Specialization of the LADM - Modelling of non-formal RRR

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Key words: Land Administration Domain Model, LADM, Legal Cadastral Domain Model, LCDM, Social Tenure Domain Model, STDM, real property right, non-formal right, informal right, customary right, Refined LADM modelling

SUMMARY

This paper proposes a more detailed classification of the legal part of the LADM, ISO 19152, (i.e. interests in land) than possible in the current standard (ISO, 2012) today and is an attempt to raise awareness of the possibilities to further develop the LADMs 'right', 'restriction' and 'responsibility' classes (RRR). The term 'land' is here used for land, water and air.

The LADM does, in principle, already facilitate the modelling of e.g. informal and customary rights. However, there has, to the authors' knowledge, not yet been any approach that incorporates non-formal social tenure relationships, such as informal occupation, tenancy based on non-formal and informal rights and customary rights into the LADM. This paper uses the non-formal rights descriptions in the Social Tenure Domain Model (STDM) as an input to further develop the LADM.

In this paper the authors base their research on an extended classification of the LADMs RRR classes presented at the FIG Working Week in Nigeria (Paasch et al., 2013). The extension is based on the newly developed Legal Cadastral Domain Model, LCDM (Paasch, 2012a), as a conceptual basis for adding an additional level to the LADM classification. The LCDM states that interests in land can be classified according to whether they are limiting or beneficial to real property ownership. The extended classification is further 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.

This paper contains a discussion on how the legal part of the LADM can be expanded. Furthermore, the "code list" issue addressed in the FIG 2013 Working Week paper is further researched in this paper, e.g. how to develop the code lists for refined LCDM classes (based on specialisations), that could/should be used. The incorporation of a specialized description of non-formal rights in the LADM may be of future value when (if) more detailed information on social tenure 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 of interests in land has to be exchanged internationally. This would require international maintenance of code tables.

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1. INTRODUCTION

The LADM is developed by the International Standardisation Organisation ISO as a tool for structuring land administration worldwide. Development and maintenance of the standard is a normal procedure within ISO, which includes a review at least three years after publication and every five years after the first review by all the ISO member bodies. The LADM is managed by ISOs Technical Committee 211 (TC211) on Geographic Information/Geomatics.

This paper is intended as an input to the future LADM review. Other input are e.g. recent research published in two papers presented at the Working Week of the International Federation of Surveyors, FIG, held in Abuja, Nigeria, in May 2013 (Paasch et al., 2013) and (Hespanha et al., 2013). This paper is a continuation of this research and initiates a discussion on possible aspects of maintenance of customary and non-formal rights, restrictions and responsibilities (RRR) in the next "development round" of the standard.

In Paasch et al., (2013) further detailed modelling in the administrative package of LADM, based on the newly developed Legal Cadastral Domain Model, LCDM is presented. See also Paasch (2012a and 2012b). Paasch highlights that customary and informal rights have not been investigated in the LCDM, but can already be represented in the LADM. The Social Tenure Domain Model, STDM, (Augustinus et al., 2006, Lemmen et al., 2007, FIG 2010) can be used as input in an extended LADM version describing non-formal RRR. Augustinus (2010) explains that STDM could make it possible for all citizens to be covered by some form of land administration system, including the poor, thereby improving the land management capacity of the industry, as well as addressing upcoming challenges such as climate change. According to Augustinus the STDM should contribute to poverty reduction, as the land rights and claims of the poor are brought into the formal system over time.

In the paper (Hespanha et al., 2013) it is stated that flexibility is needed in relation to the way of recordation, the type of spatial units used, the inclusion of customary and informal rights, the data acquisition methodologies and in the accuracy of boundary delineation. In the paper (Hespanha et al., 2013) it is concluded that a more detailed alignment with the proposals as in Paasch et al. (2013) is needed where customary and informal rights are concerned.

In this paper first the RRRs in a broad sense are discussed in section 2. Then the proposed RRR extensions of LADM are introduced in section 3; this includes a discussion of non-formal rights in land. The extensions are based on Paasch et al. (2013). Section 4 describes using, structuring and maintaining LADM code lists and provides an international outlook. The paper closes with conclusions and a recommendation.

