

# STDM Online: Hosting Options

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## Abstract

This paper will present the development of the STDM Online information tool. This tool is the result of the next development phase of the STDM concept and model which have been extensively presented at World Bank Conference on Land and Poverty.

STDM Online is a “Software as a Service” Web offering. This means that it requires no local installation but only a web browser and access to the Internet.

The presentation gives a quick overview of the architecture design and highlights the core components. The system is designed to be highly scalable storing the data in a Postgresql database with PostGIS extension. This set-up can be used on highly scalable server environments and is the core piece of technology for many established Mapping Agencies including the Ordnance Survey of Great Britain, Geonovum of The Netherlands or The BKG of Germany. The last phase of the project has focused on leveraging web based tools to complement the solid and stable standalone core. All bindings in the system are standardized around W3C and OGC interface and data specifications making the system modular and extensible. In the outlook we will highlight the technical roadmap and how it is interweaved with social networks to establish an environment that will allow user groups to directly interact with the project. In the long run this will be the means to attract sponsors and fund developers to support the sustainable growth of the project.

## **The Social Tenure Domain Model**

UN-HABITAT through the Global Land Tool Network (GLTN) is working in partnership with international partners in the promotion of secure land and property rights for all through the development of pro-poor and gender appropriate land tools. This objective is aligned foundations towards realisation of Habitat Agenda which states that: “Access to land and legal security of tenure are strategic prerequisites for the provision of adequate shelter for all and for the development of sustainable human settlements affecting both urban and rural areas. It is also one way of breaking the vicious circle of poverty. Every Government must show a commitment to promoting the provision of an adequate supply of land in the context of sustainable land use policies. While recognizing the existence of different national laws and/or systems of land tenure, Governments at the appropriate levels, including local authorities, should nevertheless strive to remove all possible obstacles that may hamper equitable access to land and ensure that equal rights of women and men related to land and property are protected under the law. The failure to adopt, at all levels, appropriate rural and urban land policies and land management practices remains a primary cause of inequity and poverty. It is also the cause of increased living costs, the occupation of hazard-prone land, environmental degradation and the increased vulnerability of urban and rural habitats, affecting all people, especially disadvantaged and vulnerable groups, people living in poverty and low-income people” (Habitat Agenda, 1996, Article 75).

UN-HABITAT's Global Campaign for Secure Tenure is thus focused on advocating change and assisting Member States to introduce innovations which strengthen the tenure security for majority of people, especially the poor and disadvantaged groups. The focus of the Campaign is unambiguously aimed at promoting a set of policies, strategies and (technical) tools that will directly benefit the urban and rural poor throughout the world. It addresses the issues of forced evictions, secure tenure for both men and women and, equally important, the right of women to land/property inheritance. According to GLTN a land tool is a practical way to solve a problem in land administration and management. It is a way to put principles, policies and legislation into effect (GLTN, 2015).

The conventional land administration approaches based on land registration have not been successful, especially in developing countries where there shortage of resources, capacity and there prevails land governance challenges. RICS estimates: “that there are around 6 billion land parcels or ownership units

world-wide, but currently only 1.5 billion parcels are formally registered and have security of tenure. Within many of the 4.5 billion unregistered parcels, 1.1 billion people live in the squalor of slums.” (RICS Report, 2011)

FIG concurs with the figures by noting 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.” (FIG Publication 52, 2010)

