Specialization of the Land Administration Domain Model (LADM) - An Option for Expanding the Legal Profiles

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Key words: Land Administration Domain Model, LADM, Legal Cadastral Domain Model, LCDM, real property right, public regulation

SUMMARY

The Land Administration Domain Model, LADM, passed on the 1st of November 2012 unanimously the final vote towards becoming an international standard, ISO 19152. Based on the standard this paper is a proposal for a more detailed classification of interests in land as modelled within LADM and an attempt to raise the awareness of the possibilities to further develop the LADM's "right", "restriction" and "responsibility" (RRR) classes. The current standardised classification of RRRs in the LADM is restricted to a top-level classification of RRRs. In this paper the authors use the classification of interests in land described in the newly developed Legal Cadastral Domain Model, LCDM, to further develop the LADM. The LDM is based on comparative international legal investigations, including case studies from Portugal, Germany, the Netherlands, Ireland and Sweden.

The conceptual basis of the LCDM is that interests in land can be classified according to whether they are limiting or beneficial to real property ownership. The classification in the model is further based on the paradigm that there are two major types of interest in land; privately agreed interests and public regulations imposed by a public agency to further the interests of society. This is a pattern that can be observed in the legislation of many different jurisdictions, and therefore a useful extension of the international standard. The result of the paper is a proposal on how the administrative part of the LADM (i.e. interests in land) can be expanded. This work can be used to improve and extend the current informative LADM Annexes F 'Legal Profiles' and J 'Code lists'. Customary and informal rights have not been investigated in the LCDM, but can already be represented in the LADM (and its extension STDM: Social Tenure Domain Model). Inclusion of further options for representation of detailed attributes might be very useful for a next LADM version.

The possible extension of LADM does not bring any limitation to the use and implementation of LADM – which is already on-going in several countries. On the contrary: the flexibility of LADM as a concept is demonstrated again and the proposed extensions may be very useful for those countries where a more detailed classification of RRR is under discussion.

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1. INTRODUCTION

This paper presents an expansion of the Land Administration Domain Model, LADM. The LADM is a conceptual model, providing a formal language for describing interests in land. The LADM on 1 November 2012 unanimously passed the final vote towards becoming an international standard, ISO 19152:2012 (ISO 2012). This is a big milestone for FIG; FIG submitted the proposal for the development of the LADM to ISO.

The paper discusses a proposal for a more detailed classification of interests in land than modelled in the current version of the LADM and is an attempt to raise the awareness of the possibilities to further develop the LADM's "right", "restriction" and "responsibility" classes, commonly referred to as RRRs. The classes are shown in Figure 1. The options for an extension of LADM, as proposed in this paper, demonstrate the flexibility of LADM. It does not mean in any way that the legal/registrative component is not covered in LADM; on the contrary: the detailed classification is only possible because of the complete coverage of land administration components in the LADM concept.
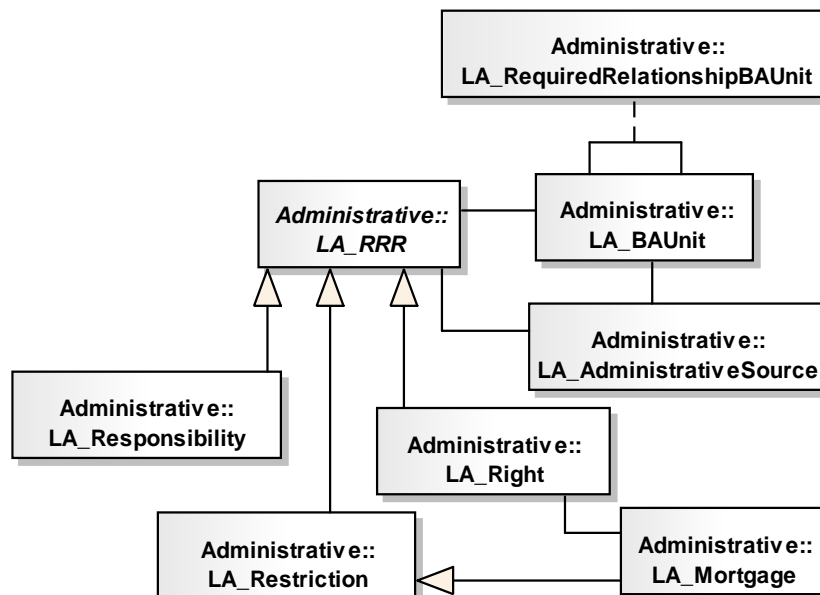

Figure 1. LADM's Right, restriction and responsibility classes (ISO 2012).

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In this paper the authors use the classification of interests in land described in the newly developed Legal Cadastral Domain Model, LCDM (Paasch 2012a; 2012b), which is based on comparative international legal research. The model is illustrated in Figure 3 and 4. The LCDM is in this paper used as a conceptual basis for adding an additional level to the LADM classification, thus making a more detailed classification of RRRs in the LADM "Administrative package" possible.

A legal approach can be used to extend the current informative ISO LADM annexes F 'Legal Profiles' and J 'Code lists', especially adding more content and 'structure' to the code lists for the Administrative Package: LA_RightType, LA_RestrictionType, LA_ResponsibilityType, and LA_MortgageType (ISO, 2012); see Section 4. The proposed changes can be an input to the next revision of ISO 19152. It should be noted here that ISO expects revisions frequently (i.e. every five years). It takes a lot of time to prepare those revisions given the comprehensive development approach within ISO. To ISO the revision procedure proves that standards are used in practice. Before any revision the paper contributes to practical implementation of the proposed improvements.

