

Can LADM contribute to a more fair large scale land acquisition?

João Paulo HESPANHA, Portugal, Tarun GHAWANA, India, Christiaan LEMMEN
and Jaap ZEVENBERGEN, The Netherlands

Key words: Access to land, Cadastre; Digital cadastre, Security of tenure, Standards, LADM, STDM

SUMMARY

Large scale land acquisitions happen again and again. Reasons are in food prices, production of palm oil and bio fuel and carbon offset. Substantial areas are affected, e.g. areas in size comparable with Western Europe. Beneficiaries are local elites, national governments and international companies, harmed are small holders who can not defend their rights, esp. women. Oxfam (2011) provides analyses and a set of recommendations on this subject.

In the context of those recommendations from Oxfam it can be recognised that there is an urgent need for new approaches in Land Administration and Management. Conventional approaches, often of historical footings, proved to be inadequate in many jurisdictions.

Flexibility is needed in relation to the way of recordation¹, the type of spatial units used, the inclusion of customary and informal rights, the data acquisition methodologies and in the accuracy of boundary delineation. It is less important to produce accurate maps. It is more important to have a complete cadastral index map and to know how accurate the map is. For instance, highly rigorous and accurate methodologies as practiced by registered or licensed surveyors are not pro-poor approaches and take very long to cover a whole region.

A more flexible approach in Land Administration and Management may result in fast availability of a cadastral map with a related registry of all (formal, informal, customary) in an area. This can then be used as a (more) solid base for large scale land acquisitions. The paper investigates up to which level the Land Administration Domain Model (LADM) can contribute to a fair approach in large scale land acquisition.

In the paper the problem of large scale land acquisition will be briefly introduced with a focus on the transfers of rights (and restrictions). Fitness for purpose will be tested based on a series of cases. The broader land governance issues that need to be addressed to get to fair large scale land acquisitions are only briefly mentioned and mostly outside the scope of this paper.

¹ Note: in this paper the word 'recordation' is used to underline a difference with a formal 'registration' of formal land rights in a formal land administration system.

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1. INTRODUCTION

Potential conflicts between customary and / or informal systems of land tenure with the state supported formal systems of land registration are an issue in many developing regions. Africa presents a significant challenge because the traditional authorities (chiefs, clans, families etc.) have significant authority over land in most countries. Where it exists, formal land administration consists of the conventional approach based predominantly on deeds and title registration. However, the vast majority of the urban and rural population in African countries uses customary systems of land administration. Further due to the complex nature of the cadastre and property rights, colonial land administration laws and regulations remain entrenched in many countries (Burns, 2006; UN ECA, 2012).

In recent years, a new dimension has added to this situation and makes it more complex. Non-African governments concerned about stability of food supplies are promoting acquisition of farmland in foreign countries as an alternative to purchasing food from international markets. This fast-evolving context creates opportunities, challenges and risks. Increased investment may bring macro-level benefits and create opportunities for raising local living standards (Cotula et. al., 2009; Von Braun, and Meinzen-Dick, 2009). Apart from food prices, reasons are in large scale production of palm oil and bio fuel and carbon offset. Substantial areas are affected, e.g. areas in size comparable with Western Europe. Beneficiaries are local elites, national governments and international companies, harmed are small holders who can not defend their rights, esp. women. Oxfam (2011) provides analyses and a set of recommendations.

On the other hand, land deals in Africa are framed by high levels of public concern over land rights and food security, both within countries and internationally. Commentators and insiders recognise the need to weigh the ambitions and potential of large-scale land-based developments against the concerns of host country citizens about sovereignty over local resources, as well as the vigorous criticism of some civil society organisations (Cotula et. al., 2009).

This study is largely based on previous studies done by international organisations and many of them refer to media reports as their basis. For this study, the authors have tried to present the situation in the context of the Land Administration Domain Model (LADM) framework.

First an introduction is given to the continuum of land rights in section 2. A similar type of continuum can be applied to technologies, approaches in land administration, recordation (Zevenbergen et. al, 2013), spatial units, accuracy and types of right holders. The LADM supports this continuum of approaches. Then some example cases of transfers on land (use-) rights and restrictions in relation to large scale land acquisition are presented in section 3. In section 4 the LADM framework is presented with a focus on customary tenure, government land, and privately held Land. This framework allows the combined representation of

different forms of tenure. The next section 5 presents some specialisations in LADM. The paper ends with a discussion on the integration LADM and the Social Tenure Domain Model, STDM (Augustinus et.al., 2006, FIG, 2010, UN HABITAT 2012, and Lemmen, 2012).

2. THE CONTINUUM OF LAND RIGHTS

Already in the FIG Bogor Declaration (FIG, 1996) the different needs from different countries are underlined: a simple low cost manual cadastre recording only private ownership rights may be appropriate for one country, while a sophisticated and relatively expensive fully computerised cadastre recording a wide range of ownership and land use rights may be appropriate for another country. The infrastructure can support a vast array of legal, technical, administrative and institutional options in designing and establishing an appropriate cadastral system, providing a continuum of forms of cadastre ranging from the very simple to the very sophisticated. Such flexibility allows cadastres to record a continuum of land tenure arrangements (Section 4.5 of the Bogor Declaration) from private and individual land rights through to communal land rights, as well as having the ability to accommodate traditional or customary land rights. In field operations there is a range of technologies from plane table to GPS. Work may commence with large scale images for adjudication purposes.

Larsson (1991) presents ‘axis of variation’ in the (so-called progressive, see Fourie and Van Gysen (1995)) development of cadastral/land information systems. One can start at different levels; types of simplification can be seen as variations along a number of axes – which together determine information content. Most important axes are according to Larsson:

- the *land – unit division axis*. For parcel based systems a division in land units is imperative. Variations can be found in size of the units – group (village), farm, parcel, etc,
- the *location – determination axis*. Location of land can be indexed without maps, as in the Doomsday Book and in most ancient tax recordation’s. It can be also located by a point on an aerial photograph or map or as a co-ordinate. If the boundaries of the units have been recorded on the ground, they can be recorded in a map or co-ordinate record with a varying degree of accuracy. This depends partly on whether ground survey, photo interpretation or photogrammetric methods are being used. Variations in methods and results are possible,
- the *information – content axis*. To the primary land unit designation can be added various information. Such as area, land use, buildings, assessed value, owner, other rights, population, etc,
- the *information – quality axis*. In a land information system may vary considerably in quality,
- the *maintenance – axis*. Larsson says that the availability of up-to-date data is of strategic importance for land information systems. It may be included as a quality issue, and:
- the *spatial – axis*. This is about priority setting in order to determine which areas should be included.