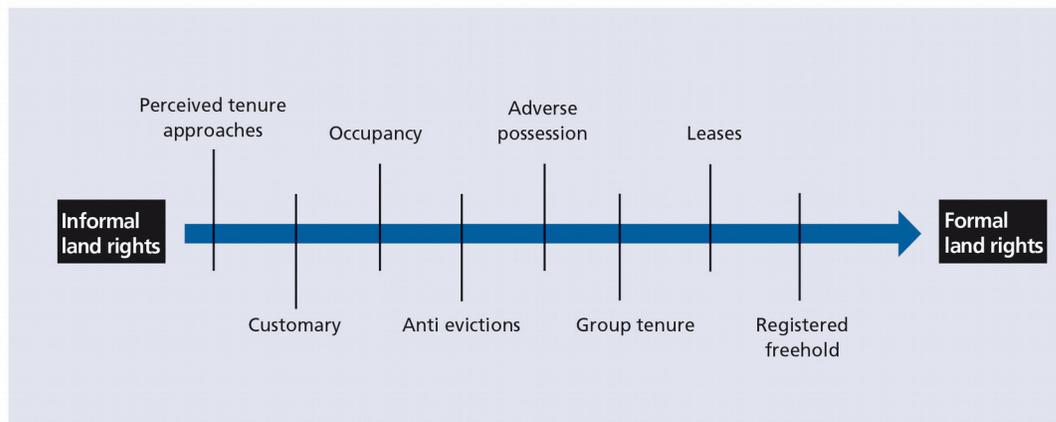
This highlights the need for policies that enhance sustainable urbanization.

The Norwegian Forum articulates the challenges by stating that: “As pressure on land grows, marginalised individuals and communities often seek to secure their access to land resources through formal registration. In most cases, people find that individualised formalisation processes are far too costly, difficult to access, favour the primary rights holders (men and elites) and are unreliable due to weak and corrupt institutions. Land registration processes must therefore be designed to allow for collective land registration. They should be transparent, accessible, affordable and equitable, with emphasis on protecting secondary rights holders, such as women, pastoralists and tenants.” (The Norwegian Forum for Environment and Development, 2007)

In addressing these challenges GLTN adapts a strategy that enshrines the following:

- Establishment and adaption of a continuum of land rights, rather than just focus on individual land titling;
- improve and develop pro poor land management as well as land tenure tools;
- unblock existing initiatives; assist in strengthening existing land networks;
- improve global coordination on land; assist in the development of gendered tools which are affordable and useful to the grassroots;
- and improve the general dissemination of knowledge about how to implement security of tenure

## Continuum/range of land rights



*Figure 1: Continuum / range of land rights*

The figure above represents a highly simplified illustration of continuum of land rights: “At one end are formal land rights, where the owner is an individual, who holds a set of registered rights to a parcel of land that are enshrined in law: At the informal end of the continuum are informal rights: a group of individuals (such as a clan) may have traditional rights to use a piece of land. And in between these two extremes are a wide range of rights.”<sup>1</sup> The figure is highly simplified because in reality the land rights are not restricted to a single line and in some cases there are overlaps. Also the relevance and pertinence of the rights varies from situation to situation and on temporal locations to the extent that registered freehold should not be considered as universally appropriate system.

GLTN advocate for inclusive approaches where land rights are not restricted solely to registered rights and not only to individual property rights. The concept identifies a continuum of land rights from informal to formal and the categories of tenure in the continuum may include pavement dweller, squatter tenant, squatter owner, tenant (unauthorized subdivision), owner (unauthorized subdivision), legal owner (unauthorized construction), tenant with contract, leaseholder and freeholder. From the perspective of the poor, access to security of tenure based exclusively on the allocation of registered rights and individual property titles is not necessarily efficient, equitable or affordable. The diversity of stakeholders’ needs, objectives and strategies requires a diversity of tenure options including leases, rental contracts and various informal arrangements. Inclusion of all types of rights will then get reflected in the land market making it more realistic and effective.

In order to actualise the Continuum concept GTLN, in partnership with ITC, FIG, UN-Habitat and World Bank developed the Social Tenure Domain Model (STDM). STDM is designed to model the relationships between people and land as a basis for land administration and/or land management. The focus is on modeling the relations independently from the level of formalization and/or legality of those relationships. It supports all forms of land rights including customary and informal rights.