Incorporating the conceptual thinking and classification of the LCDM into the LADM enables a more detailed level of describing interests in land than the LADM's "right", "restriction" or "responsibility" classes. This may be of future value when (if) more detailed information on land use has to be stored in national or international land administration registers. The LADM allows national specializations to be added to the standard. However, such specializations may be useful when used within a nation, but are of rather limited value when more detailed data in interests in land has to be exchanged internationally. This would require also agreeing on the refinement and structure of the LA_RRR subclasses (including international maintenance of code lists). This paper aims at starting the debate on such a legal expansion of the international standard.

Other initiatives of frameworks for exchanging cadastral information are e.g. the EULIS and INSPIRE initiatives. EULIS, European Land Information Service, is an online service providing land and real property information. EULIS provides easy access to land and property information for professional customers in Europe and also provide information about different land registration conditions in Europe. Access to European Land Registers is supported by information on the local land registration environment and a glossary of terminology (see e.g. http://eulis.eu; Ploeger & van Loenen, 2005; Ploeger & van Loenen, 2004).

INSPIRE, Infrastructure for Spatial Information in the European Community, (INSPIRE, 2007) is an EU directive that, together with its guidelines and implementing rules, provides data specifications for themes to be exchanged within the European Community, such as administrative units and cadastral parcels, among a range of other themes. See

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http://inspire.jrc.ec.europa.eu/index.cfmfor INSPIRE data specifications, guidelines and regulations.

Any exchange of data would require (some form of) international maintenance of tables. This is, however, not a realistic approach, since there is no pan-governmental organisation that, to these authors' knowledge, has expressed any interest in maintaining such international lists. An alternative is to include the extended code lists, with internationally agreed values, in the (next version of) the LADM standard and perhaps make these code lists normative rather than informative. Both approaches help structuring and harmonizing international exchange of data in interests in land. In the meantime, proposed new values for these code lists could be maintained by the editors of the LADM standard and be disseminated via the LADM Wiki (http://wiki.tudelft.nl/bin/view/Research/ISO19152/WebHome).

The remainder of the paper is organized as follows. The LCDM is first introduced and discussed in Section 2. Next the LADM is expanded with a more refined legal modelling in Section 3. The modification and extension of the LADM code lists in the administrative package is next discussed in Section 4. Finally, Section 5 contains the main conclusions and recommendations for future work.

2. THE LEGAL CADASTRAL DOMAIN MODEL

Rights and regulations influence ownership. So-called absolute ownership only exists in theory, since no-one is allowed to execute his/her absolute ownership. (Hereafter "his" is used for his/her.) There is always one or more private or public regulations limiting the use of the property, i.e. the owner's ownership functions (Ekbäck, 2000) are reduced. Examples are when the owner grants someone a use right on his property, the limitation not to build certain constructions or e.g. the maintenance of buildings. The concept of ownership can therefore not be discussed without also discussing private and public imposed restrictions limiting the owner's right (in part or in whole) to use the property, e.g. by removing some of his/her rights to the added value from the land or limiting his/her effective use right of the property. The owner's "absolute" ownership right is reduced on all or some of his ownership functions, depending on the nature of the restriction. Obligations may also be imposed on the owner, e.g. regarding the maintenance of buildings on the property. Furthermore, the owner may be granted some of his/her (original) rights previously limited by a regulation by being granted permissions/dispensation from a regulation, i.e. restoring (some of) the owner's ownership functions. The influence of rights, restrictions and responsibilities are illustrated in Figure 2 where the owner's ownership functions are reduced by public or privately imposed restrictions and obligations to use or otherwise facilitate the property.

The right of ownership is in the LCDM classified as a separated right between a person and land. Even if ownership traditionally may be regarded as a uniform right, the right of ownership is, conceptually speaking, a collection of several other rights/ownership functions as described above. If we treat ownership as a "bundle-of-rights" (Simpson, 1976), the

"bundle" can be classified as a property to property right or person to property right, depending on the executer.
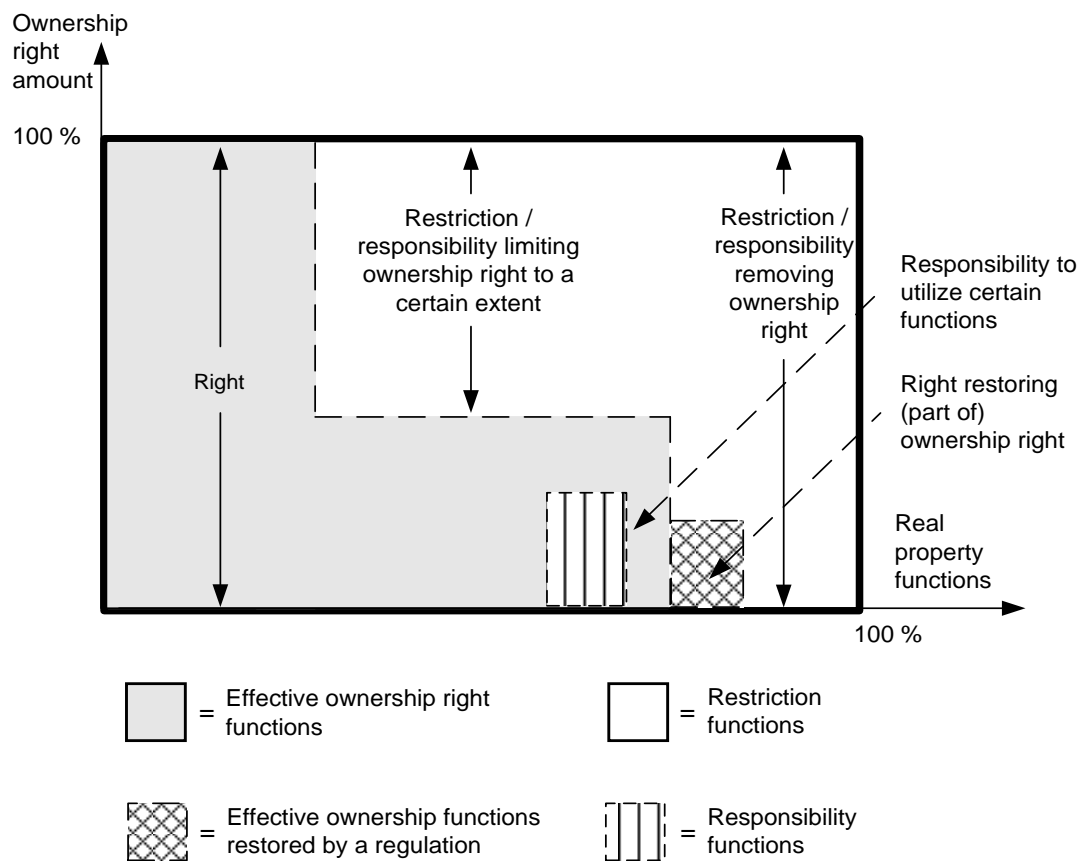