Fourie (1998) pays a lot of attention to identification of objects. As a result a range of identifiers has been proposed based on some innovative new concepts, see also Fourie and Nino-Fluck (2000): points, lines, sketch maps, text, list of names, non geo-referenced parcels, unique numbers, geo-referenced parcels, etc.:

- points, geo-codes (sometimes known as dots on plots), and lines, in vector or raster format;
- polygons with fuzzy boundaries;
- text, including lists of names and unique numbers;
- parcels - poorly surveyed, non geo-referenced and geo-referenced; and:
- sketch maps, and photographs, in the absence of any better description.

In 1998 Fourie undertook a comprehensive review of the cadastre and land information in Africa for the United Nations Economic Commission for Africa. An overview is presented in that review as to what is required in terms of spatial units, identifiers, representation of varying accuracies, scales and qualities combined with persons and based on evidence (from the field) of how social tenures actually worked. The whole spectrum of tenure systems needs to be covered: formal, informal and customary systems, not neglecting land related disputes and conflicts. Focus in the design of systems should be on sustainable development – not on land transactions and mortgage. Design criteria for an information system are worked out in detail in this review – e.g. on the use of graphical reference frameworks; on the possible use of a range of instruments and data acquisition methods; on the contents of an information system where cadastre can be a linked system.

The importance of standards and national spatial frameworks was recognised, allowing decentral use of data for different purposes and for many different decision makers, combined with central use of data. Conventional LASs are parcel based. Fourie and Nino-Fluck (1999) propose ranges of technologies for data acquisition. Modelling: cadastral mapping using remotely sensed images, aerial photographs and GPS as source should be possible. According to them it should be possible to have flexible accuracy demands: it should accommodate, *‘defined in Dale and McLaughlin (1988) terms’*, graphical (pictorial) data, geometric (measurement based) data and topological data. Illegal and informal lands and customary lands should be possible to include. A continuum of land rights is proposed in UN-HABITAT (2008).

LASs are not yet supporting all these requirements. This continuum of land rights was already discussed in UN-HABITAT, 2003: ‘there is a range of land rights in most countries which occupy a continuum, with a number of such rights occurring on the same site or plot’. And: ‘there is a range of informal-formal (illegal-legal) types along a continuum, with some settlements being more illegal in comparison to others’. There is a reference to Payne (1997) who speaks about a useful strategy for policy makers ‘...every step along the continuum from complete illegality to formal tenure and property rights as a move in the right direction, to be made on an incremental basis’.

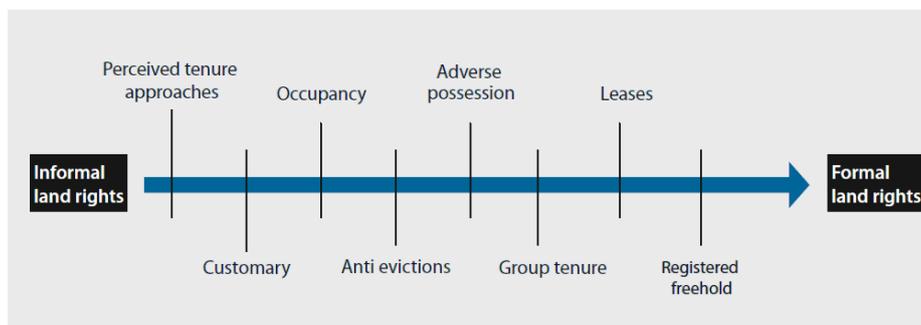


Figure 1 The continuum of land rights (from UN-HABITAT, 2008 There is an earlier version in UN-HABITAT, 2004).

Quan (2000), in Toulmin and Quan (2000), speaks about the introduction of simple systems for land rights documentation, boundary definition and support for the resolution of disputes at community level. Such systems for land rights management should be transparent. Quan also proposes simple approaches to formalise land market transactions (announcement of agreements at public meetings, providing facilities for written transactions, registration of contracts, and the witnessing of signatures. And: low cost survey and registration procedures. Further attention is paid to the recognition and integration of customary rights into the legislative framework and the extension of tenants rights.

UN-HABITAT (2008) views the various types of land right 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, see Figure 1.

One more ‘continuum’ is at the subject side: FIG (1995) states that land units as parcels are defined by the formal or informal boundaries marking the extent of lands held for exclusive use by individuals and specific groups of individuals (e.g. families, corporations, and communal groups). Toulmin and Quan, 2000, speak about land shared by several groupings (e.g. wetlands, woodlands, grazing area’s) and about fuzzy boundaries.

Today there is more and more discussion about complete global coverage, see for example (Bennet et al, 2010). There can be support in the avoidance of land grabbing with an overview of the complete set of existing people to land relationships. Knowledge on areas which are included in land registry and area’s which are not included has a special value in this context.

Enemark (2012) recognises cadastre as the core engine for spatially enabled land administration. According to him spatial enablement is not primarily about accuracy: it is about adequate identification, completeness and credibility. Systems should be built using a ‘fit for purpose’ approach while accuracy can be incrementally improved over time when justifying serving the needs of citizens and society. In relation to the concept of the continuum of land rights such a fit for purpose approach could then be referred to as a ‘continuum of accuracy’.

In (Zevenbergen, 2013) the development of pro-poor land-recording systems is highlighted. It is stated that the Global Land Tool Network (GLTN) will document and analyse the institutional issues associated with local land-record management, before undertaking a pilot project. Work is also needed on organising data collection for local land records, such as customary land rights. It is important to find ways for the public sector – especially the courts

and land agencies – to accept information from these nonconventional approaches, for example, to accept them as evidence in a court case, or to use them for land management. A next step would be to set up land information systems that cover larger areas and that rely on information from both conventional and non-conventional sources.

CheeHai Teo, (2012) sees a ‘continuum of approaches’, ranging from ‘less rigorous’ to more ‘rigorous’, a ‘continuum of technology’, ranging from ‘less sophisticate’ to ‘more sophisticate’ and a ‘continuum of measurement’ from ‘more precise’ to ‘less precise’.

