The Social Tenure Domain Model: a Specialisation of LADM towards bridging the Information Divide[1]

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Key words: STDM, Security of Tenure, Land Information, GLTN, LADM

SUMMARY

United Nations Secretary General Ban Ki-moon declares that the Millennium Development Goals (MDGs) have been the most successful global anti-poverty 'push' in history and that the number of people living in extreme poverty has now been halved (United Nations 2013). This is indeed good news. However, the challenge on poverty reduction is still very significant. In the UN-Habitat's published State of the World's Cities (2010/2011), it was highlighted that slum population is expected to increase to 1.4 billion by 2020. IFAD (2011) pointed out that despite significant progress in reducing poverty particularly in East Asia – there are still about 1.4 billion people living on less than US$1.25 a day, and close to 1 billion people are suffering from hunger.

While there are various key strategies and interventions in addressing poverty reduction, and sustainable development in general, land governance initiatives are increasingly becoming critically important. In this context, the development of reliable land information systems becomes strategic and useful to bridge the information divide. The Global Land Tool Network and its more than 55 international partners has been developing pro-poor and gender sensitive land policies, tools and approaches and one of them is the Social Tenure Domain Model (STDM). STDM is based on a global standard called the Land Administration Domain Model (LADM) and supports the recognition of the continuum of land rights approach. It is intended to promote security of tenure of the poor, women and vulnerable groups but increasingly recognized as an important land governance tool.

This paper will provide the rationale and framework of STDM development, its current and potential applications and its future development plans. It will also highlight the STDM pilot in Uganda particularly the lessons learned and experiences and how the pilot is influencing the replication and scaling up of STDM in other countries as well as in different contexts or thematic areas. As a way of conclusion, the paper will confirm that STDM as a pro-poor land governance tool and a new way of thinking, is already on its way to bridge the gap in addressing the land information requirements of the urban and rural poor.

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[1] Keynote paper

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1. INTRODUCTION

While the 2013 UN Report on Millennium Development Goals (MDGs) gave the world a glimmer of hope, still the global challenges on poverty reduction and sustainable development are significant and daunting. IFAD (2011) pointed out that despite significant progress in reducing poverty particularly in East Asia – there are still about 1.4 billion people living on less than US$1.25 a day, and close to 1 billion people are suffering from hunger. It added that during the food crisis between 2006 and 2008, about 100 million poor urban and rural poor were pushed into the ranks of the world's hungry. UN-Habitat reports that slum population is expected to increase to 1.4 billion (UN-Habitat _____). UN-Habitat further stressed that urbanization also contributes substantially to climate change issues. Take for instance that the 20 largest cities consume 80% of the world's energy and urban areas generate 80% of greenhouse gas emissions worldwide (FIG 2010).

While there are various key strategies and interventions in addressing poverty reduction, and sustainable development in general, land governance initiatives are increasingly becoming critically important. In this context, the development of reliable land information systems becomes strategic and useful to bridge the information divide.

The Global Land Tool Network (GLTN) and its more than 55 international partners has been exploring solutions to address the above challenges through the development of pro-poor and gender appropriate land policies and tools. GLTN, as facilitated by UN-Habitat, is a global partnership of key international actors who are working together to specifically address land tenure and land governance issues.

Various literatures have pointed out that the benefits of land administration systems are enormous which include contribution towards poverty alleviation, security of tenure, management of land disputes, inclusive planning, management of natural resources and protection of the environment, amongst others (Williamson et al 2010, Burns 2007, Magel 2006 and Antonio 2006). However, in developing countries, cadastres and parcel-based land administration systems only covers about 30% of the country and 70% are not covered by any formal land registration and information systems (Lemmen, Augustinus, Haile and van Oosterom, 2009). Most of the poor are part of the 70% who have no legal, documented and registered land rights. What they have are informal, customary, unwritten and over-lapping land rights and claims.

