object). Secondly a class PublicRestriction was introduced related directly to the real estate object. In both cases no relation is made to the class Person. Finally all three classes just mentioned were related to LegalDocument (like contracts, deeds or decisions), which in virtually all cases are the source of the establishment or transfer of a right or restriction.

In this paper some first ideas on how to expand the legal/administrative side of the model are presented. But before we can do that, we should rethink the roots of the 'parcel' (and the other specializations of RealEstateObject).

### 1.2 The 'parcel'

Unlike most other geographical objects that constitute what we call geo-information these days, the parcel is not a physical reality (man-made or not), but an institutional creation. A parcel is a part of the continuum of the earth, that a group of people have decided to treat as an identifiable unit. To a certain extent this can be reflected by the use that is made of it, but ultimately it is the legal rights that certain people have that determines the extent of and the boundaries between two parcels.

This also means that the expansion of the core cadastral model in the RealEstateObject package (see paragraph 2.1 of Lemmen et al, 2003) can only be explained by looking at different types of legal rights that relate to different units of the earth (and even other objects). The fact that the RealEstateObject is only an abstract class and different forms of

'parcel' form classes on their own is caused to a large extent by the variety in legal rights and the variety in the types of units their vesting creates.

## 2. CORE OF THE CADASTRAL DOMAIN MODEL

Based on the above, it is clear that a parcel (or other object) cannot exist on its own, but ultimately finds its definition in the extent of the unit over which a certain person holds a legal right. RightOrRestriction cannot be depicted merely as an association class of the relation between Person and RealEstateObject. In the field of cadastre and land registration, at which the core cadastral model primarily aims, a parcel is totally depending on the legal right (the type of right, the occurrence of the right and the extent of the right). Therefore RightOrRestriction should be seen as a class on its own.

This will also make it easier to deal with the case of rights or restrictions that do not have a direct relation to a person. Now that RightOrRestriction is no longer considered as an association class between Person and RealEstateObject, it would be possible to allow for the occurrence of cases where there is no relation to Person, although introducing a new specialization class 'ImpliedPerson' of the abstract class Person might be a more elegant solution. In any case, this allows for making Mortgage and PublicRestriction into specialization classes of the abstract class RightOrRestriction.

On the other hand in many countries there are certain rights which prime beneficiaries are one or more other RealEstateObjects. This could be simple servitudes, but also party walls (supporting two constructions owned by different persons) and other joint facilities (ranging from common roads, fishing waters to golf courses). Such a right (or the share in the right) is attached to the ownership of (or other strong right in) a certain, neighboring parcel, and can in most cases not be transferred separately from that parcel. An exception to that rule can be found for instance in Sweden with regard to the right to fish in certain water, which can be detached from any parcel in the area. Hence the specialization NonGeoRealEstate.

## 3. SPECIALIZATIONS OF RIGHTS

### 3.1 Types of rights and restrictions

In (Lemmen et al, 2003) we emphasized that use is made of 'Literate Modeling', which is very prominently done in section 2.4 with regard to the legal/administrative classes. Even though little is depicted in the class diagram in addition to the class RightOrRestriction, we described four categories of private law rights and restrictions. There is also a difference in the way the different categories of rights and restrictions relate to persons, and the relevant list of attributes is also likely to differ between the different categories. All of this form good reason to expand the legal/administrative package, by making RightOrRestriction into an abstract class and introducing a number of specialization classes along the lines of the categories just mentioned.

The types of legal rights that can be distinguished contain at least:

a. Firstly we have the strongest right available in a jurisdiction, called e.g. ownership, freehold or property.
b. Secondly we have derived rights from the previous category where the holder of this derived right is allowed to use the land in its totality (often within the limits of a certain land use type, e.g. housing or animal farming).
c. Thirdly we have minor rights that allow the holder of it to some minor use of someone else his land, e.g. walking over it to the road. Such rights can be called servitude or easement, and also may include the right to prevent certain activities or construction at some nearby land, e.g. freedom of view.
d. Fourthly we have the so-called security rights, whereby certain of the previously mentioned rights can be used as collateral, mainly through bank loans, in the form of e.g. mortgage, hypothec, lien (paragraph 2.4 of Lemmen et al, 2003).

In addition to the rights listed under c) we have the party walls and other joint facilities (for instance the Dutch *mandeligheid*; also see paragraph 2).
Another type can be restrictions and responsibilities whose beneficiary is less concrete, like for instance a more or less general interest, or a type of servitude that is benefiting for instance a utility company (to let you refrain from undertaking activities that might harm cables or pipelines).

Of course we could expand the core cadastral model by showing these four categories of legal rights as specialization classes of the abstract class RightOrRestriction. We might even try to refine the model a bit more, since not all the legal rights can exist on their own. Usually the strongest right (a.) has to apply to a parcel before rights of categories b., c. or d. can be created. The types b., c. and d. can be depicted as composite associations of the type a.