The Social Tenure Domain Model (STDM) (Augustinus et.al, 2006, FIG, 2010, UN HABITAT 2012), as a specialisation of the Land Administration Domain Model, brings all required functionality together. This functionality is also available in the LADM (ISO, 2012). LADM includes the so called Basic Administrative Units, allowing grouping of spatial units. This functionality is not explicitly (but implicitly) available in STDM.

3. TRANSFERS ON LAND (USE-) RIGHTS AND RESTRICTIONS

Foreign governments and private enterprises are described as involved in dealings with national or sub-national governments and also with community representatives or individuals; see for example (Oxfam, 2011). However, different reports mentioned dominance of different parties in such types of dealings. Generally a private or joint equity company is engaged in acquiring land, but it can also be a foreign government. On the other side of the deal is a land provider, either a government or, much more rarely, a private land-owner (Cotula et al, 2009; Friis and Reenberg, 2010).

Each deal typically involves a wide range of parties through the multiple stages of preparing, negotiating, contracting and operationalising the project. First, multiple agencies within the host government are engaged. Even in countries where there is a central point of contact (‘one-stop shop’) for prospective investors, usually an investment promotion agency, this agency alone will not deal with all aspects of the land deal. At a minimum, the investor is likely to need to engage separately with government agencies at the local level. As per World Bank Study (Deininger et. al., 2011), contrary to the image of a neo-colonial foreign scramble for land that often emerges from media reports, acquisitions recorded by official inventories are dominated by local individuals or companies.

Von Braun and Meinzen-Dick (2009) give the tabular data based on media reports about the details of land investment dealings between government to government, private sector to government, private sector to private sector and private sector to unknown parties. The details include name of investor country, target country, nature of deal (area acquired with purpose), status of deal, source.

Land dealings mean transfer of certain types of rights over the land to the purchaser. The transfer of rights could be permanent in nature or up to certain time period under a lease agreement. Agreements could also involve certain types of restrictions (Cotula, et. al. 2009).

Specific restrictions on the acquisition of certain land rights by non-nationals may also exist. In some countries, non-nationals face restrictions on land ownership (e.g. in Ghana, under article 266 of the 1992 Constitution) and on resource use (for example, in Tanzania foreigners may acquire land rights only for the purpose of an investment project under the Tanzania Investment Act). But under certain circumstances incorporation of local subsidiaries may enable foreign investors to overcome these barriers. And in countries like Mali there is no

formal legal differentiation of treatment between nationals and non-nationals – though differences in practice may still exist. In Mozambique, foreign and domestic investors alike may acquire a renewable 50-year land use right, which for the first two years (five for nationals) is conditional upon the implementation of an agreed investment plan (articles 17 and 18 of the Land Act 1997).

In terms of legal analysis, the Sudan-Syria inter-governmental land deal, involves a renewable 50-year lease; the government of Sudan commits itself to delimiting the land and delivering it to the government of Syria “free from any right” other than ownership, which remains vested with the government of Sudan (article 3 of the agreement). The contract between Varun and 13 associations of local landowners involves a 50-year deal combining lease and contract farming arrangements, renewable for up to 99 years. Similarly, in Ethiopia, a contract from Benishangul Gumuz Regional State involved a 50-year lease (article 3). In Mali, land allocations to investors in the Office du Niger area also typically involve leases.

Some African countries have recently taken steps to strengthen the protection of local land rights, including customary rights – even where land is state owned or vested with the state in trust for the nation. Customary rights are for instance protected, to varying degrees, under Mali’s Land Code 2000, Mozambique’s Land Act 1997, Tanzania’s Land Act and Village Land Act 1999 and Uganda’s Land Act 1998 (Cotula et al, 2009).

Unlike Latin America and Eastern Europe, the land deals taking place in Africa predominantly involve government allocated land leases or land-use rights being distributed instead of land sales. The types of land agreement are ultimately determined by the status of land ownership within countries, which in Africa often involves collective ownership. In fact, an estimate from the World Bank (Deininger et.al., 2011) states that between only 2 and 10 percent of land across Africa is held under formal land tenure, which is normally just in urban settings.

Most of the international studies have quoted the various media reports as their references. This is due to the lack of transparency in making public the documents related to many such deals. However at one point FAO (see Cotula, et. al., 2009) states that most documented land leases are granted by the government. This includes 100% of documented cases in Ethiopia, Mali and Mozambique, and the vast majority of cases in Sudan. In other countries there is room for private transactions, however. In Ghana, for example, leases may be granted by the Land Commission, by customary chiefs or by families or individuals, depending on who holds the land. All the land leases documented by the Ghana inventory were granted by private right holders, particularly customary chiefs purporting to act on behalf of their communities. World Bank report 2011 (Deininger et. al., 2011) cites the data officially available to in-country consultants for large land transfers during 2004-09 in 14 countries, complemented by analysis of media reports on large investments in 2008-09.

4. LADM FRAMEWORK

The Land Administration Domain Model (LADM) has been published as a International Standard (IS) by the International Organisation for Standardization (ISO, 2012; Lemmen et al, 2011), as ISO 19152. The IS covers basic information related to components of land administration (including water and elements above and below the earth surface). It includes

agreements on data about administrative and spatial units, land rights in a broad sense and source documents (e.g. deeds or survey plans). The rights may include real and personal, informal rights as well as indigenous, customary and informal rights. All types of restrictions and responsibilities can be represented. *Overlapping claims* to land may be included. The IS can be extended and adapted to local situations; in this way all *people land relationships* may be represented (Lemmen et al, 2011). The different ‘continuum’ approaches, as introduced in section 2 of this paper are supported (ISO, 2012). See also (FIG, 2010) for the STDM. LADM is modelled in Unified Modelling Language (UML), a basic standard for modelling (Booch, Rumbaugh and Jacobson, 1999). A UML class diagram describes the types of objects and the various kinds of structural relationships that exist among them like associations and specializations. A class represents a main object in land administration. The core of LADM is in four basic classes: LA_Party, LA_RRR, LA_BAUnit and LA_SpatialUnit. These are defined as follows:

Basic class LA_Party represents persons, groups or organisations that play a role in a rights transaction. The abbreviation RRR in basic class LA_RRR means ‘Rights, Restrictions and Responsibilities’. A right is defined in LADM as an action, activity or class of actions that a system participant may perform on or using an associated resource. It should be noted here that a right may provide a formal or informal entitlement to own or do something; and further that the International Standard (IS) 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). It is important to see that Rights may be overlapping, or may be in disagreement and can be represented as such. A restriction is the formal or informal obligation to refrain from doing something. A responsibility is a formal or informal obligation to do something.