2. RRRs: FORMAL, CUSTOMARY AND INFORMAL IN THE LADM

Rights, restrictions and responsibilities are related to ownership of land. According to the authors knowledge there does not exist any international definition of ownership. The working definition used in this paper is that ownership is a combination of the owner's right to use the real property/ the right to manage and exclude others from the property/ the right to added value or financial income from the property and the right to transfer the property by sale or donation according to the owner's choice. The owner executes the rights until he/she decides (or is forced to, by e.g. the State or municipality) to part with the property. It should be recognised that this working definition is not only about statutory tenure; it includes customary tenure. Tenure is often categorised as follows (FAO, 2002):

- *'Private: the assignment of rights to a private party who may be an individual, a married couple, a group of people, or a corporate body such as a commercial entity or non-profit organization. For example, within a community, individual families may have exclusive rights to residential parcels, agricultural parcels and certain trees. Other members of the community can be excluded from using these resources without the consent of those who hold the rights.*
- *Communal: a right of commons may exist within a community where each member has a right to use independently the holdings of the community. For example, members of a community may have the right to graze cattle on a common pasture.*
- *Open access: specific rights are not assigned to anyone and no-one can be excluded. This typically includes marine tenure where access to the high seas is generally open to anyone; it may include rangelands, forests, etc, where there may be free access to the resources for all. (An important difference between open access and communal systems is that under a communal system non-members of the community are excluded from using the common areas.)*
- *State: property rights are assigned to some authority in the public sector. For example, in some countries, forest lands may fall under the mandate of the state, whether at a central or decentralised level of government'.*

In practice, most forms of holdings may be found within a given society, for example, common grazing rights, private residential and agricultural holdings, and state ownership of forests. Customary tenure typically includes communal rights to pastures and exclusive private rights to agricultural and residential parcels. In some countries, formally recognised rights to such customary lands are vested in the nation state or the President "in trust" for the citizens (FAO, 2002). In broad terms, land tenure rights are often classified according to whether they are "formal" or "informal" (FAO, 2002). Formal property rights may be regarded as those that are explicitly acknowledged by the state and which may be protected using legal means. Informal property rights are those that lack official recognition and protection. In some cases, informal property rights are illegal, i.e., held in direct violation of the law. An extreme case is when squatters occupy a site in contravention of an eviction notice (FAO, 2002). The need for inclusion of customary land tenure into land administration is underlined in many documents; see for example the Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National

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Food Security (FAO, 2012). In UN-HABITAT (2003 and 2008) the various types of land rights are viewed as existing along a continuum, with some settlements being more consistent with law than others. This view makes it possible to include the people with the weakest tenures in the idea of sufficient legal access. Alden Willy (2012) provides the following definition and description for customary tenure:

'Customary land tenure refers to the systems that most rural African communities operate to express and order ownership, possession, and access, and to regulate use and transfer. Unlike introduced landholding regimes, the norms of customary tenure derive from and are sustained by the community itself rather than the state or state law (statutory land tenure). Although the rules which a particular local community follows are known as customary law, they are rarely binding beyond that community. Customary land tenure is as much a social system as a legal code and from the former obtains its enormous resilience, continuity, and flexibility. Of critical importance to modern customary landholders is how far national law supports the land rights it delivers and the norms operated to sustain these'.

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 this paper "Common" is used for properties collectively owned by other properties (often adjacent), as described below.

Given the overview above it is good to see that LADM is not only about statutory and formal rights. It is also about customary and informal rights. In section 1, Scope, of the LADM, Clause 1 of (ISO, 2012) it is highlighted (amongst other) that the standard 'provides a terminology for land administration, based on various national and international systems, that is as simple as possible in order to be useful in practice. The terminology allows a shared description of different formal or informal practices and procedures in various jurisdictions'. Those 'informal practises' open options for inclusion of customary and informal tenures, as can be recognised in the definitions in clause 4 of the standard (author's italics and bold):

– basic administrative unit (BAUnit) is defined in clause 4.1.2 as 'administrative entity, subject to registration (by law), or recordation [by informal right, or customary right, or another social tenure relationship], consisting of zero or more spatial units against which (one or more) unique and homogeneous rights [e.g. ownership right or land use right], responsibilities or restrictions are associated to the whole entity, as included in a land administration system',
– level is defined in clause 4.1.11 as a 'set of spatial units, with a geometric, and/or topological, and/or thematic coherence' – examples are:
   o one level of spatial units for an urban cadastre and another for spatial units for a rural cadastre
   o one level of spatial units to define basic administrative units associated with rights and another level of spatial units to define basic administrative units associated with restrictions
   o one level of spatial units to define basic administrative units associated with formal rights, a second level for spatial units to define basic administrative

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units associated with informal rights and a third level for spatial units to define basic administrative units associated with customary rights
  - o one level with point based spatial units, a second level with line based spatial units, and a third level with polygon based spatial units.
- Right is defined in clause 4.1.20 as an action, activity or class of actions that a system participant may perform on or using an associated resource (ISO, 2007, 4.38). It should be noted here that:
  - o a right may provide a formal or informal entitlement to own or do something
  - o the International Standard deals with real rights and personal rights. Real rights are rights over or in respect of spatial units (e.g. ownership, or usufruct). Personal rights are rights that parties have (e.g. fishing rights, grazing rights, or use rights)
  - o rights may be overlapping, or may be in disagreement
  - o examples of rights are: ownership right, apartment right, tenancy right, possessions, customary right, Islamic right (e.g. miri or milk), indigenous right, or informal right.