In this context that GLTN partners is promoting the concept of continuum of land rights approach (Figure 1) rather than a focus only on issuing individual freehold titles (UN-Habitat 2008b and UN-Habitat 2009a). Across this continuum, different tenure systems may operate

either by individual and/or group claims, and plots or dwellings within a settlement and may change over time. As GLTN partners puts it, conventional land titling approaches have largely failed to deliver their expected results because the existing technical solutions are expensive, inappropriate for the range of tenure found in developing countries, unsustainable financially or in terms of available capacity, and instead a range of land tenure options is more appropriate. While the concept is incrementally and widely accepted in the global discourse, a new set of land administration and information management systems are necessary to implement the continuum of land rights. This is in practical terms means responding to the needs and requirements of the 70% of the citizenry in a developing country that are mostly comprised of the poor people and providing them equal socio-economic opportunities.
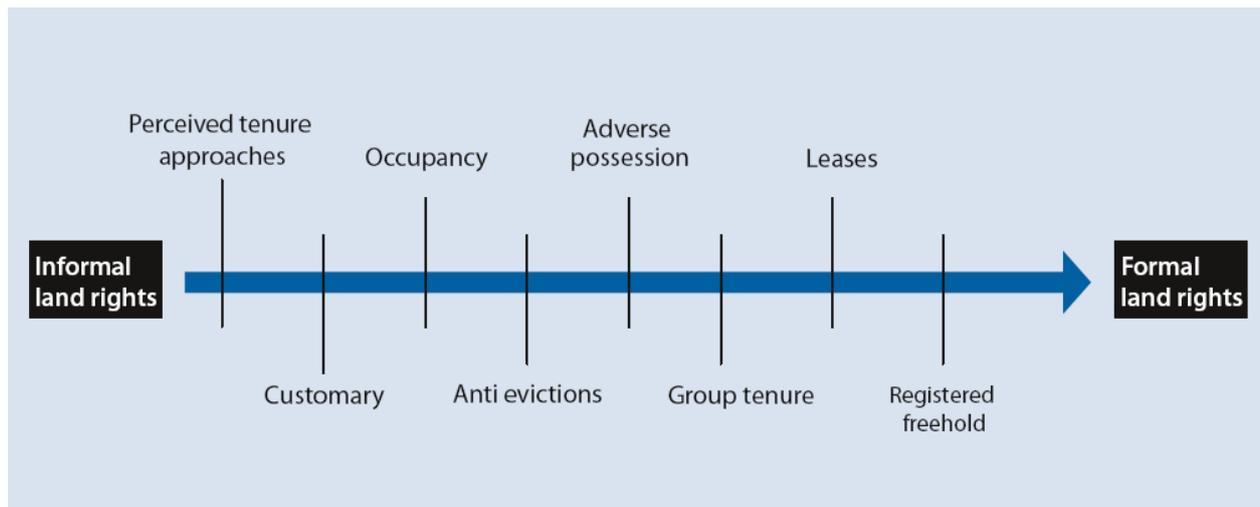
Figure 1. Continuum/range of land rights (UN-Habitat 2008b)

GLTN partners are motivated to find solutions to bridge this technical gap and are committed to assist governments, land professionals and poor communities in urban and rural areas to improve tenure security at scale. In this context that Social Tenure Domain Model (STDM) as a pro-poor land information system emerged. STDM is a more flexible land information system that can handle various types of land rights and social tenure particularly in informal settlements. Its development is based on free and open software packages. It is based on a newly approved global standard (the Land Administration Domain Model) being promoted by the International Federation of Surveyors (FIG), amongst others. STDM is a specialization of LADM and through this standardization; data integration is possible (Lemmen 2010 and Enemark 2009).

2. LINKAGES BETWEEN LADM AND STDM

Both LADM and STDM both represent the relationship that people have over a given piece of land or spatial units.

At the core of LADM is a conceptual model which provides an abstract representation of:

a. Party – This can be parties (persons or organizations) or group parties (groups of persons or organizations). A party constitutes an identifiable single entity which is legally recognized.
b. Ownership right – This is a formal or informal entitlement to own a given piece of land. This can also be represented a responsibility (e.g. maintain a historical site or maintain a waterway) or as a restriction over a given piece of land (or water).
c. Spatial unit – This represents a single area (or multiple areas) of land (and/or water) for which a party has a right, restriction or responsibility over.
d. Spatial sources and representations – This refers to the documents related to a survey where the data is acquired digitally in a field office, using forms of field sketches, ortho-images or existing topographic maps.

By abstracting the representation of the basic components of land administration, LADM provides common terminology for land administration. The application of relevant attributes, rules and associations to these core components enables LADM to deliver a basis for national and regional profiles which can subsequently be standardized and easily integrated.