A basic administrative unit (basic class LA_BAUnit in LADM) is an 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. Basic class LA_SpatialUnit is defined as a single area (or multiple areas) of land and/or water, or a single volume (or multiple volumes) of space.

An association is a link between classes. An aggregation occurs when a class is a collection of other classes. A specialisation is a subclass, or “child”. A subclass inherits all attributes from the baseclass or “parent” class. Furthermore the UML class diagrams show the attributes and operations of a class and the constraints that apply to the way objects are connected. An attribute is for example ‘name’ (attribute to class LA_Party) or ‘area’ (attribute to class LA_SpatialUnit). An operation is for example the requirement that the sum of ‘shares’ (an attribute to a right) of a type of right should be equal to 1.

Three typical forms of land tenure which can be abstracted from the reports from a number of countries in Africa (Burns, 2006; Cotula et.al, 2009; von Braun and Meinzen-Dick; 2009; Aryeetey and Lewis, 2010; Cuffaro and Hallam, 2011), coincide with the different forms of Property identified in the Rights Profile of ISO 19152 LADM proposal (ISO, 2012). Those three forms of tenure are: customary tenure, government land, and privately held land.

Combined representations of those forms of tenure are presented below.

4.1 Customary tenure

One of these forms of tenure concerns the rights held in common by local communities, referred generally as customary tenure.

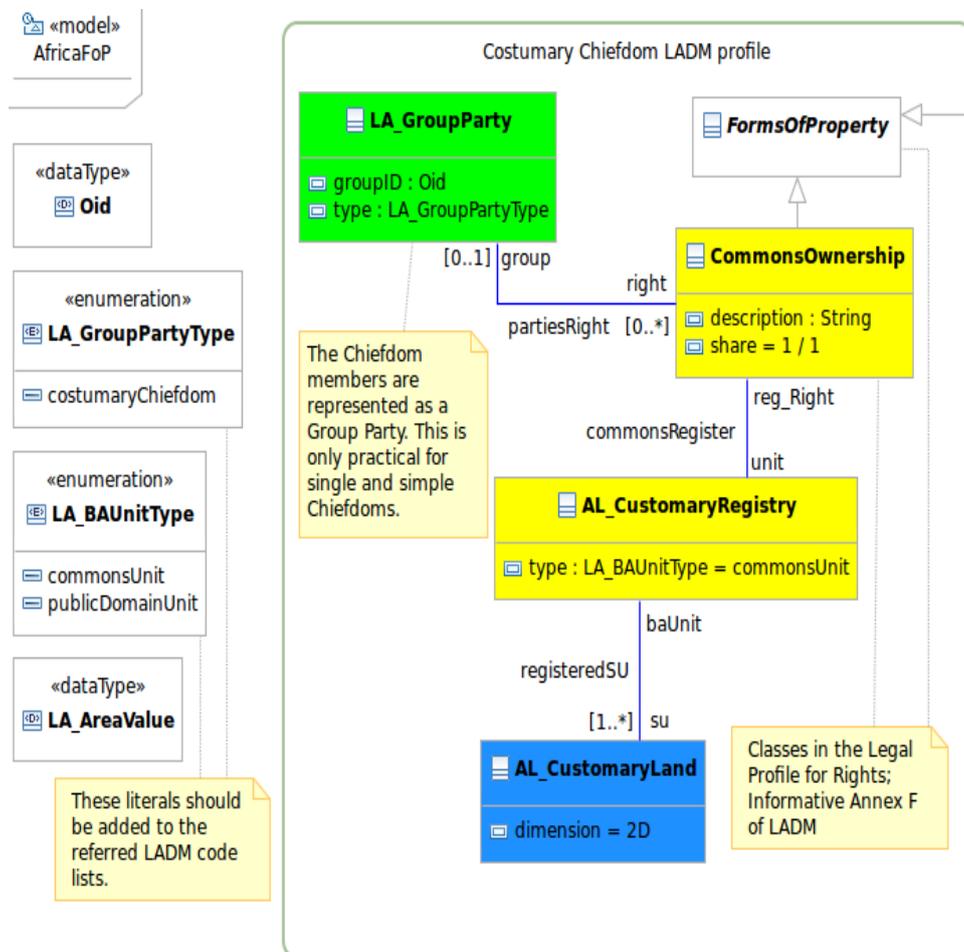


Figure 2: LADM Profile for a Customary Tenure

The diagram in Figure 2 depicts how this situation can be modelled by using LADM classes in UML, for the case of a single and simple Chiefdom (customary tenure), typically comprising a set of lands (as Spatial Units) around a village, governed by a single Chief. The group of members (Parties) holding property rights over the common land is represented by a Group Party (class `LA_GroupParty` in LADM) which collectively holds one or more (or none) Commons Ownership type of rights for a special type of Basic Administrative Unit (`AL_CustomaryRegistry`; check specialisations from LADM in Figure 7). It must be said that this kind of commonly held registries are not always registered in the existing Land Registry systems. So, a new kind of registry, or the integration into existing registry systems has to be considered to formalise such rights into each national property law.

Further, it is possible that each register for a Commons Ownership includes more than one, spatially separated Spatial Unit, including individual facilities or buildings included into private or state held property (the other two Forms of Property). A new type of Spatial Unit has been considered (AL_CustomaryLand as specialisation from LA_SpatialUnit). An example of a real case of customary tenure is presented in the instance level here below in Figure 3. See Arko-Adjei (2006) and Arko-Adjei (2011).