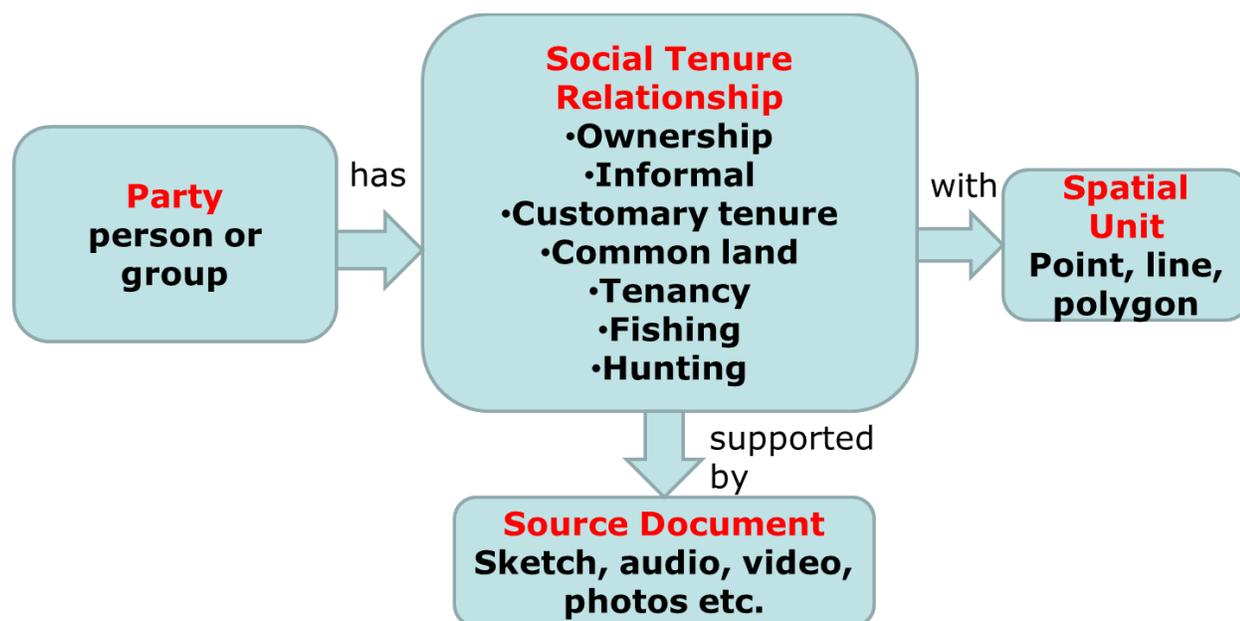


Figure 2: Conceptual model of STDM

The underlying drivers to the development of STDM were that it should adhere to the principles and core values of GLTN which are pro poor, good governance, equity, subsidiarity, sustainability, affordability, systematic large scale and gender sensitiveness. In addition it complies with the element of “fit for the purpose land administration” which are declared as:

- Flexible in the spatial data capture approaches to provide for varying use and occupation.
- Inclusive in scope to cover all tenure and all land.
- Participatory in approach to data capture and use to ensure community support.
- Affordable for the government to establish and operate, and for society to use.
- Reliable in terms of information that is authoritative and up-to-date.
- Attainable to establish the system within a short timeframe and within available resources.
- Upgradeable with regard to incremental improvement over time in response to social and legal needs and emerging economic opportunities.

There are a number of proprietary software in the market for land administration and management; however these do not meet the affordability requirements. STDM has thus focused on Free and Open Source Software entailing Geospatial and Database components for implementation of the concept. This paper highlights open source usage, development cycle and sustainability issues.

