BRINGING IN STANDARDS

With Land Administration Domain Model and Social Tenure Domain Model, information-related components of land administration can be registered worldwide in a standardised way. Here's a look at these systems

Standardisation has become a well-known process in the work of land administrations and land registries. In both paper-based systems and computerised systems, standards are required to identify objects, transactions, relationships between objects (eg parcels, more generally spatial units) and persons (eg citizens, or subjects legally speaking, and more generally speaking parties), classification of land use, land value, map representations of objects, and so on. Computerised systems require further standardisation when topology and the identification of single boundaries are introduced. In existing land administrations and land registries, standardisation is generally limited to the region, or jurisdiction, where the land administration (including cadastre and/or land registry) is in operation. Open markets, globalisation, and effective and efficient development and maintenance of flexible (generic) systems, require further standardisation. LADM entered the stage of Draft International Standard (DIS) on March 1, 2010 (ISO/DIS, 2010). The design principles of LADM are partly based on 'Cadastre 2014.' It is expected that in the year 2011, LADM will become an international standard, labeled ISO 19152. Furthermore, in April 2010, the prototype of a software tool, Social Tenure Domain Model (STDM), was presented at the XXIV FIG International Congress in Sydney, Australia (Augustinus, 2010; Zevenbergen and Haile, 2010). STDM, in its turn, is

LADM provides a terminology for land administration, based on various national and international systems. The terminology allows a shared description of different formal or informal practices and procedures in various jurisdictions

almost entirely based on LADM, and is meant to support the security of tenure of people in developing countries. From now on, with LADM and STDM, it is possible to register worldwide the information-related components of land administration (LA) in a standardised way. With this in mind one may wonder what will be the consequences of this in 15 years' time.

Goals and basic features

LADM will serve two goals:

- Provide a basis for the development of LA systems.
- Enable involved parties, both within one country and between different countries, to communicate, based on the shared vocabulary (that is, an ontology).

LADM defines a reference model, covering basic information-related components of LA. Basic components relate to the following:

- Parties (people and organisations).
- Rights, responsibilities, and restrictions (RRRs).
- Spatial units (parcels, buildings and networks).
- Spatial sources (surveying).
- Spatial representations (geometry and topology).

LADM provides a terminology for LA, based on various national and international systems. The terminology allows a shared description of different formal or informal practices and procedures in various jurisdictions.

Flexible and extensible components

All three main classes of LADM - spatial units, RRR's, and parties - deliberately have an open, flexible and extensible character:

Spatial units (a.k.a. parcels). Spatial units are areas of land or water where rights and/or social tenure relationships apply. Those areas can be represented in LADM in different ways. A 'sketch based' spatial unit is used when a sketch is available.

A 'text based' spatial unit is used when the definition of the spatial unit is entirely by descriptive text. This includes the 'bounds and metes' descriptions. A 'point based' spatial unit is used when the only information about the location are the coordinates of a single point within its area (or volume). A 'line-based' (a.k.a. 'unstructured' or 'spaghetti') spatial unit is used when the representation is allowed to have inconsistencies, such as hanging lines and incomplete boundaries. A 'polygon based' spatial unit is used when each spatial unit is recorded as a separate entity. A 'topology based' spatial unit is used when spatial units share boundary representations. This range of spatial units can cover different kind of land administrations: community-based, or rural, or urban, or other types of land administration, like marine and 3D cadastre (Lemmen et al, 2010).

RRRs (rights, restrictions and responsibilities). Rights may be formal rights, like ownership, apartment right, usufruct, free hold, or lease hold. But it may also be a 'social tenure relationship,' as occupation, tenancy, non-formal and informal rights, customary (which can be of many different types witch specific names), or indigenous rights. There may be overlapping claims, disagreement and conflict situations. There may be uncontrolled privatisation. This list is extensible, to be filled by local tenancy relationships. With regard to this, UN-HABITAT proposed 'the continuum of land rights' (UN-HABITAT, 2008). Restrictions are entitlements to refrain from something, like building within a certain area around a petrol station. Responsibilities are obligations, like cleaning ditches to secure proper water discharge.

Parties. Parties are persons, or groups of persons. A group of persons may be a tribe, a family, a village, a company, a municipality, the state, a farmer cooperation, or a church community. Also, this list is extensible, it can be adapted to local situations; based on community needs.