Figure 2. Right, restrictions and responsibilities influencing the right of ownership. Based on Ekbäck (2000).

The conceptual basis of the LCDM is that interests in land can be classified according to how they are limiting or beneficial to real property ownership. The classification is based on the paradigm that there are two major types of interest in land, privately agreed interests and regulations imposed by a public agency to further the interests of society. The administrative (i.e. legal) part of land administration is based on national (or even state/provincial) level legislation, which is supposedly very different in the various legislations.

The LADM standard is conceived in international consensus. For this reason the first version of the standard has been limited with regard to the details it describes and the administrative part was limited to the top level structure of LA_RRR and its immediate subclasses. The

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LCDM does not, in principle, differ from the LADM, except from that the model is based on the RRR's influence on ownership, which is seen as the central interest in land. The LCDM is based on comparative international legal investigations, including case studies from Portugal, Germany, the Netherlands, Ireland and Sweden. The legal patterns, which were observed in the legislation of these different jurisdictions, representing quite a number of the main legal doctrines, were quite similar and therefore included in the LCDM. These patterns are also good candidates for the extension of LADM.

Private interests are in the LCDM divided into five groups: *Common*, *Property to property right*, *Person to property right*, *Latent right* and *Monetary liability*, as shown in Figure 3. Common can e.g. be a property jointly owned by other properties; a property to property right is e.g. an easement; a person to property right is e.g. a personal use right; a latent right is a right not executed yet, e.g. a pre-emption right, and a monetary liability is a financial claim, e.g. a mortgage. Full definitions are not provided here for space reasons, but can be seen in Paasch (2012a). Further examples are provided in Section 3.2 in this paper.
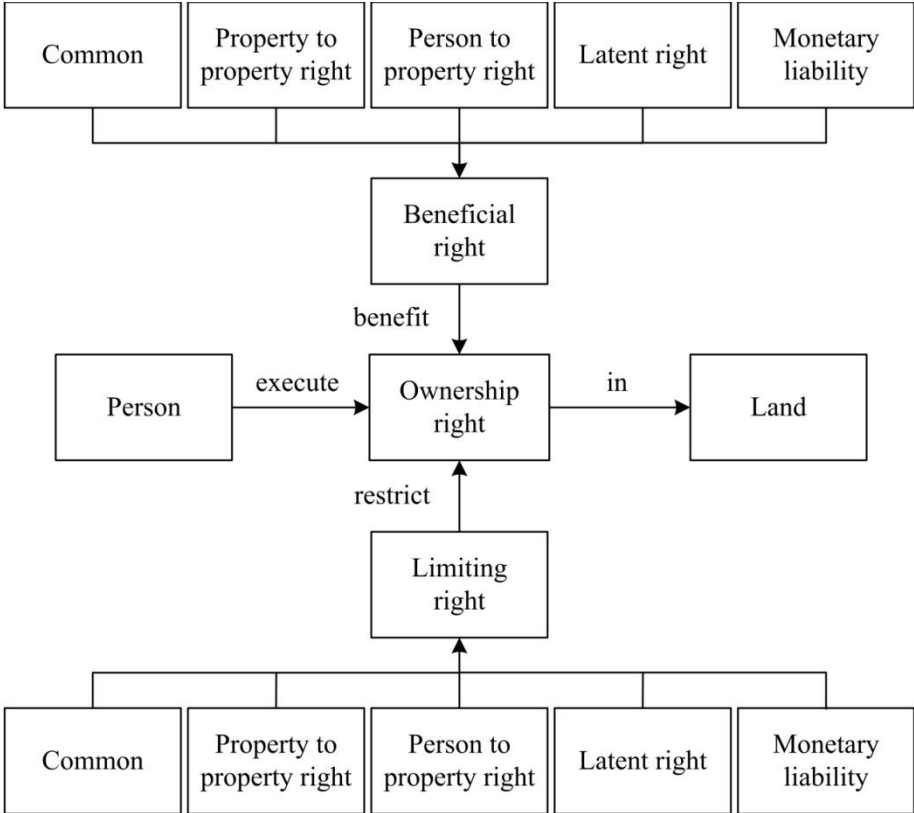

Figure 3. Classification of private real property rights in the Legal Cadastral Domain Model (Paasch 2012a).