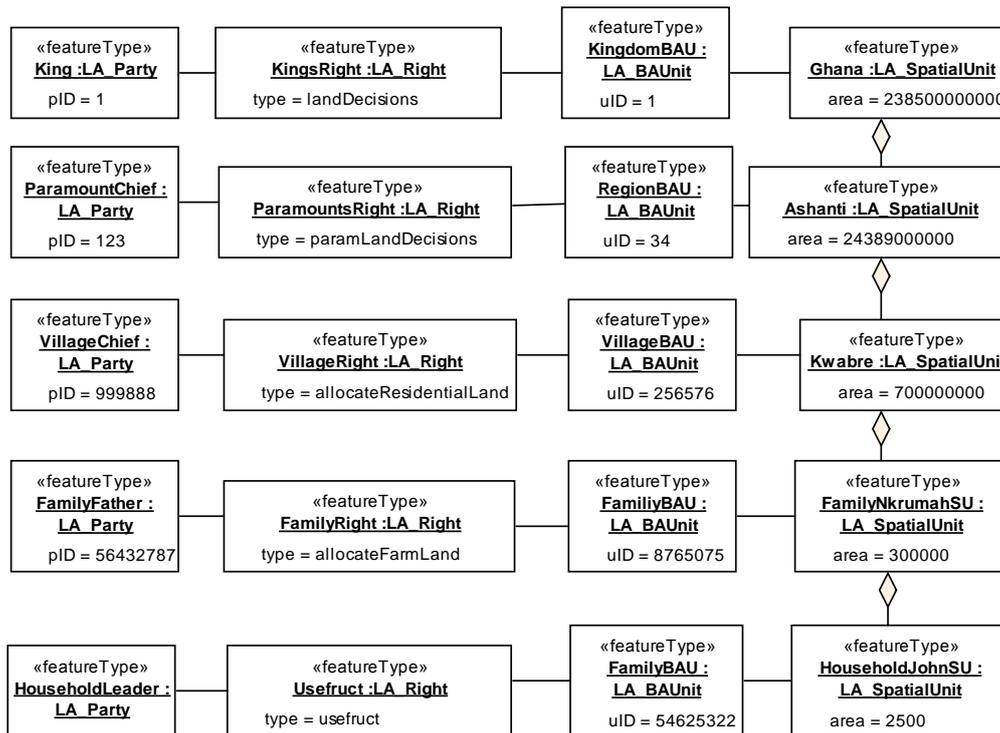


Figure 3 Customary tenure in Ghana, based on discussions with Arko-Adjei; see also ISO (2012), Annex C

4.2 Government land

Another major form of property for many countries in Africa (namely Mozambique), are the government held lands through nationalisation, which can cover the entire jurisdiction or just a part of it, like in Ghana. The nationalisation of lands could imply that the full ownership rests on the State or Federal government. Even in those cases, however, other derived or minor rights can be given to private individuals or companies, even if limited in time. In a number of countries (e.g. in Ghana), it is possible to have a mix of government lands, customary lands and private lands.

The class diagram in Figure 4 shows how LADM can model lands which fall into the Public Domain, and therefore are owned by the State. The owner, represented by the basic LADM class of LA_Party, with some default values for the role and type attributes, can be a single non natural person representing the whole state. But it is also possible to consider particular state or federal agencies which have the role of administering Public Domains of some sort. Each one of these agencies can have more than one ownership (and administration) rights.

This is represented by the PublicDomainOwnership class and the “stateOwns” association. Typically, it can be assumed that only one ownership right holds for a given basic administration unit, to be registered in a special public registry of lands. This is represented by the AL_PublicLandRegistry class. These type of registers are usually separate from the classic Land Registries, namely in many Western European countries. For every registered Public Domain, there could be one or more individual Spatial Units, which must be considered apart from the customary and the private lands. And so, a specialised class (AL_PublicDomain) is considered. This should be represented by a Polygon with one or more holes, for any privately owned enclaves within the Public Domain. It should be allowed to constitute aggregates (as Multi-polygons), for the cases where the Public Domain Lands have non-contiguous parcels. The enumerations shown in the diagram correspond to code lists in LADM; however in this case, it was not needed to add any new literals to the existing ones.

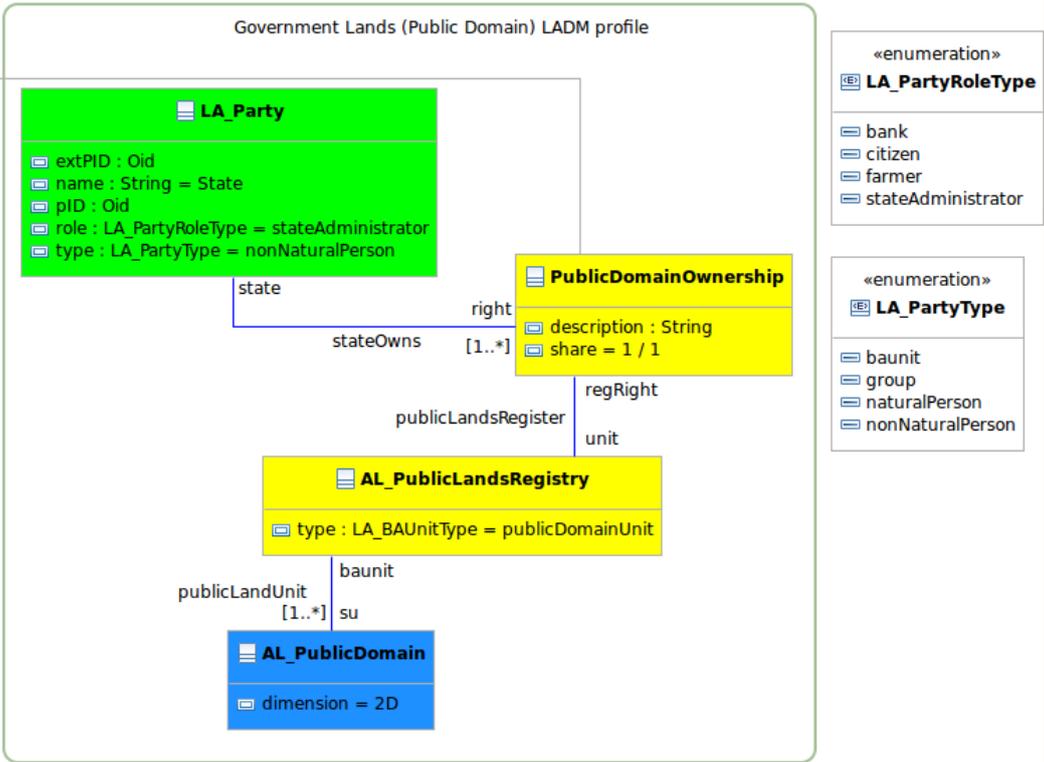


Figure 4: LADM Profile for Government Land

4.3 Privately held Land

The Land Administration procedures involving large land acquisitions can assume various forms, as already reported. One of the more complex but potentially beneficial for the local economy is that of Public-Private Partnerships or PPP's. These contracts can involve Land Leases, Concessions (granted upon Public Lands) or purchases, that is, acquisition of Private or even Public Land, although this last form is seldom used. Furthermore, the Foreign Investors in a PPP contract can implement individual “contract farming” agreements, paying attention to the local tenure relationships. And consider also investments on rural and

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agricultural infrastructure, like roads or irrigation networks (von Braun, 2009).