Further it is highlighted in clause 5.4 of the standard that the main classes of the Administrative Package are the basic classes LA_RRR and LA_BAUnit. LA_RRR is an abstract class with three specialization classes:

1) LA_Right, with rights as instances. Rights are primarily in the domain of private or customary law. Ownership rights are generally based on (national) legislation, and code lists in the LADM are in support of this, see Annex J of the standard (ISO, 2012).
2) LA_Restriction, with restrictions as instances. Restrictions usually "run with the land", meaning that they remain valid, even when the right to the land is transferred after the right was created (and registered). A *mortgage*, an instance of class LA_Mortgage, is a special restriction of the ownership right. It concerns the conveyance of a property[1] by a debtor to a creditor, as a security for a financial loan, with the condition that the property is returned, when the loan is paid off.
3) LA_Responsibility, with responsibilities as instances.

Code lists for Administrative Package in clause 6.4.9 include a code list for LA_RightType: the LA_RightType code list includes all the various right types, such as ownership, customary or lease, used in a specific land administration profile implementation. The LA_RightType code list is required to implement the LA_Right class. A code list shall provide a complete list of all codes with a name and description. Code lists for Spatial Unit Package in clause 6.5.8 include LA_LevelContentType: the LA_LevelContentType code list includes all the various level content types, such as primary right or customary, used in a specific land administration profile implementation. The LA_LevelContentType code list is required only if the attribute type in LA_Level class is implemented. The code list shall provide a complete list of all codes with a name and description. Further there are some specific classes which are relevant for common, customary and/or communal lands:

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[1] Note: Not all countries see it as such; it is a limted right, not necessary a transfer to creditor. This can be included in a next version of the Standard.

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- LA_GroupParty: any number of parties, together forming a distinct entity, with each party registered. NOTE A group party may be a party member (4.1.14) of another group party. EXAMPLE A partnership (with each partner registered as a party), or two tribes (with each tribe registered as a party).
- LA_Party: person or organization that plays a role in a rights transaction. NOTE 1 In order to be registered as a party, not all members need to be identified and registered individually. NOTE 2 A basic administrative unit may be a party because it may hold a right of e.g. easement. EXAMPLE An organization may be: a company, a municipality, the state, a tribe, a farmer cooperation, or a church community (with each organization represented by a delegate: a director, chief, CEO, etc.).

Those are only the most relevant functionalities to model customary and informal land rights based on LADM. Examples are in Annex C of ISO (2012).

3. EXTENSIONS TO LADM RRR CLASSES

3.1 Extended legal profiles, private law

The top level (and abstract) classes for the realm of private law are proposed to be included in the LADM 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. Interests belonging to the realm of private law can be divided into the following groups for each RRR: *Common, Property to Property, Party (Person) to Property* and *Latent*.

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). 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 responsibility 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. 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 1 – 3.

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. 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 maintenance and management of the servant real property (#2) and the 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 1 – 3.

The LCDM's *Party (Person) to property* relation contains interests executed by a party to use, harvest the fruits/material of, rent or lease the real property in whole or in part. Party 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 party (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 1 – 3.

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. 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 1 – 3.

3.2 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 restriction for the real property owner to perform certain activities on his/her real property (LA_PublicRestriction); 2) Public regulations creating a responsibility for the real property owner to perform certain activities on his/her real property (LA_PublicResponsibility); 3) Public regulations creating an right (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 interaction with a restriction or responsibility 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 RRRs can 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 RRRs 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 RRRs, 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 RRRs are modelled in the classes LA_PublicGeneralRight, LA_PublicGeneralRestriction and LA_PublicGeneralResponsibility. See Figures 1 – 3.

