



Standards for new approaches

The new Land Administration Domain Model (LADM) has evolved as an ISO-recognised standard to provide a formal language for describing traditional land administration methods, spot the similarities and differences, and provide a way forward

Land administration provides documentation on people to land relationships. It is an instrument for the implementation of land policies — part of the governmental policy on environmental sustainability, economic development, disaster management, social justice and equity and political stability. Land administration provides legal security (protection of all land rights), access to credit

(collateral for mortgage or micro credit), spatial planning, land tax and resource management (mining, forestry, and nature).

A look at the land administration systems worldwide, will reveal that these systems are largely the same in principle: they are all based on the relationships between people and land, and linked by (ownership or use) rights. The two main functions of every land administration (including

cadastre and/or land registry) are:

- keeping the contents of these relationships up-to-date; and
- providing information from the (national) registers.

These functions are implemented in different ways in different countries — responsibilities in land administration are distributed over (many) organisations and processes are often not really transparent, resulting in not-up-to-date, incomplete and non-reliable land administration.

Standards are needed in land administration, both for initial data acquisition and for data maintenance. And previous experiences have shown that it is not an easy task to design and set up a land administration. Many countries still lack the modelling expertise to set up land administration systems.

Establishing a common standard for the land administration domain was originally an initiative of the International Federation of Surveyors (FIG), which submitted a new working item proposal in 2008 to the International Standardisation Organisation (ISO). Now, Land Administration Domain Model (LADM) is a formal International Standard, known as ISO 19152. The final motion to turn the LADM into an international standard was passed unanimously on November 1, 2012 and ISO 19152 was formally published on December 1, 2012.

LADM facilitates the development of software applications which accelerates the development and implementation of proper land administration in support to sustainable development. The international standard is a breakthrough in the development of such a system and it has already gained recognition and support from the FIG, the Food and Ag-

riculture Organization of the United Nations (FAO), United Nations Human Settlements Programme (UN Habitat), the European Commission's INSPIRE and several countries.

The standard supports not only traditional land administration systems, but also enables combination with unconventional approaches, such as crowd sourcing. If guided by surveyors, such approach may accelerate the collection of a fit-for-purpose land dataset. Fit-for-purpose means that the data content, acquisition approach and data quality may vary for different areas depending on the needs and requirements. Within the LADM, a range of descriptions for the key concepts is available from informal to formal, and from lesser to higher detailed ones.

LADM supports UN Habitat's continuum of land rights. There is also a continuum of accuracy, land recordations, types of spatial units and parties involved, and data acquisition approaches. This facilitates a flexible, step-by-step approach in the development of a land administration based on the needs, priorities and requirements of users and society. This can be combined in a natural way with organisational development with a proper alignment to ICT development. As LADM is a model of the whole domain, the cooperation and coordination of organisations responsible for parts of the domain (such as valuers) is made transparent and mutual processes can easily be tuned. This makes the concept a basis for strategic development in land administration.

It is important to see that existing approaches in land administration do not recognise many of the existing land rights and are often in support of specific groups and do not cover the entire population. Customary and informal land rights are often not protected. The same is valid for women's access to land. Further, largescale land acquisition often results in formal titles combined with evictions of the people living in those areas. A complete global overview of all existing people-to-land relationships is urgently needed. For avoidance of evictions there is no need to relate

LADM facilitates development of software applications which accelerates the implementation of proper land administration for sustainable development

this to the time-consuming formal boundary measurements.

The LADM covers basic information-related components of land administration; the standard provides an abstract, conceptual model with three packages related to:

- Parties as people and organisations. This can be tribes or groups or groups of groups;
- Basic administrative units, rights, responsibilities, and restrictions (ownership rights); this may concern a property or customary area over a set of spatial units. All possible relationships between people and land can be included in a land administration system. This may concern real rights, personal rights, informal and customary 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. use rights). Representation of restrictions and responsibilities are included in the domain model. It should be noted that (claimed) rights may be overlapping or may be in disagreement. Such situations should be represented on cadastral maps.
- Spatial units such as parcels and the legal space of buildings, utility networks, and other constructions. Representation in the system can be point-, line-, polygon- or volume-based. The package also includes sub-packages for spatial sources (surveying), and spatial representations (geometry and topology). This can, for example, be drawn as boundaries on top of an image or a set of observations from a survey device.

A range of parties, rights, responsibilities, restrictions, basic administrative units and spatial units can be used in the LADM context. This allows for many approaches under the same standardised data umbrella, resulting in maintainance and gradual quality improvements based on versioned objects when needed.

As land administration deals with huge amounts of data which are of dynamic nature requiring a continuous maintenance process, the role of ICT is relevant. Without the availability of information systems, it will be difficult to guarantee good performance with respect to meeting

The purpose of the LADM is not to replace existing systems, but rather to provide a formal language for describing them, so that their similarities and differences can be better understood

changing customer demands. Organisations are now increasingly confronted with rapid developments in technology (crowd sourcing, GNSS-based data acquisition devices with good options for attribute collection, data storage via Internet services, geospatial databases, open systems, and GIS), as well with a growing demand for new services and a market pull (fast data acquisition of legal and geometric data, avoidance of land grabbing, recognition of traditional land use rights, e-governance, sustainable development, electronic conveyance, and the integration of public data and systems). Modelling is a basic tool, facilitating appropriate system development and re-engineering and, in addition, it forms the basis for meaningful communication between different systems. This also enables the implementation of distributed solutions.

The purpose of LADM is not to replace the existing systems, but rather to provide a formal language for describing them, so that their similarities and differences can be better understood. This is a descriptive standard, not a prescriptive standard. ☺

Dr Christiaan Lemmen, Cadastre, Land Registry and Mapping Agency, The Netherlands
chrit.lemmen@kadaster.nl

Prof Dr Peter van Oosterom, Delft University of Technology, The Netherlands
P.J.M.vanOosterom@tudelft.nl

Prof. Ir. Paul van der Molen, UNU School of Land Administration Studies, University of Twente, Faculty of Geo-Information Science and Earth Observation (ITC)
paul.vandermolen@kadaster.nl