As can be abstracted by a number of references (Burns, 2006; Cotula, 2009; von Braun, 2009; Aryeetey, 2010; Cuffaro, 2011), there are few cases respecting land grabs, where the process is done primarily through private land acquisition. Involving thus the transfer of ownership from the previous owners (holding a freehold or property type of right), to the entity representing the foreign investors.

Rather, and as observed by (Aryeetey, 2010), the predominant form of foreign investment lies in long term land lease agreements, often contracted for more than 50 years, which are negotiated with the State.

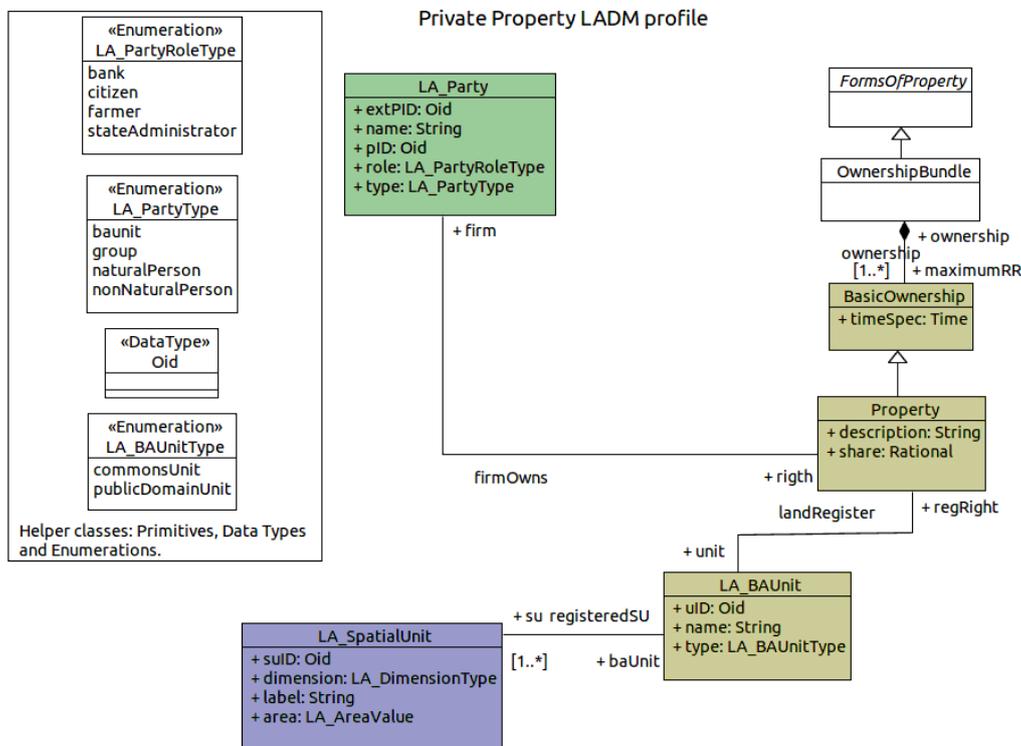


Figure 5: LADM profile for Private Land

This fact can be understood due to the recent historical evolution of the Land Administration in Africa, where in many countries subject to land grabs, land has been nationalised. Although many do recognise customary forms of tenure. The exceptions lie mostly in Commonwealth countries, formerly colonised by the British, which do have greater extent of their territories under private ownership domain, like Kenya. For instance, in (Burns, 2006) it is referred that in Namibia the majority of the land is under a common law based Freehold and is registered (through a deeds based registration system); and in South Africa, 80% to 90% is covered by registered rights and up-to-date cadastral data, although former homelands are often held under customary tenure. It must be said, however, that there are no reports of land grabs in either of these countries.

In spite of this fact, this form of acquisition can not be ignored, taking into consideration that not just the basic ownership right, but that other derived rights can be created in such large

transnational land acquisitions, such as (possibly) Plantation or certain Use Rights. The class diagram for the private land acquisition in Figure 5 depicts the registered situation after a simple land transfer for a freehold property, whose ownership is ultimately detained by a non-natural person (a firm), representing the foreign investors. The most logical initial values were attributed to the LA_Party class: The LA_PartyType is a nonNaturalPerson, and the LA_PartyRoleType corresponds to “citizen”. The spatial extent of the property right defines the boundaries of the Spatial Unit, coinciding with the LA_BAUnit register. This conforms with the most traditional view of the functions of a Land Registry. This is also the reason for this particular case being the one which uses mostly the LADM basic classes. Off course that for each particular country eventually adopting the Domain Model (LADM), specific attributes and code lists values should be considered for the different classes. The consideration of using or even upgrading existing Land Registration Systems in those countries, must be confronted with the fact that, and according to World Bank estimates, only between 2 and 10% of the land, mainly urban, is held under a formal land tenure (Cuffaro and Hallam, 2011).