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 a right in relation to other owners affected by the regulation. An example is a permission to conduct environmentally hazardous activities within a specific area. Conceptually, rights 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 RRRs are modelled in the classes LA_PublicSpecificRight, LA_PublicSpecificRestriction and LA_PublicSpecificResponsibility. See Figures 1 – 3.
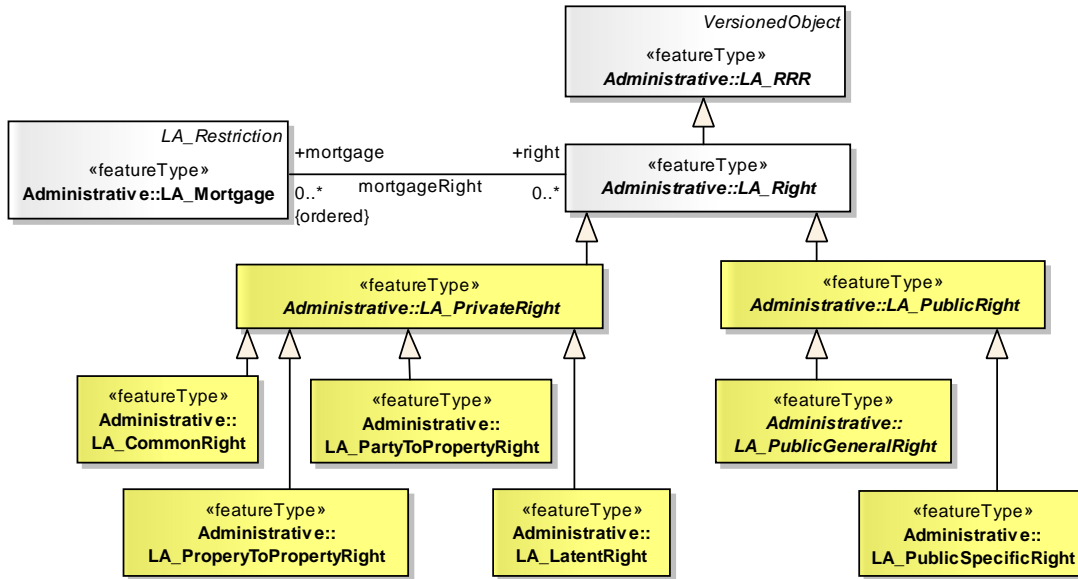
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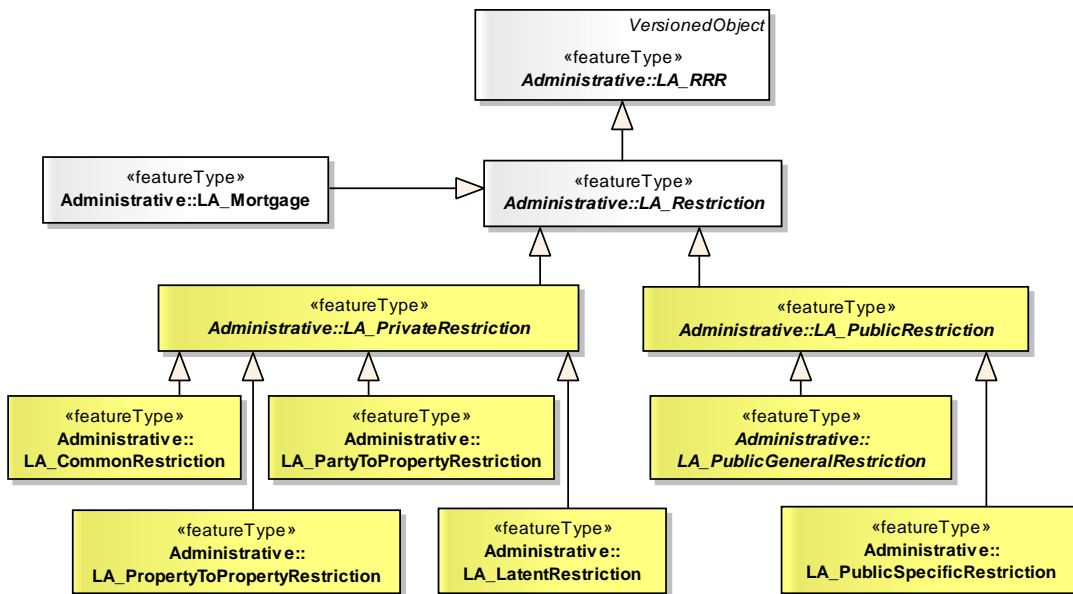*Figure 1. Specialization of the LADMs LA_Right legal profile. Extended profile for privately and publicly imposed rights.*

