

The LADM and the Continuum of Land Rights

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SUMMARY

The development of the Land Administration Domain Model (LADM) (ISO, 2012) is an initiative of the International Federation of Surveyors (FIG). The development of LADM is, amongst others, based on innovations as developed within FIG, such as Cadastre 2014 and the Social Tenure Domain Model. The acceptance of the standard by the International Standardisation Organisation is a milestone for the Federation.

The new ISO standard is relevant in relation to the implementation of:

- the Continuum of Land Rights from UN-Habitat
- FAOs Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security (FAO, 2012)
- Spatial Enabled Societies

There are important responsibilities for surveyors in relation to this.

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1. INTRODUCTION

A group of land administration professionals initiated the development of a data model that facilitates the quick and efficient set-up of land registrations. Just like social issues benefit from proper land administration, land administration systems themselves benefit from proper data standards.

In many countries the responsibilities and tasks in land administration are distributed among different organisations. Sometimes those organisations deal with different administrative territories. All of which may have subdivisions again: central, regional and local responsibilities, with either public or private roles. As a result, the governance and quality aspects of the data sets vary. Land administrations worldwide are often incomplete, data are not up-to-date and are not fit for purpose.

At the same time, new Land Administration Systems (LASs) are being developed all over the world again and again. Sometimes countries even have more than one IT-system for land administration. The wheel keeps being re-invented. This has a huge impact on the continuity and effect of LASs.

Internationally, the wish emerged for a widely accepted data model (domain) standard, making use of the knowledge already existing worldwide. This wish was supported by UNHABITAT, the Food and Agricultural Organization (FAO) of the UN and the International Federation of Surveyors (FIG). This data model should be able to function as the core of any land administration system. The standard should be flexible, widely applicable and function as a gathering point of a state-of-the-art international knowledge base on this theme. This common standard has now been designed, it is called the Land Administration Domain Model, in short: LADM. It is published as ISO 19152:2012 (ISO, 2012). The development of LADM as an International Standard is an initiative of the International Federation of Surveyors (FIG).

This paper highlights the importance of the LADM in the context of some global developments in Land Administration. First the FIGs initiatives on Cadastre (including Cadastre 2014 and the Social Tenure Domain Model) are introduced in section 2, followed by the FIG Statement on UN-Habitat's Continuum of Land Rights in section 3. The implementation of the Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security by FAO can be aligned to this as highlighted in section 4. In section 5 it is explained that for the profession it is important to see that there is an urgent need for further coverage of documented people to land relationships in land administrations. This requires innovations and new concepts in accuracy and performance. LADM can be supportive here as – this is briefly explained in section 6 of this paper.

2. FIGs INITIATIVES ON CADASTRE

FIG has always been pro active and innovative when it is about the development of Cadastre. The outcomes of those developments have been used as input in the LADM development.

The statement on the Cadastre of the FIG highlights, from an international perspective, the importance of the Cadastre for social and economic development (FIG, 1995). The development of such systems should be promoted internationally, with attention to the needs and demands of societies with customary and informal tenures.

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 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 GPS to the plane table. Work may commence with large scale photomaps for planning and adjudication purposes.

In the FIG Bathurst Declaration (FIG, 1999) the importance of continuously addressing user requirements is highlighted and the importance of ICT for the development of LASs is underlined. Information technology will play an increasingly important role both in constructing the necessary infrastructure and in providing effective citizen's access to information. This is a general recommendation for many countries still today.

Kaufmann and Steudler (1998) presented characteristics of existing cadastral systems based on a research by a working group Vision 2014 from FIGs Commission 7 on Cadastre and Land Management. This vision received a lot of attention for the idea that Cadastre 2014 will show the complete legal situation of land, including public rights and restrictions – using the concept of legal land objects. The 'principle of legal independence' is a key item in the realisation of Cadastre 2014. This means that legal land objects, being subject to the same law and underlying a unique adjudication procedure, have to be arranged in one individual data layer; and for every adjudicative process defined by a certain law. Besides a special data layer for the legal land objects underlying this process has to be created. The concepts of Cadastre 2014 are implemented in LADM. Cadastre 2014 was inspired by the Object – Right – Subject model as from FIGs Honorary member and Past OICRF Director Henssen (Henssen, 1995).

Other relevant LADM input is in the FIG Guide on Standardisation (FIG, 2006) and in the FIG Publication on Administering Marine Spaces (FIG, 2006).

The Social Tenure Domain Model is developed in combination with LADM development. In the STDM Publication (FIG/GLTN, 2010) it is highlighted that most developing countries

have less than 30 percent cadastral coverage. This means that over 70 percent of the land in many countries is generally outside the land register. This has caused enormous problems for example in cities, where over one billion people live in slums without proper water, sanitation, community facilities, security of tenure or quality of life. This has also caused problems for countries with regard to food security and rural land management issues.