On the other hand, STDM is an implementation of LADM that is meant specifically for developing countries which have very little or no cadastral coverage in urban or rural areas. STDM, in its current development, tries to represent the realities on the ground particularly modeling the complex tenure relationships held by the poor independent of the accuracy or legal issues. Below is a simplified representation of STDM concept.
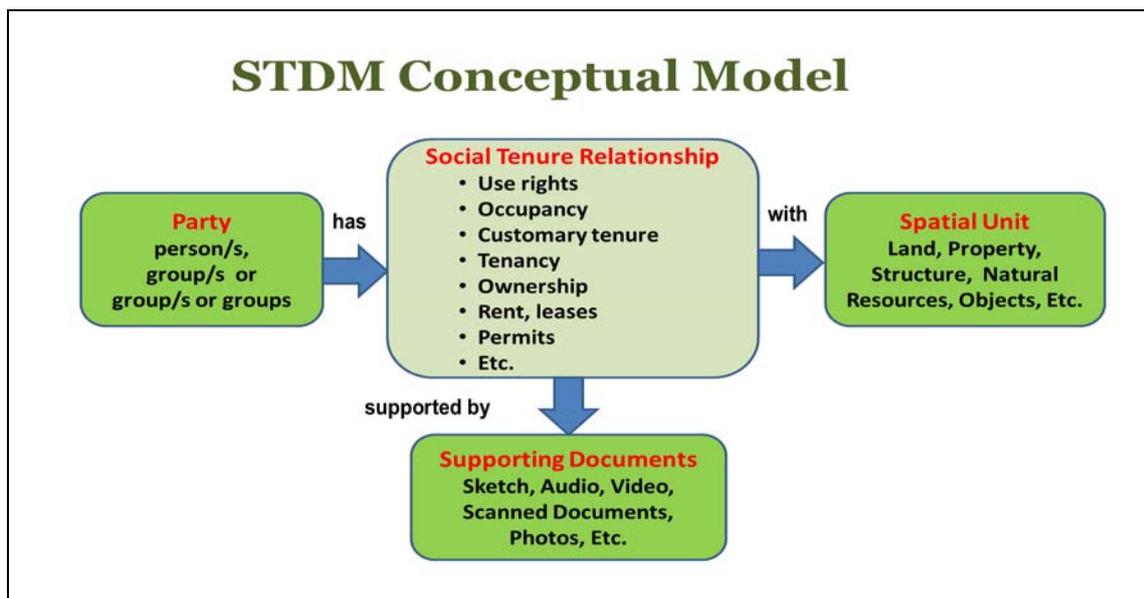

Figure 2. STDM conceptualm model

STDM represents the basic concepts in three ways:
a. Party – This can be a person, company, municipality, cooperation, married couple, group or group of groups.

    b. Spatial unit – discrete area(s) of land, natural resources, properties, structures or objects other than accurate and well established units (relative to those defined by LADM).

    c. Social tenure relationship – This is the relationship between parties and spatial units and which is in the form of informal rights, tenure rights, long leases, rents, ownership rights, Islamic tenure rights, state property, conflict areas, diagreements, overlaps, use rights, etc.

In STDM, it is envisioned to also capture supporting documents including photos, images, videos, sketch, maps and other documents (formal or informal) to illustrate and describe the social tenure relationships and identify the concerned parties.

The commonalities between LADM and STDM include the following:

    a. Rights, restrictions or responsibilities in LADM are collectively represented as social tenure relationship in STDM.

    b. The right, restriction or responsibility (in LADM) and social tenure relationship (in STDM) of a party over spatial unit can both be supported by source or supporting documents. However in STDM, this is expanded to non-formal documents like informal agreements, videos, verbal agreements, sketch and other types of docunents as it is not limited or tied to represent formal or legal status of the tenure relationship..

    c. Both LADM and STDM support state-based modeling where the validity of objects requires at least two dates which indicate the time interval during which the object is recorded in the system. Consequently, it is possible to reconstruct the particular state of an object within a given time interval.

The main difference between LADM and STDM arises from their respective origins and context; wherein LADM seemingly highlight its use on formal systems like cadastre and land registry systems, STDM extends this concept and further emphasizes the relationships between people and land (extending its definition to natural resources, buildings, properties and other objects) independent from the level of formalization and legality of these relationships. The two models are in most cases complementary particularly in situations where conventional cadastral systems are not adequate to support tenure security such as in post conflict/disaster situations, informal settlements and customary tenure areas.