Figure 2. Specialization of the LADMs LA_Restriction legal profile. Extended profile for privately and publicly imposed restrictions.
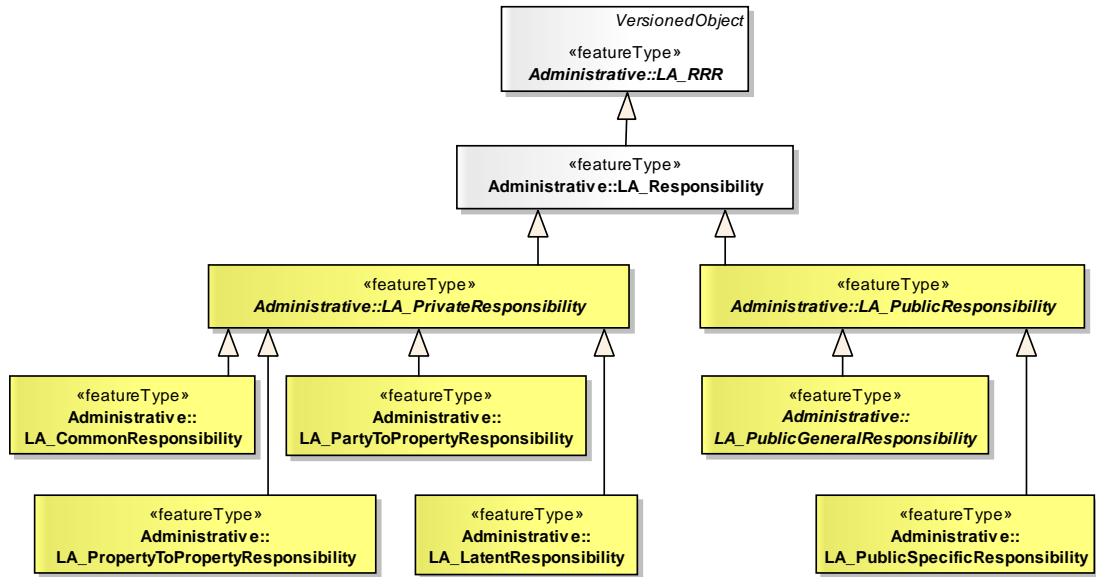
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Figure 3. Specialization of the LADMs LA_Responsibility legal profile. Extended profile for privately and publicly imposed responsibilities.

3.3 Customary and informal extensions to RRRs

The basis for the inclusion of customary and informal tenure in LADM is in the comprehensive analyses in (Augustinus, 2006). Existing land information systems have limitations because of the fact that informal and customary tenures cannot be included. Generally, the systems are not designed for this purpose (Fourie, van der Molen, Groot, 2002, FIG/COST, 2004; Lemmen et al., 2005, Augustinus et al. (2006), FIG (2010). Land tenure types, also in terms of the continuum of land rights (UN-HABITAT, 2008), which are not based on the cadastral parcel and are not registered require new forms of LASs, including land information management systems. A social tenure approach is needed to fill the gap. This is done via the STDM, where a range of tenures is covered: the STDM provides a land information management framework integrating formal, informal, and customary land systems and administrative and spatial components by facilitating the recording all forms of land rights, types of rights holders and all kinds of land and property objects / spatial units. The Social Tenure Domain Model (STDM) (Augustinus et.al, 2006, FIG, 2010), brings all required functionality together. It should be recognized that this functionality, by definition, is also available in the LADM[2] – a series of class names is identical, but not all. The STDM Annex I of the LADM Standard (ISO, 2012) gives an overview of the LADM class names with their aliases in STDM, see Figure 4.

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[2] In (UH Habitat, 2012) STDM is introduced as a concept with related components: a new way of thinking about land records, a software package based on free, widely used and open-source systems to record information about land, a method of collecting data about land and a way of using and disseminating information about land and property. Awareness of the broader concept is relevant here.

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LADM class name	STDM alias
AdministrativeSource	SocialTenureInventory
LegalSpaceBuildingUnit	Unit
BoundaryFace	*identical name*
BoundaryFaceString	*identical name*
GroupParty	*identical name*
BAUnit	*n.a.*
Level	*n.a.*
Mortgage	Collateral
LegalSpaceUtilityNetwork	UtilityNetwork
Party	*identical name*
PartyMember	*identical name*
Responsibility	*identical name*
Restriction	*identical name*
RequiredRelationshipBAUnit	*n.a.*
RequiredRelationshipSpatialUnit	*n.a.*
Right	STDM_Relationship
RRR	SocialTenureRelationship
Source	*identical name*
Point	SurveyPoint
SpatialSource	SpatialUnitInventory
SpatialUnit	*identical name*
SpatialUnitGroup	AdminSpatialUnit
VersionedObject	*identical name*

Figure 4. LADM class names and corresponding STDM alias (ISO, 2012).