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Public interests are in the LCDM divided into six groups: *general* or *specific prohibitions* or *obligations* and *general* or *specific advantages*. See Figure 4. Publicly imposed regulations and decisions influencing ownership can be classified as general or specific *public restriction, public responsibility* (e.g. being obliged to perform some duties issued by a public administration) or a *public advantage,* i.e. a publicly imposed right (e.g. the right holder is being granted certain privileges by a public administration in relation to others not granted any privileges, for example a dispensation from a public restriction to build within urban areas). Public specific restrictions and responsibilities are based on decisions affecting a limited and defined set of properties. An example is a municipal development plan which may e.g. involve a prohibition to erect new buildings on properties within the planned area and/or specifying certain mandatory measures to be undertaken. Such measures could involve water and sewage solutions, establishment or alteration of private roads connected to the public roads network or the maintenance of green areas. Full definitions are not provided here for space reasons, but can be seen in Paasch (2012a). Further examples are provided in Section 3.3 in this paper.
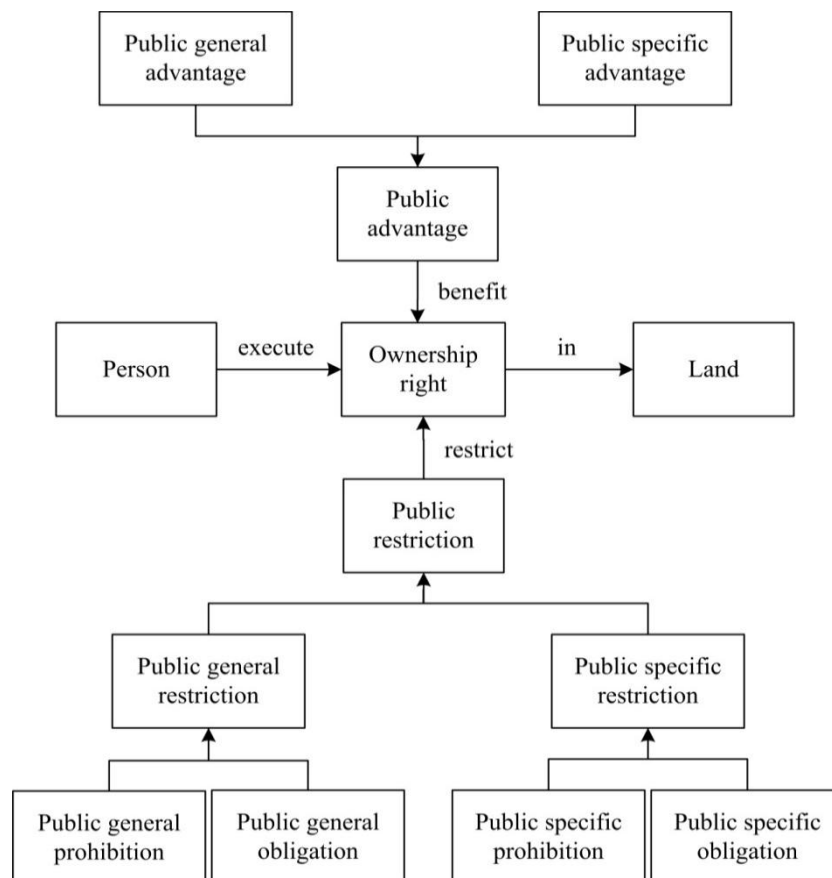

Figure 4. Classification of public regulations in the Legal Cadastral Domain Model (Paasch 2012a).

3. EXPANDING THE LADM LEGAL PROFILES

The "realm of private law" and the "realm of public law" are mentioned in the LADM's informative annex F, containing legal profiles (ISO, 2012). The LCDM classification of private and public interests can therefore be implemented in the LADM on a conceptual level. This has been proposed in this paper by adding the LCDM classification for the purpose of creating a more detailed, standardized classification of RRRs than in the current standard.

3.1 Terminology

The terminology used in the LCDM differs from the terminology used in the LADM. The reason is that the LCDM was developed in parallel with the LADM, where the terms changed during the development phase. Now that the LADM has an accepted terminology it is therefore advisable to adjust the LCDM terminology when using the model to expand the LADM legal profiles in order to avoid confusion and achieve uniformity. The LCDM's "person" is synonymous with the LADM's "party", which will be used henceforth in this paper and the LCDM's "prohibition" and "obligation" terms can be substituted with "restriction" and "responsibility". The LCDM's "advantage" term can be substituted with "right".

The authors are aware that the term common is ambiguous as it can have two interpretations: "Normal, basic, standard" and "shared, joint." "Common" is an accepted term in land management for properties jointly owned by other properties, see e.g. Elinor Ostrom´s *Governing the Commons* (Ostrom, 1990). In the LCDM and in this paper "Common" is used for properties collectively owned by other properties (often adjacent).