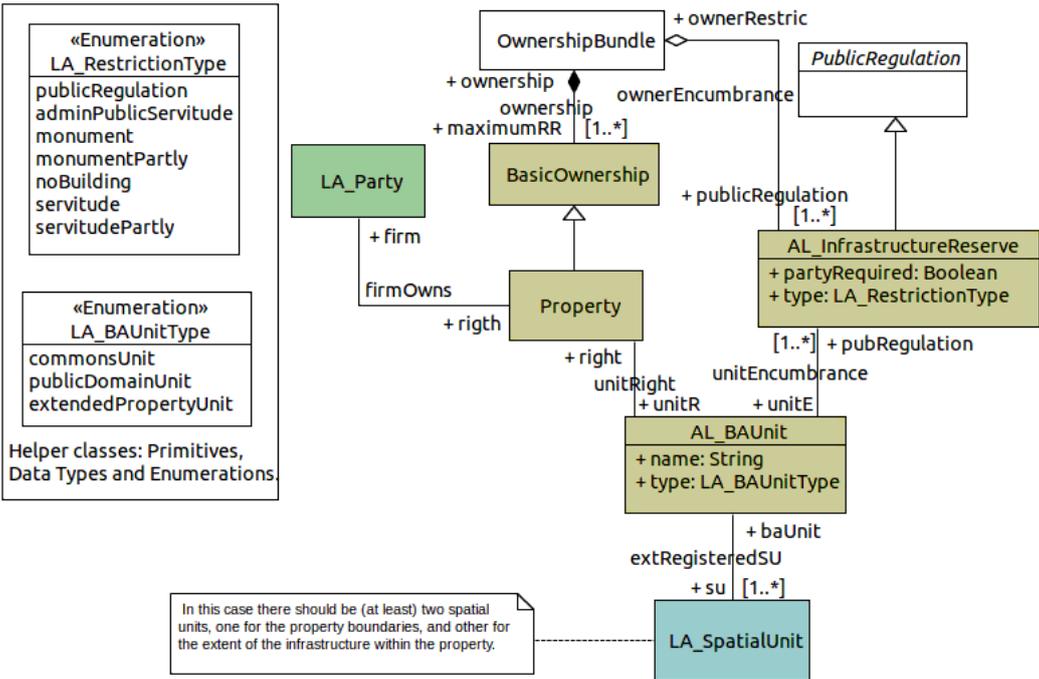


Figure 6: Sustainable large-scale land acquisition LADM profile

These concerns, however, should be raised when planning for implementation, and this paper is more concerned with finding if the domain model in LADM is capable of depicting the Land Administration System aspects of different forms of land grabbing. One aspect that has to be considered at the domain modelling stage, however, is the Land Administration support for an investment which assures Sustainable Development. In LADM, this can be seen as a different level of Spatial Units, which are to be defined through Public Regulations which are valid upon all different forms of property (commonly held, public or private).

In the last case, these could assume the form of administrative servitudes, temporary use of land, or even expropriation. The specifics of each type of restriction or responsibility should be defined through a Land Policy Act, having the goals of Sustainable Development, creating infrastructure and employment, while at the same time securing local land rights, as demanded by (Cotula, 2009). To this fact, consider the following quote from (Cotula, 2009): *‘Many countries do not have in place legal or procedural mechanisms to protect local rights and take account of local interests, livelihoods and welfare’*.

Taking into consideration the above defined goals, a new diagram is created which depicts a hypothetical case of a beneficial large-scale land acquisition, as can be modelled through LADM by considering some specialisations from existing classes. This has been titled as “Sustainable large-scale land acquisition upon private land” and the corresponding class diagram is presented as Figure 6.

The diagram in figure 6 is of course an over-simplification of any hypothetical real case for a sustainable large-scale land acquisition. The purpose is to show how the basic LADM classes, together with classes from the Rights, Restrictions and Responsibilities profile in LADM (Annex F of ISO 2012), can support for the registration of such a case.

The diagram presents just the class names, for those depicted in the previous diagram, concerning private land. It adds however two specialised classes, one for a possible type of public based regulation (AL_InfrastructureReserve), using the parent classes from Annex F, and the other for a new type of Land Registration, where both the basic ownership rights and the publicly imposed restrictions are registered for each basic administrative unit.

As the note in the diagram clearly states, there should be more than one Spatial Unit for such cases, in order to quantify and locate the boundaries of the (public) regulation within the parcel. In this example, a portion of the land within the property should be reserved for a particular type of infrastructure, like rural irrigation.

To consider implementation of such a profile, known recommendations and best practices from documented cases should be studied in detail. It is expected that a number of Restrictions and Responsibilities of different types should be depicted for any given parcel, privately owned or under a long lease or concession over government or commonly held land.

5. MODELLING OF SPECIALISATIONS IN LADM

This section shows what specialised classes had to be considered in the modelling of African Lands. We use in this paper the prefix AL to identify this, see figure 7. The use of prefixes in this way is very common in UML models in ISO standards.

As already mentioned in section 4.1 a new kind of registry, or the integration into existing registry systems has to be considered to formalise such rights into each national property law. This is possible in LADM: registertype is an attribute of LA_Level. A level is a set of spatial units, with a geometric, and/or topological, and/or thematic coherence. For example: there can be one level of spatial units for an urban cadastre and another for spatial units for a rural cadastre. Or, another example: one level of spatial units to define basic administrative units associated with formal rights, a second level for spatial units to define basic administrative units associated with informal rights and a third level for spatial units to define basic administrative units associated with customary rights.

This paper shows what are the generalisation associations to the existing LADM basic Classes LA_Party, LA_RRR, LA_BAUnit and LA_SpatialUnit. LA_Level is associated to LA_SpatialUnit and can include the different registration types, see Figure 7. Even if they are specialised at this level of analysis, it is perfectly possible that there can be further specialisations for each African Country, taking into account their different cultural and historical background, and current legislation.

As the LADM Core draws on all possible land administration systems, oriented to a free market economy and private property rights and also to customary, informal and public lands, and the respective registries (as specialisations within LA_Level): in the Spatial Unit component, each specialised class can be further associated with individual LA_Level classes, each with a particular spatial structure and its set of geometric and topology rules – which can be combined with different registry types. The LA_StructureType code list includes all the various spatial structure types, such as point or polygon, used in a specific land administration profile implementation.