The LADM includes the so called Basic Administrative Units, allowing grouping of spatial units. This functionality is not explicitly (but implicitly) available in STDM. The main difference between LADM and STDM is in the BAUnit, Level, RequiredRelationshipBAUnit and RequiredRelationshipSpatialUnit which are not applicable in the STDM. The fact that BAUnit is not available in STDM implies that RRRs work directly against Spatial Units, i.e. there isn't any administrative entity, subject to registration (by law) or recordation (by informal right, customary tenure or another social tenure relationship).

So far there are no specific needs for further detailing in LADM classes because of requirements related to representation of customary or informal land rights could be identified. In LADM a representation of overlapping tenures is possible. The LADM functionality as presented in section 2 seems to be sufficient.

It should be noted that different approaches in modelling are possible. For example: a rights as "a group party (pastoralists) with an access right for a certain period of time" can be modelled as in Figures C16 and C36 in ISO, (2012). The latter figure represents a pastoralist group in Kenya which has two different kinds of rights: 1. a right to migration corridors (these

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can pass through farmers land), and 2. a right to access grazing areas for a longer period of time. An alternative is to use restrictions. Note: this would mean a "customary" restriction to a formal right. A "formal" restriction on an informal rights is also possible, for example a restriction to built/live within 100m from a highway or close to a river with danger for inundation. Or an area with risk on land slides or other danger. Responsibilities can be to built protections for that (or to take measures for evacuation) – as far as reasonable. Innovative responsibilities could be in capturing water during the raining seasons.

There are possibilities in LADM to identify different types of customary tenures in code lists. The main issues are the inclusion of BAUnit and the terminology (it should be noted that LADM already includes generic terms as "Party" or "Spatial Unit"). The inclusion of BAUnit means that a customary tenure can de modelled against a group of spatial units.

In Hespanha (2013) there is a suggestion in the last section to include 2 more subclasses to LA_RRR: LA_CustomaryRight and LA_InformalRight (apart from LA_PublicRight and LAPrivateRight as introduced here above). This was based on the idea that types of customary and informal rights had to be introduced into separate classes for separate tenures. As a consequence all tenures would get a subclass – this would introduce a lot of complexity. An alternative is to use a hierarchy in LA_Right, LA_Restriction and LA_Responsibility as based on the models as in Figures 1 – 3.

Basic principle in this approach is that customary and informal tenures are classified under the private realm (not under public realm or state lands – or open access). Overlaps in tenures are always possible – unless impossible under a certain jurisdictions ("exclusive or").

4. USING, STRUCTURING AND MAINTAINING LADM CODE LISTS

The inclusion of the legal classes of the LADM is one step in the direction of international harmonization of the administrative/ legal information in land administration. Agreeing on the various types of rights, restrictions, responsibilities, and mortgages is relevant.Types of tenure should be well defined and public – to support land markets, to avoid land grabbing, to protect customary and informal land users. In the current version of the standard ISO 19152, there are now sample values for these code lists: LA_RightType, LA_RestrictionType, LA_ResponsibilityType, and LA_MortgageType); see Figure 5. However, besides being just informative part of the standard, the values for the various types are just indicated by a single name (label) without giving definitions. For the first version of the LADM standard, it was considered 'a bridge too far' to standardize the legal definitions of the various types of RRRs. And it is ambitious indeed – compare the approach taken in EULIS, a European portal to land register information in various European countries each with their own real estate legislation. A definition in natural text (English), based on national legislation, is given for every type of right (restriction, etc.); see Figure 6. However, the first step in direction of better international understanding is taken by giving the option to display comparable definitions from other countries. It is not claimed that these types of right are equal, but first links are made.

Figuur 5. LADM's current code lists for Administrative Package (Annex J.2 of the standard).

Figure 6. EULIS Glossary with legal terms from various countries, with definitions given in English and option to display comparable legal terms from other countries (with their definition). Go to the EULIS website eulis.eu → launch the service → Glossary tab.