The LADM's "LA_Mortgage" term (i.e. a financial security in a real property) is by the authors judged as being rather limited, aiming at a specific type of financial relation between the Party and the right holder. The LCDM's "monetary liability" term seems more appropriate since it covers a wider range of financial relations. The class has relations to the LA_Right and LA_Restricion classes, which is in accordance with the LADM, however, the current LA_Mortgage class should be interpreted in a wider sense in order to encompass even other types of financial relations, e.g. the German *Rentenschuld* (Paasch, 2011), without switching to new name for the class (e.g. LA_MonetaryLiability) in order to keep LADM backwards compatible after the legal refinement. A monetary liability (LA_Mortgage) is a relation in terms of security for e.g. a loan between the real property owner and the right holder. Examples are the German *Hypotek,* the Irish *mortgage*, the Dutch *hypotheek,* the Swedish *mortgage lien* (Paasch, 2011) and *the Portuguese hipoteca* (Hespanha et al., 2009) rights. The rights can be either beneficial or limiting to real property ownership (Paasch, 2011). The right holder may in many legal systems authorize a forced sale of the real property if the mortgagee does not fulfil the specified financial obligations. A monetary liability might be seen as a latent right (i.e. a right not yet executed), but is in this model described as a separate class

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because of its strong financial content. A mortgage is a restriction to ownership, since the owner of the real property is forced to tolerate certain conditions.

3.2 Extended legal profiles, private law

The top level (and abstract) classes for the realm of private law are LA_PrivateRight, LA_PrivateRestriction and LA_PrivateResponsibility. They are specializations of respectively LA_Right, LA_Restriction and LA_Responsibility, which should also be made abstract (implying a change proposal to the LADM standard). Interests belonging to the realm of private law can, as mentioned, be divided into the following groups for each RRR: *Common, Property to Property, Person to property* and *Latent*. Monetary liability is already described in the LADM and is therefore not part of the proposed specialisation. These groups can be used for further specializations of the above mentioned top level private law classes, as described below.

The *Common* relation is a real property to land relation executed in land legally attached to two or more real properties. Owners of the real properties (in the LADM termed Basic Administrative Unit, LA_BAUnit) execute co-ownership rights in the land at issue (Paasch, 2011). I.e. the real property is owned by other properties, not persons. Examples are the German *Anliegerflutstück*, the Dutch *mandeligheid,* the Swedish *samfällighet* (Paasch, 2011) and the Portuguese *Baldios* (Hespanha et al., 2009). The relation is covered in the LADM by allowing a LA_BAUnit to be a Party owning (a share of) another LA_BAUnit. A *Common* ownership right may also be beneficial for the real properties having a share in the common property as it allows the use and profit of the land not to be accessible to others than the shareholder properties. However, the right can also at the same time be seen as a restriction or obligation to ownership since the participating real properties may have to contribute to the maintenance and management of the legally attached land. Note that this "restriction aspect" may be considered as a kind of mirror of the beneficial side in the model, on a conceptual level. Perhaps at system implementation level it could be decided to store and maintain only one side of the mirror and derive the other side when needed (further investigations are required to validate this hypothesis). The *Common* relation can therefore execute a right, restriction or generate a responsibility, which can be placed in the LA_CommonRight, LA_CommonRestriction or LA_CommonResponsibility classes, depending on the actual content of the relation. See Figures 5 – 7.

The *Property to property* relation is executed by the owner of a real property (#1) in another real property (#2), due to his/her ownership, i.e. the right is attached to the property #1. Examples are the German *Grunddienstbarkeit*, the Irish *easement*, the Dutch *erfdienstbaarheid,* and the Swedish s*ervitut* (Paasch, 2011), the Portuguese *servidoes prediais* (Hespanha et al., 2009). Property to property rights are beneficial to ownership for the dominant real property (#1) as they allow the use and benefits of the servant real property (#2). However, the right can also at the same time be seen as a limitation since the participating real properties (#1 and potentially also others) have to contribute to the

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maintenance and management of the servant real property (#2) and facilities they use on the property (#2). This "restriction aspect" may also be considered as a kind of mirror of the beneficial side in the model. The property to property relation can execute a right, restriction or generate a responsibility, which thus exists as a *property to property right*, *property to property restriction* or *property to property responsibility*, depending on the actual content of the relation and modelled with the LA_PropertyToPropertyRight, LA_PropertyToPropertyRestriction or LA_PropertyToPropertyResponsibility classes. See Figures 5 – 7.

The LCDM's *Person to property* relation contains interests executed by a person to use, harvest the fruits/material of, rent or lease the real property in whole or in part. Examples are the German *Niessbrauch*, the Irish *profit á prendre*, the Dutch *erfpacht,* the Swedish *tomträtt* rights (Paasch, 2011) and the Portuguese *Usufructo* (Hespanha et al., 2009). Person to property rights can be beneficial by the income of a rent to the property owner by allowing someone else to use one's real property or demanding some actions to be performed. This "restriction aspect" may also be considered as a kind of mirror of the beneficial side in the model. The person to property relation can execute a right, restriction or generate a responsibility, which can be placed in the LA_PartyToPropertyRight, LA_PartyToPropertyRestriction or LA_PartyToPropertyResponsibility classes, depending on the actual content of the relation. See Figures 5 – 7.

The *Latent right* relation contains relations not yet executed on a real property. Examples are e.g. a mining concession which may be granted years before it is used, i.e. the right is latent until it is activated. Other examples are the German *dingliches Vorkaufsrecht*, the Irish *right of entry or of re-entry attached to a legal estate*, the Dutch *voorkeursrecht,* the Swedish *hembudsskyldighet* (Paasch, 2011) and the Portuguese *preferencia* (Hespanha et al., 2009). When executed, the relation will belong to one of the other RRR sub-classes. The latent relation may therefore execute a right, restriction or generate a responsibility, which thus is creating a LA_LatentRight, LA_LatentRestriction or LA_LatentResponsibility, depending on the actual content of the relation itself. See Figures 5 – 7.