The Global Land Tool Network (GLTN), facilitated by UN-HABITAT and funded by Norway and Sweden, is a coalition of international partners, including FIG (the International Federation of Surveyors), ITC (University of Twente, Faculty of Geo-information Science and Earth Observation, The Netherlands), and the World Bank (WB), has taken up this challenge and is supporting the development of pro-poor land management tools, to address the technical gaps associated with unregistered land, the upgrading of slums, and urban and rural land management.

The security of tenure of people in these areas relies on forms of tenure different from individual free hold. Most off register rights and claims are based on social tenures. GLTN partners support a continuum of land rights, which include rights that are documented as well as undocumented, from individuals and groups, from pastoralist, and in slums which are legal as well as illegal and informal.

This range of rights generally cannot be described relative to a parcel, and therefore new forms of spatial units are needed. A model has been developed to accommodate these social tenures: the Social Tenure Domain Model (FIG/GLTN, 2010).

3. FIG STATEMENT ON UN-HABITATs CONTINUUM OF LAND RIGHTS

UN-Habitat's Resolution GC23-17 is a landmark, a call for all to *“promote the security of tenure for all segments of society by recognizing and respecting a plurality of tenure system, identifying and adopting, as appropriate to particular situations, intermediate forms of tenure arrangements, adopting alternative forms of land administration and land records”*.

FIG provided a statement on the continuum of land rights at the 6th World Urban Forum 2012, held in Naples, Italy, under the title: “Celebrating the Recognition of a Range of Land Rights: Taking Stock and Moving Forward”. It is recognized in this document that Land (and the seas and her natural resources) is the source of all production and consequently the generation of wellbeing for humanity. It is stated that the profession must consider the wider good, the needs of humanity and not just its professional interest. The profession is challenged to continue contributing towards securing tenure rights for all with appropriate, applicable and affordable approaches.

Then the statement proposes new approaches and methodologies should be supported: ‘whilst noting that many jurisdictions today requires accurate, assured and authoritative land and property information, yet there are many jurisdictions that need an “initial point of entry” to begin accumulating and building these crucial data and information base. When considering the resources and capacities that are required to build this desired and crucial information base, an “initial point of entry” may well involve methodologies that are of lesser

sophistication and accuracies, information from participatory and volunteered sources, technologies that are mobile and widely available, for example. These are distinct from prevailing approaches and practices that are usually rigorous and out-dated'. In other words: 'the continuum of Land Rights has given rise to the recognition that there should be "continuum" of approaches and solutions, of technologies and technological sophistication, of robustness and accuracies as we all work towards securing tenure rights for all, particularly for the disadvantaged among us. This "continuum" has provided this "initial point of entry" and allowed many more to begin the journey towards secure tenure rights. These are reasons to celebrate'.

As the quest for secure tenure rights for all continues, the Global Land Tool Network (GLTN) should look beyond the continuum of land rights. With secure tenure rights, there will be responsibilities. It is the understanding that GLTN is presently looking into the *valuation* of rights, the rights of the local administration/government to tenure based income stream and moving forward, the rights of tenure holders to access basic services and infrastructure and into the future, the rights to development and the land market. Hence there would be a series of continuum arising from this continuum of land rights.

Further it is stated that professionals acknowledge that journeying along the continuum of land rights is already complex and could be more complex along the continuum following from the continuum of land rights. In the midst of these complexities; there is the need to manage and plan for change since we are in an era of rapid changes. The Profession acknowledged that within the land sector, its contribution and role is highly technical in nature.

The statement concludes that "fit-for-purpose" approaches, taking into consideration context, scale and opportunity are needed. There is thus the challenge to develop tools and solutions that can be incremented, that are able to connect with and deliver benefits from a variety of approaches and efforts that are of different scale, purposes and origins.

4. FAO 'VOLUNTARY GUIDELINES'

FAOs Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security (FAO, 2012) outline principles and practices that governments can refer to when making laws and administering land, fisheries and forests rights. This very comprehensive set of guidelines includes 'delivery of services' and 'records of tenure rights'. In those areas some of the guidelines are highlighted here:

- national standards should be developed for the shared use of information, taking into account regional and international standards. States should strive to establish and maintain accessible Inventories,
- where possible, States should ensure that the publicly-held tenure rights are recorded together with tenure rights of indigenous peoples and other communities with customary tenure systems and the private sector in a single recording system, or are linked to them by a common framework. Systems should record, maintain and publicize tenure rights and

- duties, including who holds those rights and duties, and the parcels or holdings of land, fisheries or forests to which the rights and duties relate,
- the spatial accuracy for parcels and other spatial units should be sufficient for their identification to meet local needs, with increased spatial accuracy being provided, if required over time, and:
 - to facilitate the use of records of tenure rights, implementing agencies should link information on the rights, the holders of those rights, and the spatial units related to those rights. Records should be indexed by spatial units as well as by holders to allow competing or overlapping rights to be identified. As part of broader public information sharing, records of tenure rights should be available to State agencies and local governments to improve their services. Information should be shared in accordance with national standards, and include disaggregated data on tenure rights.