An approach similar to the EULIS glossary is taken by the European Environment Agency (EEA) in their GEneral Multilingual Environmental Thesaurus (GEMET) which contains a lot of terms and definitions (in different languages), but now also structured, e.g. by explicitly

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indicating the broader/narrower or related term[3]. This approach is thus taking international harmonization one step further and might serve as an example for how we could provide definition of the types of rights (restrictions, etc.) in the context of land administration. Having broader/narrower terms, is one approach which might be applied in LADM administrative code lists. Having, more broad terms which are internationally agreed, can then be refined by more specific terms (types of rights) at national level. So, the values in the code lists get a hierarchal structure, which provides some semantics as terms higher in the hierarchy are internationally defined and agreed on. Adding more content, meaning and 'structure' to the current code lists for the Administrative Package would then be another step in the development of the LADM.

UML code lists are just list of values without any (hierarchical) structure. A simple hierarchically structured code list needs to be organised in a simple way. This means simple hierarchical coding based on Figures 1, 2 and 3. We propose the convention that formal right (restriction, responsibility, etc) code list values start with 1 (i.e. 1_formal), and informal code list values start with 2 (2_informal), etc.. The second number in the code list value is then further refining the actual type; e.g. for LA_RightType this could be 1_1_ownership, 1_2_lease, etc. for formal types and 2_1_tenancy, 2_2_grazing, etc. for informal types, etc. Of course, this has to be organised in a manageable way: both creating initially agreed code list values and a mechanism to maintain this international list. This means the identifier of the code lists in included in the hierarchy. For refinement in country profiles this should then be followed by the ISO 3166-1 country code. ISO 3166 is the International Standard for country codes and codes for their subdivisions. The existing attributes LA_Righttype, LA_Restrictiontype, LA_Responsibility remain where they are. Order in sequence of 'registration'.

In this context it is relevant to consider the approach taken by INSPIRE (Lutz, 2010), both with respect to modelling (hierarchical structuring) the code list values and how to manage these. INSPIRE applies ISO 19135 'Procedures for item registration' (ISO, 2005) for managing and disseminating code lists. Beside definitions of code list (values) also identifiers of code list (values) play an important role. In order to be referenceable the identifiers in INSPIRE are all URIs. This is true for the INSPIRE register itself[4], for a specific code list; e.g. land use classification[5], and for a specific code list value; e.g. 'farming infrastructure'[6]. The INSPIRE code list register contains besides a referenceable identifier and label (name) also the definition of the code list values; e.g. for 'farming infrastructure' the definition is: 'Farm dwellings, animal husbandry infrastructure (animal dwellings and processing infrastructure linked to farms), manure storage and other farming infrastructure (e.g. buildings linked to plant handling and processing in farms).'

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[3] See at www.eionet.europa.eu/gemet with concepts defined in natural language and terms (concept names) given in many languages, but also linking to broader or related terms.
[4] http://inspire.ec.europa.eu/codelist
[5] http://inspire.ec.europa.eu/codelist/HILUCSValue
[6] http://inspire.ec.europa.eu/codelist/HILUCSValue/1_1_2_FarmingInfrastructure/

The above INSPIRE example of the code list for Land Use Classification (HILUCS), was not chosen by accident. For this code list the hierarchy in code list values was considered very important and therefore modelled explicitly. To the code list value, e.g. 'farming infrastructure', an identifier is associated, of which the numbers in the last part of the identifier contains an encoding of the hierarchy; e.g. 1_1_2_FarmingInfrastructure (three deep because of the number hierarchy prefix). So, the parent is code list value with identifier (last part), which is two deep: 1_1_Agriculture. This code list value in turn has parent with identifier (last part), which is one deep 1_PrimaryProduction. This is clearly a root value as we can not remove any numbers in the identifier (last part) anymore. For LADM a similar pragmatic approach is proposed, which can be made operational. The question arises, who will be responsible for managing the register: maintaining the content and disseminating this content? Some options are: ISO/TC211, OGC or FIG (with register on http://isoladm.org). However, there are many countries in the world and several of them with more jurisdictions (provinces, states), who might all want to extend the basis code list values. Perhaps, it is not good to have a single 'authority', but apply a kind of open linked data approach. The usefulness of identifiers that are referenceable has been demonstrated by INSPIRE.