3.3 Extended legal profiles, public law

The top level (and abstract) classes for the realm of public law are LA_PublicRight, LA_PublicRestriction and LA_PublicResponsibility. They are specializations of respectively LA_Right, LA_Restriction and LA_Responsibility. Interests in land belonging to the realm of public law can be classified as belonging to three groups according to the functions they execute: 1) Public regulations creating a prohibition for the real property owner to perform certain activities on his/her real property (LA_PublicRestriction); 2) Public regulations creating an obligation for the real property owner to perform certain activities on his/her real property (LA_PublicResponsibility); 3) Public regulations creating an advantage (i.e. a permission /dispensation /concession) allowing the real property owner to (i.e. voluntarily) conduct certain activities on his/her property (LA_PublicRight). Any permission is an

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interaction with a prohibition or obligation at instance level (e.g. a permission to build within an otherwise restricted coastal non-building zone). There would be no need for any permission without one of these limiting regulations. This classification is in accordance with the LADM's "RRR" classification.

The public RRR's can, as described in the LCDM, be divided into general and specific types. Public general restrictions and responsibilities are, as we have seen, regulations prohibiting or mandating activities on certain types of real property at a general or specific level. The term specific is used for a limited number of real properties, in opposition to general, which is affecting "all" real property. The public general RRR's could be modelled at class level (and no need to store this at instance level). This implies that the corresponding classes (LA_PublicGeneralRight, LA_PublicGeneralRestriction and LA_PublicGeneralResponsibility) should be modelled as abstract classes. The code lists for these public general RRR classes are then considered as explicit representations of the relevant generic public legal items. This is in contrast to the public specific RRR's, which need to be represented at instance level. An example of a specific RRR is the obtained building permit for building activities for a specific property located in an urban area. An example of a general RRR is the requirement (i.e. mandatory) to perform activities on certain types of real property, at a general level, i.e. the maintenance of production on agricultural land, which may not be withdrawn from agricultural production without prior notification/permission. The Public General RRR's are modelled in the classes LA_PublicGeneralRight, LA_PublicGeneralRestriction and LA_PublicGeneralResponsibility. See Figures 5 – 7.

The *Public specific right* class contains permissions, dispensations, commissions and other public grants on land use allowing the real property owner to conduct otherwise restricted activities and thereby "reclaiming" parts of his latent real property functions limited by a restriction. The grant is creating an advantage in relation to other owners affected by the regulation. An example is a permission to conduct environmentally hazardous activities within a specific area. Conceptually, advantages can also be affecting certain types of real property. They are here placed in the *Public general right* class. They are not general permits valid for specific types of property as such, but the result of changes in legislation restoring parts of the owner's original real property functions for a certain type of property. An example is a change in the Swedish Planning and Building Act of 1987, ch. 8, on January 1st 2008 to allow the construction of garden sheds or cabins measuring up to 15 square meters without applying for a building permit instead of the previous limitation of 10 square meters. The change in the Act expanded the owner's right to use the real property, i.e. to build a larger shed than before. The Public Specific RRR's are modelled in the classes LA_PublicSpecificRight, LA_PublicSpecificRestriction and LA_PublicSpecificResponsibility. See Figures 5 – 7.

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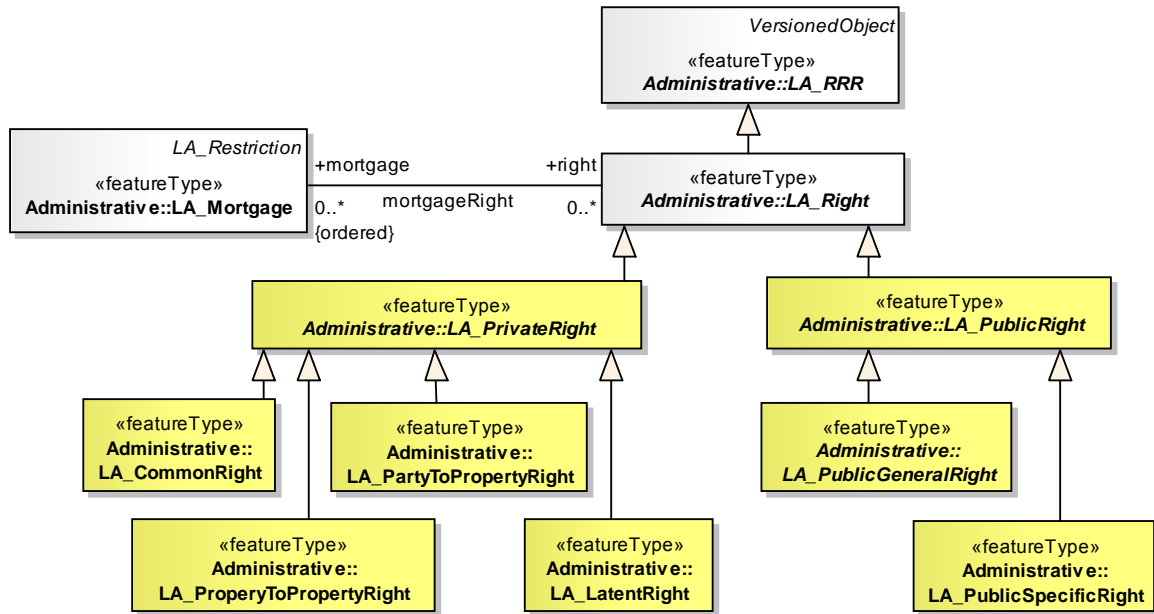Abuja, Nigeria, 6 – 10 May 2013

Figure 5. Specialization of the LADM's LA_Right legal profile. Extended profile for privately and publicly imposed rights.