## **The STDM Online Software Stack**

STDM Online uses the same core components and extends the functionality to the Web by adding a Sahana Eden platform. It follows a sustainable large scale approach by deploying the following main components:

- PostgreSQL (object-relational database)
- PostGIS: GNU GPL v 2.0 (spatial data extension for PostgreSQL)
- Sahana Eden
- Web2Py
- OpenLayers and Leaflet

PostgreSQL is used to store the data which has been modeled following the STDM concepts which are based on the ISO standard LADM (Elia, 2013). PostgreSQL (<http://www.postgresql.org/>) is one of the most widely deployed professional high performance database systems globally . PostGIS (<http://postgis.org>) implements functionality to make geographic operations available in PostgreSQL. Sahana Eden is an Open Source Humanitarian Platform which can be used to provide solutions for Disaster Management, Development, and Environmental Management sectors. OpenLayers and Leaflet are JavaScript libraries used to display maps with geographic data like cadastral and base map data, satellite and aerial imagery, road maps, OpenStreetMap data and so on. PostGIS, OpenLayers are approved by the Open Source Geospatial Foundation as highest quality software (The OSGeo Incubator, 2015).

## **STDM Specific Code**

Specific code implemented exclusively for STDM is based on the templating system of Sahana Eden. Therefore the code base which has to be developed and maintained under the auspices of STDM is manageable. At the same time the STDM project and its users profit from the advanced technologies and high stability of the above mentioned COTS Open Source software. Improvements to the core software

stack will be automatically inherited by the STDM code base and can be leveraged by the users. By following this course the core value to follow a systematic large scale approach and sustainability is warranted.

## **The Positive Impacts of Open Source Software on STDM**

Before looking into how STDM makes use of Open Source software, this paper will give a short introduction to the concepts behind Open Source and Free Software. STDM is not about software alone. Instead, STDM leverages different software packages to get real work done while supporting its core values pro-poor, equity, affordability, good governance, subsidiarity, gender sensitiveness, systematic large scale approach and sustainability. In the following section we will learn about Free and Open Source Software in general and how it fits perfectly with the core values of STDM before going into the more project specific aspects of selected software packages used in STDM.

## **The STDM Online Business Case**

In many time-limited projects the decision for a specific software stack has to be taken very early on. When the project starts most of the budget set aside for software has to be spent on the licenses. If later on in the project it turns out that the software was a complete failure there is nothing that can be done about it because the budget has already been spent.

With Open Source this is different. Anybody can try out any software for any purpose at any time and the software can be changed at any time during the project. It is even possible to run parallel architectures with different software stacks because there is no artificial barrier to the acquisition of the software.

Unfortunately many aid organizations lack the IT know how and staff to install, maintain and properly back-up software. This is where STDM Online can help. The SaaS model is completely maintenance free for the end user. It can best be described as Dropbox or Gmail, it just does the job for you without strings attached.

## Conclusions

Land administration is about people, the relation between people and places, and the policies, institutions and regulations that govern this relationship. Land administration systems provide a nation with an infrastructure for implementation of land policies and land management strategies in support of sustainable development. In many developed countries these systems are well developed and provide a kind of backbone in society in support of efficient land markets and effective land-use management. In most less developed countries, however, less than 30 percent of the land is included in the formal systems of land registration and administration that serve mainly the elite.

Instead of trying to replicate the effort of the countries with existing land records new approaches have to be found that will address the needs of each specific region. The technological aspect should be secondary. The most important aspect is the fit-for-purpose acquisition and maintenance of the data. Therefore any closed system must be the wrong decision. STDM Online may not provide high class surveying features but it is a tool that can be used productively from day one of its operation and which is totally transparent and open about the contained data. The Postgresql database is accessible by any SQL standard conforming software product and can be exported at any point in time.

In less developed countries there is an urgent need to build simple systems using a flexible and affordable approach to identifying the way land is occupied and used. The systems should include all land and provide security of tenure for all. When considering the resources and capacities required for building such systems, the more advanced concepts as predominantly used in developed countries may well be seen as the end target but not as the point of entry. When assessing technology and investment choices the focus should be on a “fit-for-purpose approach” that will meet the needs of society today and can be incrementally improved over time. The Open Source based STDM tools meet these requirements and help less developed countries to meet with the economically stronger parts of the world on equal footing.

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## **Figures**

Figure 1: Continuum / range of land rights

Figure 2: Conceptual model of STDM

Figure 3: Proprietary and Open Source Development Models