From the field of semantic technologies, a similar approach can be detected in RDF (resource description format) in an attempt to create more formal semantics. Specifically appropriate is the RDF vocabulary[7] SKOS (Simple Knowledge Organization System). SKOS Core (W3C, 2004a) has semantic relations between concepts (such as: broader. narrower, related) and mapping properties (such as: closeMatch, exactMatch, broadMatch narrowMatch, relatedMatch). In addition, SKOS Extensions (W3C, 2004b) are a set of terms extending the SKOS Core vocabulary to support some common features of knowledge organisation systems, especially thesauri. Instead of just modelling an hierarchy SKOS has some more refined ways to describe relationship between terms (and below the concepts they indicate): broaderGeneric, broaderInstantive, broaderPartitive, narrowerGeneric, narrowerInstantive, narrowerPartitive, relatedHasPart, and relatedPartOf. An example of the use of SKOS in the our domain is the 'Cadastre and Land Administration Thesaurus' (CaLAThe by Erik Stubkjær and Volkan Cagdas), which is also LADM related/inspired; see Figure 7. The content of this thesaurus covers the complete LADM, so not only code list values, but also the LADM classes themselves (which might be considered as a drawback: 'semantic soup', with classes, attributes, enumeration, and code list terms all in one environment).

There is also an initiative to represent land administration data as Linked Data via the 'Core Immovable Property' in RDF (again LADM based). This should fit into the e-Government Core Vocabularies[8] by the European Commission, ISA Programme: Interoperability Solutions for European Public Administration (EC 2009). At the moment it is still a difficult question what is the best way forward. The semantic technologies (RDF, SKOS, linked data) provide tools which could be very useful. However, from modelling perspective UML class diagram already have generalization (broader-narrower) and also aggregation (part-whole) associations between classes (concepts) to create hierarchies. Note that this is at class level and note at code list value level.

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[7] http://www.w3.org/2004/02/skos/extensions.rdf
[8] https://joinup.ec.europa.eu/elibrary/document/egovernment-core-vocabularies

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Cadastre and Land Administration Thesaurus (CaLAThe)

Return to homepage -

Ownership

Alternative label:

Broader terms:
Real property right

Narrower terms:
Shared ownership
Individual ownership
Public ownership
Adverse possession

Related terms:

Definition:
Collection of rights to use and enjoy property, including right to transmit it to others. The complete dominion, title, or proprietary right in a thing or claim (Source: BLACK).

Scope Note:
GEMET term

Identifier:
http://www.cadastralvocabulary.org/CaLAThe/Ownership

Exact match:
http://www.eionet.europa.eu/gemet/concept/5971

Version 2.0 (10/10/2012)
Please contact Erik Stubkjaer or Volkan Cagdas for suggestions and comments.
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	Terms of the ISO/DIS 19152 LADM Administrative package		Draft CaLAThe terms based only on LADM terms	CaLAThe thesaurus terms (ver.1) and related thesauri A: AGROVOC agricultural vocabulary G: GEMET Thesaurus I: INSPIRE Spatial Data Themes O: Cycorp's OpenCyc S: STW Thesaurus for Economics	
	Primary terms	Secondary terms: Attributes and Enumeration and code list terms		Adopted terms (+ alternative labels)	New terms (+ alternative labels)
1	LA_BAunit		Basic administrative unit ~	Property unit ~ (Basic administrative unit)	(Real estate (S))
2 3 4 5	LA_BAUnitType	basicPropertyUnit leasedUnit propertyRightUnit	Basic administrative unit type ~ Basic property unit - Leased unit - Property right unit -	Property unit type ~	Servient property unit Dominant property unit
6	LA_RRR		Right, restriction and responsibility -		Law (S)
7	LA_Right		Right -		Real property right
8 9 10 11 12 13 14 15	LA_RightType	agriActivity commonOwnership customaryType firewood fishing grazing informalOccupation	Right type - Agricultural activity - Common ownership ~ Customary right ~ Firewood - Fishing - Grazing - Informal occupation -	Shared property ~ Customary law ~	Legal basis (G) (Formal right Real estate law (S) Individual ownership Public ownership (A) Party share Condominium right Timeshare ownership Planning law (G)

Zeve | Next | Previous | Highlight all | Match case | Reached end of page, continued from top

ISO/DIS 19152... | PeopleXS - mana... | Postvak IN - pva... | doc | CanonEos-7702... | Windows Task M... | 7 Microsoft Off... | 8 Adobe Acrob... | untitled - Paint | N «

Figure 7. Some example screen shots from the SKOS organized 'Cadastre and Land Administration Thesaurus' (CaLAThe) http://cadastralvocabulary.org/

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5. CONCLUSION AND RECOMMENDATIONS

The research presented in this paper show that it is possible to extend the Land Administration domain Model, LADM and its code lists, using the Legal Cadastral Domain Model, LCDM and the Social Tenure Domain Model, STDM, to making it possible to describe non-formal rights, restrictions and responsibilities. We recommend further research into the organisation of code tables and the approach in publication of code lists.

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