Figure 6. Specialization of the LADM's LA_Restriction legal profile. Extended profile for privately and publicly imposed restrictions.

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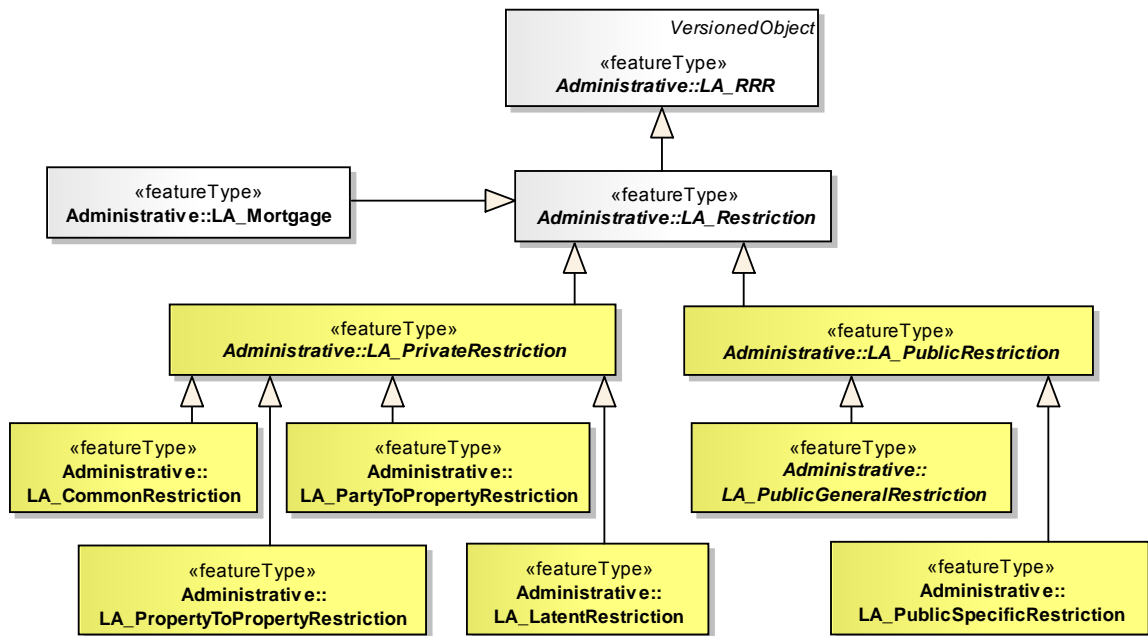Environment for Sustainability
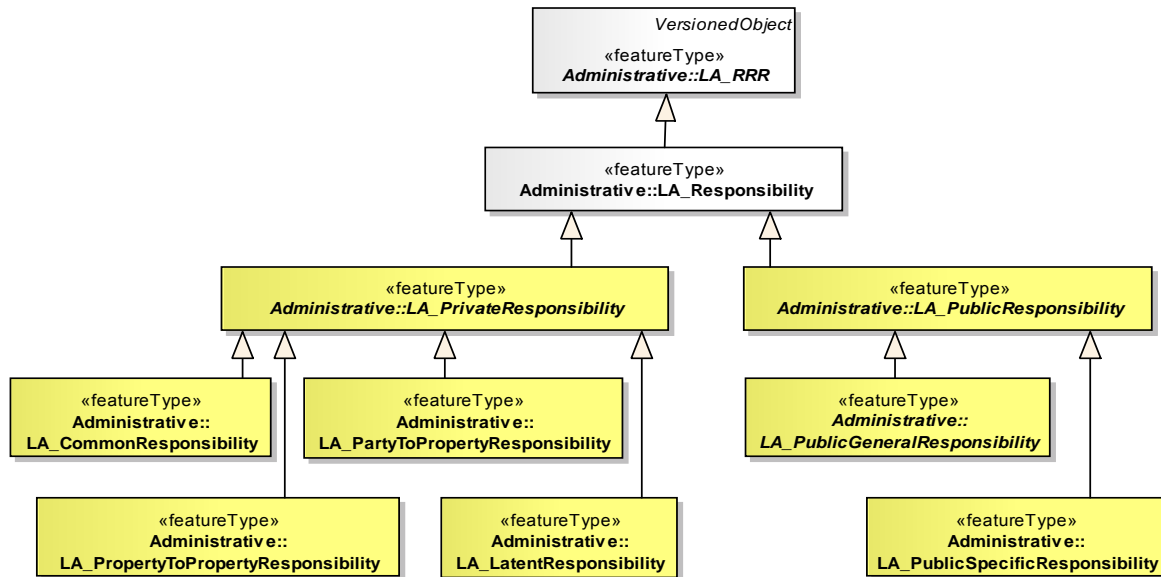Abuja, Nigeria, 6 – 10 May 2013

Figure 7. Specialization of the LADM's LA_Responsibility legal profile. Extended profile for privately and publicly imposed responsibilities.

4. MODIFICATION OF LADM CODE LISTS

The adding of the LCDM to the LADM can be used to improve and extend the informative annexes F ("Legal Profiles") and J ("Code lists") in the current LADM version, especially by adding more content and 'structure' to the current code lists for the Administrative Package: LA_RightType, LA_RestrictionType, LA_ResponsibilityType, and LA_MortgageType); see Figure 8.