Those highlights fit very well to the continuum approaches.

5. FIT FOR PURPOSE APPROACHES – ENEMARK

According to Honorary President of the FIG (President 2007-2010) the spatial (information) framework should be developed using a *flexible* and *fit-for purpose* approach rather than being guided by high tech solutions and costly field survey procedures. Accuracy can then be incrementally improved over time when relevant and justified by serving the needs of citizens and society. In relation to the concept of continuum of land rights from UN Habitat such a fit-for-purpose approach could be referred to as a ‘continuum of accuracy’. The key focus should be on providing secure land rights for all, and managing the use of land and natural resources for the benefit of local communities and the society as a whole (Enemark, 2012).

Fit-for-purpose means that the framework should be designed for the purpose of managing current land issues within a specific country or region - rather than following more advanced technical standards. The land administration functions may put different requirements on accuracy and this again may vary depending on the geography and density of the use of land. Security of tenure does not in itself require accurate boundary surveys while the important aspect is identification of the land object with its legal or social right. Also, the accuracy required for the purpose of planning and management of the use of land varies considerably. The scale of the framework depends on topography and density of development and may vary from large scale mapping in dense urban areas to minor scale images in rural and remote regions. Accurate surveys of property boundaries may be justified in high value urban areas. Accuracy is a relative term that relates to the purpose of creating the spatial framework. Four key principles of a fit-for-purpose approach for developing the spatial framework can be recognised in the view of Enemark (2012):

1. General boundaries. Using general boundaries (the physical object in the field) will be sufficient for most land administration purposes especially in rural and semi-urban areas, while fixed boundaries (monuments and surveyed) will contribute to interoperability between legal and physical objects in advanced land information systems and also to reducing boundary disputes to some extent. Fixed boundaries can be used where relevant

or necessary for any specific purposes or when required and paid for by the landowner/stakeholders.

2. Satellite images/orthophoto. Using large scale satellite images (e.g.50 cm resolution) or orthophotos will be sufficient for most land administration purposes. Boundaries can easily be identified on the images/orthophotos in most cases. Experience shows that people in general can read the images easily so that a participatory approach to boundary determination can easily be applied. Non-visual boundaries can easily be added using hand held GPS or field survey field survey measurements. Using satellite images/orthophotos are by far cheaper than field survey and does not require the capacity of trained professionals to undertake the field work. The mapping methodology using satellite images/orthophotos provides also the general topography of land use and buildings and infrastructure.
3. Accuracy relates to the purpose. Accuracy of the information such as the parcel boundaries should be understood as a relative issue related to the use of this information, while technical standards are often inflexible and over the top for the purpose. The need for accuracy of the various features should be determined by the purpose of using this information for dealing with the various land administration functions. In this regard, the registration of legal and social tenure rights requires identification of object, but the process does not call for a high accuracy in itself. Also, planning and land development processes mainly require sufficient mapping for identifying physical and spatial objects rather than high accuracy. Any demand for accuracy may stem from issues such as high land value in dense urban areas or implementation of costly construction works.
4. Opportunities for updating. Building the spatial framework is not a one-stop process – it should be seen in a perspective of opportunities for on-going updating, sporadic upgrading, and incremental improvement whenever relevant or necessary for fulfilling land policy aims and objectives. This of course requires that the mapping and surveys are linked a national grid system. The requirement for on-going updating procedures is a must in order to ensure that all data are complete and reliable. Without such procedures the investments are easily wasted over a relatively short period. The opportunity for upgrading is essential and allows for providing an improved map-base whenever needed for specific purposes such as land development activities, major construction works and implantation of major infrastructure. This allows for incremental improvement that, in turn, will establish a spatial framework in line with modern and fully integrated land information systems.

6. ROLE OF SURVEYOR

Paradigm has shifted and conventional approaches need to change. There is an urgent need for cadastral maps and land registries for societies worldwide and it is complex to find simple solutions for the introduction of appropriate or improvement to land administration systems.