## 3.2 Rights minus restrictions

Such derived rights carve something away from the strongest right. This also means that it is not enough to know that a certain person possesses the strongest right. To really know the extent of his right, you also need to know if any of the other rights exist there. The actual legal right a certain person has in an object comprises of his positive rights minus other persons' positive rights with regard to the same object (or a part thereof). The question than remains whether
  a) the other persons' positive right is registered;
  b) the negative right of the first person is registered; or
  c) both are registered

A further complication are the 'responsibilities', negative rights that do not have an (easy) identifiable beneficiary.
The perception on the difference between the strongest right and the derived rights differs between legal traditions. Most continental European countries start with 'ownership' and built derived rights on top of this. Much English literature, however, talks about the bundle of sticks that make up the right(s) in land. The sticks can be freely arranged. This will also affect the decision regarding registration of 'negative side of a right', which is very important in the first case, and not so important in the second.

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An interesting way of dealing with the dilemma of positive right minus a negative right is the way the Dutch administrative cadastral database deals with this. When you have the full right of ownership this is registered with the code 'VE' (full ownership in Dutch). Now if someone else gets the right of superficies (right to own a building on someone else's land) not only will that right be added to the registration as 'OP', but the 'VE' will be changed into "right of ownership minus superficies", depicted by flipping the letters of the first right and adding the second right: EVOP. There will be no-one for this object that has a VE recorded, but only an OP and the EVOP. This is only done with the limited rights that imply full use (leasehold, superficies and usufruct), but not with minor restrictions like servitudes in the Dutch implementation.

## 4. RESPONSIBILITIES

The class for the legal relations shown in the core model used in (Lemmen et al, 2003) is RightOrRestriction. However, current literature on cadastral and land administration isues is often talking about three R's: Rights, Restrictions and Responsibilities. A restriction means that you have to allow someone to do something or that you have to refrain from doing something yourself. Restrictions can both be within private law, especially in the form of servitudes, as within public law, through zoning and other planning restrictions as well as environmental limitations.
Responsibilities mean that one has to actively do something. Not all legal systems allow such mandated activities as property rights (rights *in rem*), and this will also effect the question if they can (and have to be) registered. Obviously their impact can be substantial and their registration makes sense. Of course it is very important that it is very clear which person is responsible for undertaking the mandated activity. If several persons hold some of the sticks from the bundle of rights, it will not suffice to link the responsibility to the real estate object, but it has to be linked to a specific 'stick', to be able to identify the responsible person. Clearly in a system with a dominant base right, the holder of that base right is the prime addressee of the responsibility. We should make the responsibilities into a class that is in a composite association with other rights, and not relate it directly to RealEstateObject.

## 5. ANOTHER WAY OF PACKAGING

Now that the definition of parcel (and other objects) is derived from the legal rights that persons have in them, there is a relation between the specializations of RealEstateObject and of RightOrRestriction. If we would model all of them with extensive packages showing a lot of specializations (like figure 2 of Lemmens et al, 2003 for the RealEstateObject package), a model of two (actually three) abstract classes would be shown, each with a whole array of specializations. However, these two sets of specializations are interdependent. Certain rights can only be associated with certain objects, and certain limited rights can not be 'loaded' upon all other types of rights. The question than becomes, what is the use of showing this in the way this would be shown if we expand the legal/administrative side and thus expand the whole core cadastral model. This becomes a hard to read model, which can only be correctly interpreted when an array of constraints is applied (this could be formalized through object constraint languages, but also be verbally given as part of 'literate modeling'). An example of this complication can be seen in the 2003 Greek draft model (Arvanitis et al, 2003) which needs a lot of explanation to be correctly interpreted (the revised 2004 Greek model

(Arvanitis/Sismanidis, 2004) does not contain specializations for the class RightOrRestriction, and is more like the 2003 core model).

What we would need is a way to expand from the simple three class core model, not into packages which are based on the disciplinary aspects systems (Zevenbergen, 2002, p. 89-90), but that we would make different models for different types of rights, with only those specialization classes shown for RealEstateObject and for RightOrRestriction for which common instances can be found. This type of packaging seems to be better for using the model as a teaching or comparison tool, and is likely to enhance the spatial awareness of different types of rights for people not used to think that way (like lawyers).

## 6. FINAL REMARKS

This paper showed some first ideas on how to expand the legal/administrative package of the cadastral domain model. There clearly is room for further work and discussion on what ideas to implement and which ones to leave out. Some indications of at least two main legal traditions with regard to dealing with the derived rights as a right and/or a restriction have been given, which might lead two cadastral domain models. Finally these ideas should be implemented through actually modeling them in UML. This will also facilitate the understanding of the discussion for much of the audience.

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