It should be noted that although this is a land administration domain model, it is not intended to be complete for

any particular country. It should be expandable and it is likely that additional attributes, operators, associations, and perhaps new classes, will be needed for a specific region or country;

LADM and Cadastre 2014

LADM has a clear relationship with 'Cadastre 2014' (Kaufmann and Steudler, 1998). Its design principles are partly based on Cadastre 2014. Kaufmann (2004) formulated ten principles, of which seven apply to LADM:

- Principle of spatial units. The land parcel of a traditional LA should be extended to also include and administer all spatial units, which have some social, legal or economic relevance.
- Principle of the documentation of private and public rights, restrictions and responsibilities. Not only ownership rights will be documented, but also the rights, restrictions and responsibilities established by different legislations having an impact on land shall be registered. In LADM this is extended with customary and informal rights.
- Principle of legal independence. To be able to build a LA system, it is necessary to investigate the laws in a jurisdiction and to identify those with an effect on land. The different spatial units are to be arranged according to the laws by which they are defined. This structure allows the immediate adaptation of the land administration to the development of the legislation. It is not necessary to rearrange the information. New legal topics can simply be added by including a further information level. If a law is cancelled, the respective information level can be removed without reorganising the other levels. In this way it is possible to deal with facts which are not formally written down in a law. Such informal and customary rights exist where tribes or clans are obeying unwritten rules. These tribes or clans may have living, hunting and fishing rights within a defined territory from which the boundaries are known, but not documented formally. The rightful claimants are certainly able to localise the outlines of their rights and the respective spatial unit can be included into the LA system. A form of 'occupation rights' exist in informal settlements in many areas of the world. Even when the occupation of the land may be contrary to the formal law, the rights of the involved settlers are informally defined by an unwritten code. The boundaries resulting from these informal arrangements can be localised and documented. So this principle can show overlapping rights and serve to formalise the situation, to regulate transactions, to monitor and to improve ambiguous situations. Indigenous rights normally overlap with a formal ownership system. The rights and the boundaries where they are in effect are well known and can be documented.
- Principle of linking objects by geometry. The realisation of the principle of legal independence results in a structure of independent topics. Spatial units are arranged in independent topics. In principle, there is no explicit link between spatial units in different topics. Links between spatial units are normally not stored in the system but may be created when needed with the help of a GIS overlaying technique. However, in LADM, this is extended with the possibility to store links explicitly between spatial units if needed.
- Principle of unified cadastre and land registry. Spatial units are linked directly with the information needed for registration.
- Principle of land administration modelling. The idea is to model objects instead of thinking in graphical categories. Maps have no function as information repositories; their only purpose will be the visualisation of information.
- Principle of information and communication technology (ICT) application. This principle implies that ICT is the best technical tool for land administration and the only way to achieve a low-cost land administration system.

Social Tenure Domain Model

STDM is a 'specialisation' of LADM, which means that structurally it is a little less complex than LADM, but contains almost the same functionality of LADM, under different terminology (Lemmen, 2010). Formal terminology, as used in LADM, may not always be applicable because of the informal environment. In STDM, the same classes are used as in LADM, for example, class 'RRR' is named class 'Social Tenure Relationship.'

STDM is an initiative of UN-HABITAT to support pro-poor LA. STDM is meant specifically for developing countries, countries with very little LA coverage in urban or rural areas. It is also meant for post-conflict areas, areas with large scale informal settlements, or large scale customary areas. The focus of STDM is on 'people - land relationships,' independently from the level of formalisation, or legality of those relationships.

It is a search for a model that should support all forms of land rights, social tenure relationships, and overlapping claims to land.

Conclusion

We have presented the parallel development of both LADM and STDM. LADM will be an ISO-supported international standard by the year 2011. STDM, based on LADM, made its introduction as a software tool in 2010. ■

Christiaan Lemmen
lemmen@itc.nl

Harry Uitermark
University of Twente.
Faculty of Geo-Information
Science and Earth Observation (ITC)
uitermark@itc.nl

Peter van Oosterom
Delft University of Technology.
OTB, Section GIS-technology
The Netherlands
oosterom@otb.tudelft.nl