Cadastral systems are recognised worldwide as being important in support of good and sustainable governance. Governments need information to govern. Information about citizens and their land relationships is core information for sustainable economic and infrastructural development and interrelated spatial planning, resource and environmental management,

disaster management. These are about today's challenges and there are the climatological change, drought and access to water, inequitable access to land and the lack of social justice, undernourishment and food shortages, access to adequate shelter and basic services and a growing urban population with a complex urban – rural interface. Worldwide co-operation is needed to get such a global cadastral map available. Complete coverage means inclusion of customary lands and rights, informal areas, conflict areas, natural resources, etc. Surveyors and their professional attitude needs to change, co-operation with other disciplines and professions is needed, capacity needs to be built, the younger needs to be accommodated and encourage to step forward with solutions. Pro poor, participatory, easy to use tools and approaches are needed. A “party of the willing” needs to be build and will include open source communities, commercial systems and technological communities and the grass root to support innovations for development and provision of solutions. Academia need to develop and prove practical and workable approaches.

7. THE LAND ADMINISTRATION DOMAIN MODEL

FIG is participating in the Committee of Experts on Global Geospatial Information Management. This UN Committee was established to provide a forum for coordination and dialogue among Member States and between Member States and relevant international organizations, of which FIG is one. During its meeting in Cambridge UK, a report (UN ECOSOC, 2013) of the Secretary-General in collaboration with the ISO/TC 211 on establishing and implementing standards for the global geospatial information community was tabled and the importance of adopting and implementing standards within national legal and policy framework was emphasized.

FIG is a liaison member of ISO/TC 211 on Geographic Information/geomatics. ISO standardisation is a comprehensive, extensive, formal process with continuous peer reviews and iterations based on experience of earlier implementations. For LADM this (creative) approach resulted in finding common denominators in land administration. A milestone for FIG as worldwide platform for surveyors and land professionals.

LADM covers basic information related components of land administration including those over water, and elements above and below the surface of the earth. LADM provides an abstract, conceptual model with three packages related to: parties (people and organizations); basic administrative units, rights, responsibilities, and restrictions (ownership rights), and: spatial units (parcels, and the legal space of buildings and utility networks), including spatial sources (surveying), and spatial representations (geometry and topology).

The LADM defines terminology for land administration that allows a shared description of different formal, customary or informal tenures. The standard provides a basis for national and regional profiles and enables the combining of land administration information from different sources in a coherent manner. The innovation is in the availability of the LADM as a basis for structuring and organising of representations of people to land related information in databases in a generic way. This means that the LADM is one of the tools (or better:

conditions) for the *implementation of the continuum of land rights and for FAOs Voluntary Guidelines*.

This is also valid for the Social Tenure Domain Model (STDM).

There is also a continuum of accuracy, of land recordation's, of types of spatial units, of types of parties involved, and of data acquisition approaches. All this is supported in LADM/STDM – allowing for 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. This makes the concept of LADM a basis for strategic development in land administration.

The standard allows for the implementation of a rich functionality over distributed environment. Some of the offered options still have to be discovered, for example during pilots. It is good to see that a LADM community is developing.

REFERENCES

Enemark, S., (2012). Sustainable Land Governance: Spatially enabled, fit for purpose and supporting the global agenda. World Bank Conference on Land and Poverty, Washington DC, US, April 2012.

ISO, (2012). ISO 19152:2012, Geographic Information – Land Administration Domain Model. Edition 1, 118 p. Geneva, Switzerland.

FAO, (2012). Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of Food Security. Rome, Italy.

FIG, (1995). Statement on the Cadastre. FIG Publication 11.

FIG, (1996). The Bogor declaration for cadastral reform. FIG Publication 13A.

FIG, (1999). The Bathurst Declaration on Land Administration for Sustainable Development. FIG Publication 21.

FIG, (2006). FIG Guide on Standardisation, revised edition. FIG publication no 28A

FIG, (2006). Administering Marine Spaces: International Issues. FIG Publication 36.

FIG/GLTN, (2010): The Social Tenure Domain Model. FIG publication no 52

Henssen, J., (1995). Basic Principles of the Main Cadastral Systems in the World. In Proceedings of the One Day Seminar held during the Annual Meeting of FIG Commission 7

Kaufmann, J. & Steudler, D., (1998). Cadastre 2014. A vision for a future cadastral system.

UN ECOSOC - Economic and Social Council, (2013). Establishment and implementation of standards for the global geospatial information community. 3rd GGIM session, Cambridge, UK, July 2013.

UN-Habitat, (2008). Secure land rights for all. Nairobi, Kenya.

BIOGRAPHICAL NOTES

CheeHai Teo is President of the International Federation of Surveyors (2011 – 2014). He remains a Licensed/Chartered Surveyor in the private practice in Malaysia. He completed his undergraduate program in surveying in Australia in 1980, and a Masters program in Malaysia in 2004. He is a Past Secretary-General of the ASEAN Federation of Land Surveying and Geomatics and a Past President of the Royal Institution of Surveyors Malaysia (RISM) as well as having held a number of positions in the Association of Authorised Land Surveyors Malaysia (AALSM).

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