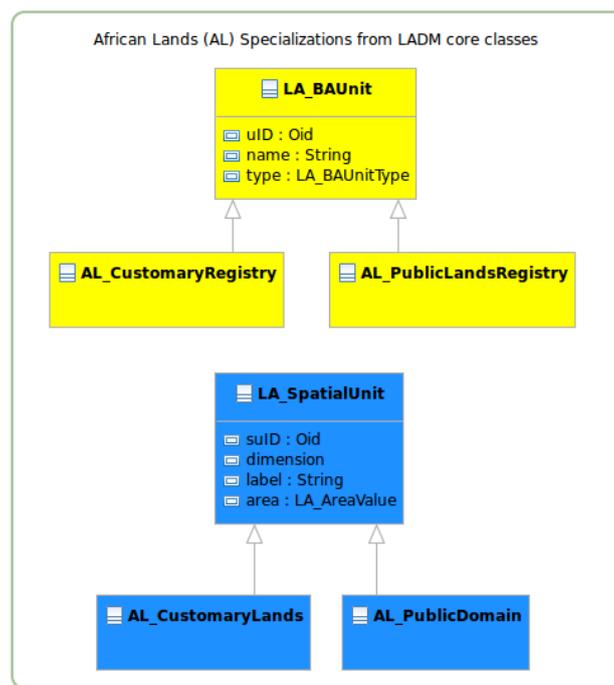


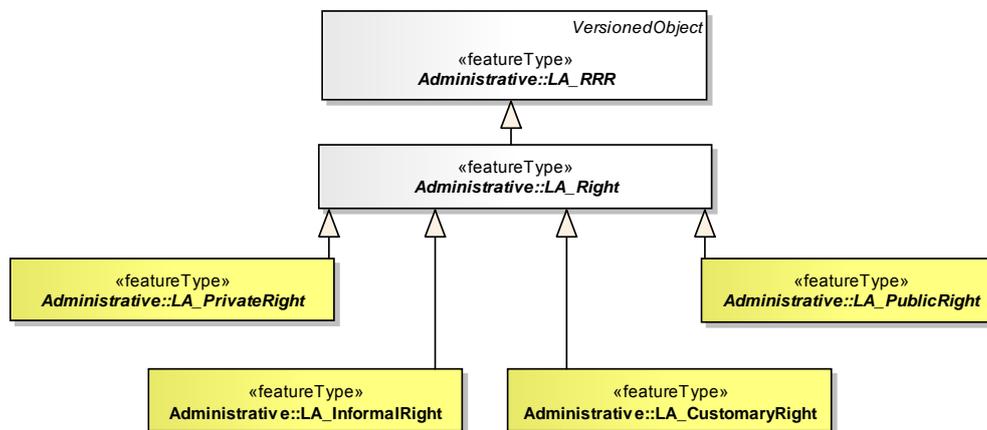
Figure 7: Specialised Classes from LADM basic Classes

6. DISCUSSION

LADM provides a generic data model for land administration based on common grounds. It is possible to use it in so-called informal and customary environments. This provides a basis to apply the model to support equal land rights for all. To support in avoidance of land grabbing by mapping the existing situation fast and with unconventional approaches as point cadastres, satellite images, boundary drawing instead of measuring, with participatory approaches,

accepting errors and with the intention to improve quality later.

With its broad functionality LADM can support in the development of concepts for land administration systems which can be in support administration of multiple types of tenure. This is also valid for the Social Tenure Domain Model (STDM). Unconventional types of rights and spatial units can be included. Overlapping claims can be represented. This functionality allows a flexible approach in Land Administration and may result in fast availability of a cadastral map with a related registry of all (formal, informal, customary) in an area. This can then be used as a (more) solid base for large scale land acquisitions. In this way all claims can be brought to decision support. If this results in a more fair large scale land acquisitions depends on the way this application is organised: the functionality is there - it could be used in a proper way. A migration from STDM to LADM is possible without problems. LADM includes core class LA_BAUnit which is not available under STDM. A migration from STDM to LADM supports in building land administration infrastructure. Further refinements are needed in this development. A more detailed alignment with the proposals as in Paasch et al (2013) is needed, this is very well possible on the basis of the contents of this paper, see Figure 8. The results of this alignment will be published in a next version of this paper.



Figur 8 Further alignment with LADM developments is needed

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BIOGRAPHICAL NOTES

João Paulo Hespanha holds a PhD from Delft University of Technology (The Netherlands). From 1997 he is an adjunct professor at the Technology and Management Polytechnic School of Águeda, University of Aveiro, Portugal. He has been involved in lecturing and research projects on Cadastre since adoption of project-led education in 2001.

Tarun Ghawana has an M.Sc in GIS with Specialization in natural resource management from the International Institute of Geoinformation Science and Earth Observation, The Netherlands. His area of expertise includes spatial analysis and spatial data modelling in particular for natural resource applications. He has worked on Indian NSDI for Department of Science and Technology, India. Currently, he is working as GIS Consultant with Integrated Spatial analytics Consultants, a multidisciplinary firm which is based in India.

Christiaan Lemmen holds a PhD from Delft University of Technology, The Netherlands. He is international consultant at Kadaster International and Assistant Professor at Twente University (Faculty ITC), The Netherlands. He is chair of the Working Group 7.1 'Pro Poor Land Management' of FIG Commission 7, and contributing editor of *GIM International*. He is director of the *FIG International Office of Cadastre and Land Records*, OICRF.

Jaap Zevenbergen is professor in land administration systems at the University of Twente, Faculty ITC) in Enschede - The Netherlands. He holds a PhD from Delft University of Technology, The Netherlands. He has published several articles and numerous papers about land administration and land registration. He is a co-chair of FIG Commission 7 Working Group 2: Land Administration, Natural Disasters and Climate Change

CONTACTS

Dr. da Fonseca Hespanha de Oliveira, João Paulo

University of Aveiro

Escola Superior de Tecnologia e Gestão de Águeda

Rua Comandante Pinho e Freitas, n.º 28

Águeda

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ZEVENBERGEN, The Netherlands

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Tel. +351 234 611500

Fax +351 234 611540

Email jphespanha@ua.pt

Tarun GHAWANA

Integrated Spatial Analytics Consultants

A-201, Kairali Apts., Sector-3, Dwarka, New Delhi-110075

INDIA

Tel: +91-9958117758

Email: tarungh@gmail.com

Dr. Christiaan LEMMEN

Netherlands Cadastre, Land Registry and Mapping Agency

PO Box 9046

7300 GH Apeldoorn

THE NETHERLANDS

E-mail: Chrit.Lemmen@kadaster.nl

Prof. Mr. Dr. Ir. Jaap ZEVENBERGEN

University of Twente, Faculty of Geo-Information Science and Earth Observation (ITC)

P.O. Box 217

7500 AE Enschede,

THE NETHERLANDS

E-mail: Zevenbergen@itc.nl