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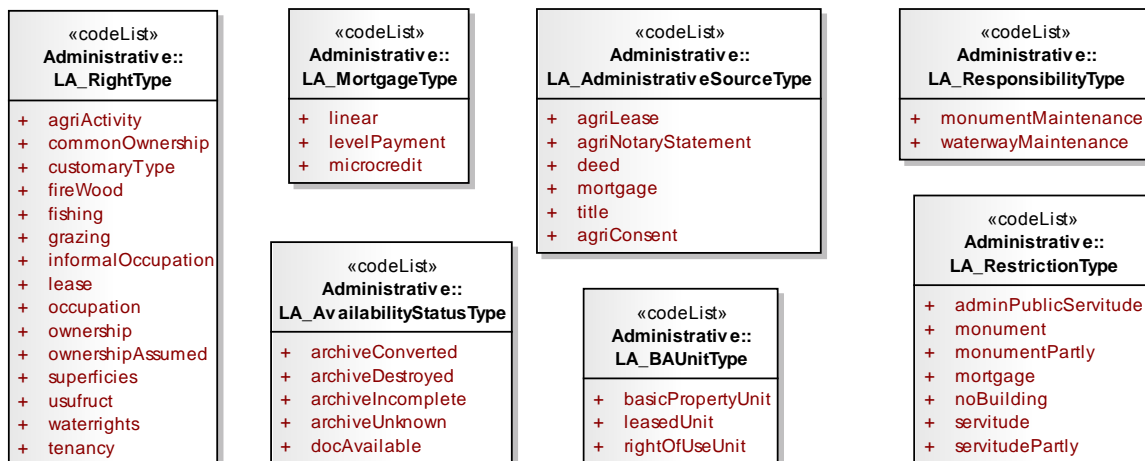Abuja, Nigeria, 6 – 10 May 2013

Figure 8. LADM's current code lists for Administrative Package (Annex J.2 of the standard).

There are a number of questions to consider with respect to the refined code list. The first set of issues is: Should there for every of the six leaf and two non-leaf subclasses of LA_Right (see Figure 5) be separate code lists? (same question for LA_Restriction and LA_Responsibility), can code lists inherit from corresponding parent code lists?, and How to finally add country specific code list values (related to the standard code list values)? The second set of issues related to these code lists are related to the abstract leaf classes: Is it clear that in this model the code list values encode the public (general) regulations? How to deal in this case with country profiles in which certain (example) code list values of the LADM standard are not applicable?

5. CONCLUSIONS

The result of this paper is a proposal on how the legal part of the LADM (the "administrative package", i.e. interests in land) can be expanded to rather few, conceptual classes, instead of the multitude of (national) property rights and regulation terms in the existing International Standard. Incorporating the conceptual thinking and classification of the LCDM into the LADM enables a more detailed level of modelling interests in land. This may be of future value when/if more detailed information on land use has to be stored in national or international land administration registers. The use of a more detailed terminology for RRR enables a better understanding of a nation's interests in land without having detailed knowledge of its legal system.

Judging from the research presented in this paper a future expansion of the administrative part of the LADM seems possible by integrating the LCDM's conceptual thinking. However, more research is needed by investing more jurisdictions. The LCDM has been tested only on Western legal systems, which may be insufficient to make it valid on a global scale. For example, further investigations in the detailed structure of informal and customary rights would contribute to further develop the model. Those customary and informal rights can already be represented in the LADM (and its extension STDM: Social Tenure Domain Model, see the Annex I and Annex J of the standard), but inclusion of further options for representation of detailed attributes might be very useful for a next LADM version.

The questions in Section 4 related to handling code lists and code list values also require further attention. The extended LADM legal profiles presented in this paper are therefore to be seen as a first step towards a more detailed classification of rights, restrictions and responsibilities.

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REFERENCES

Ekbäck, P. (2000). *Förfaranden vid planering och markåtkomst; en rättsekonomisk analys*. (In Swedish). Doctoral Thesis. KTH Royal Institute of Technology, Stockholm.

Hespanha, J. P., Jardim, M., Paasch, J. & Zevenbergen, J. (2009). Modelling legal and administrative cadastral domain: Implementation in the Portuguese legal framework. In *Journal of Comparative Law*, 4:1, 140-169.

INSPIRE (2007). *Directive 2007/2/EC*. Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) 14.03.2007.

ISO (2012). *Geographic information – Land Administration Domain Model (LADM)*. ISO 19152:2012(E). International Organization for Standardization (ISO). Geneva, Switzerland.

Ostrom, E. (1990). *Governing the commons. The evolution of institutions for collective action*. Cambridge University Press.

Paasch, J.M. (2011). *Classification of real property rights. A comparative study of real property rights in Germany, Ireland, the Netherlands and Sweden*. TRITA-FOB Report 2011:1. KTH Royal Institute of Technology, Stockholm, Sweden.

Paasch, J.M. (2012a). *Standardization of real property rights and public regulations – The Legal Cadastral Domain Model*. Doctoral thesis. KTH Royal Institute of Technology. Stockholm, Sweden.

Paasch, J.M. (2012b). The Legal Cadastral Domain Model. In *Proceedings of the FIG Commission 3 workshop*, Athens, Greece 11-12 December 2012. International Organisation of Surveyors (FIG), Copenhagen, Denmark.

Ploeger, H. & van Loenen, B. (2004). EULIS – At the beginning of the road to harmonization of land registry in Europe. In *European Review of Private law*, 3, 379-387.

Ploeger, H. & van Loenen, B. (2005). Harmonization of land registry in Europe. In *Proceedings of the FIG working week 2005 and 8th International Conference on the Global Spatial Data Infrastructure (GSDI-8)*, 16-21 April 2005, Cairo, Egypt. International Federation of Surveyors (FIG), Copenhagen.

Simpson, S. R. (1976). *Land Law and Registration*. Cambridge University Press. UK.

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