3. STDM AND LAND GOVERNANCE

3.1 Land governance and tenure security

Addressing the land issues at global, regional, country and city/municipal level is indeed one of the major challenges of our times, both in regard to addressing poverty issues as well as sustainability issues. Complex global challenges such as climate change, rapid urbanisation, food, water and energy insecurity, natural disasters and conflicts have a clear land dimension. Land related issues include unequal access to land and other natural resources, unsustainable land use, insecurity of tenure, weak institutions to resolve conflict, dysfunctional land markets and institutions and inefficient and inappropriate land administration systems (Palmer et al 2009 and Antonio 2009, 2010). Indeed, land is increasingly recognised as an important governance issue.

UN-Habitat and FAO through Palmer, Fricska and Wehrmann (2009) define land governance as 'concerning the rules, processes and structures through which decisions are made about access to land and its use, the manner in which the decisions are implemented and enforced, the way that competing interests in land are managed.' They emphasised that land governance embodies policy, legal and institutional frameworks surrounding statutory, customary and informal land practices and transaction. What is really important in their contribution is the analysis and emphasis around 'power' and 'politics' surrounding land management and administration.

Aside from the consequences of having 70% of the people of the developing countries are outside the cadastre and an over-emphasis on delivery of secure land tenure through the issuance of individual titles, Clarissa (2009) further explained there are other key land issues that impact on the delivery of secure tenure and adversely contributed to the slow achievement of MDGs. These issues include the following:

- women who composed 50% of world's population only own 2% of land;
- lack of political will by governments about going to scale and addressing the needs of the whole population;
- proliferation of graft and corruption in the land sector. Transparency International (2009) reported that land services is the third most corrupt sector behind the police and the courts and that petty corruption in the sector can sum up to US$ 700 million (Transparency International-India, 2005);
- most countries have incomplete, unreliable and non inter-operable land records and information systems;
- lack of sufficient pro-poor and practical land tools and approaches to assist in the implementation of land policies.

Central to discussion of good land governance is the provision of access to land and security of tenure to all. A wealth of literature emphasised the need for security of tenure and elaborate its benefits from equity and human rights lens to economic and livelihoods perspective, to peace and stability view, up to citizenship and empowerment standpoint (UN-Habitat 2008, 2007, 2003a and 2003b; Deininger and Enemark 2010; Palmer et al 2009; Augustinus 2009; FAO 2007; Deininger 2003; UN-Habitat 1999). These literatures also highlighted that security of tenure is the gateway to other significant processes and opportunities towards poverty reduction and sustainable development. It is clear that provision of tenure security to all members of the society is a key manifestation and indicator of good land governance.

3.2 The birth of STDM as a land governance tool
The development of STDM is to implement the concept behind the continuum/range of land rights. This technical gap was identified as early as 1998 where experts identified that there were various types and range of tenure arrangements that could not be included or fit with the conventional land registration systems and parcel-based spatial description of the rights (UNECA, 1998). This thinking progresses until the beginning of 2000 where a number of key people in the land administration field became aware and convinced that the conventional land registration and administration systems is not sufficient and not always appropriate for the range of tenure types that exist such as for the pastoralists, customary and slums. Fourie

(2001) further advanced the idea of the need for new forms of spatial information, not the cadastre, to provide tenure security in informal settlements particularly in slum upgrading initiatives.

Over time, it became clearer that this gap, aside from impacting on the security of tenure of the poor, was contributing directly to chaotic and unsustainable cities, mismanagement of the scarce natural resources (e.g. forest), environmental degradation, delays in conflict management and proliferation of slums and informal settlements (Augustinus, 2009). Christian Lemmen of the Faculty of Geo-Information Science and Earth Observation (ITC) of the University of Twente took the lead in developing the solutions to fill this technical gap from 2002 onwards by starting to develop the Social Tenure Domain Model (STDM) at the conceptual level alongside with the development of the FIG-led Land Administration Domain Model (LADM) (Lemmen et al 2007, Augustinus et al 2006 and Lemmen and van Oosterom, 2006). University of Twenty (ITC) was then financially supported by GLTN to further develop the design of the model including the technical aspects. FIG, through the leadership of then President Stig Enemark, has supported its development including the peer-reviews of STDM designs (i.e. conceptual, technical and functional) by known land professionals. In 2009, the initial version of the STDM prototype was tested by UN-Habitat and ITC in the context of the rural land administration in Ethiopia, particularly in Amhara region in collaboration with the World Bank (Zevenbergen and Haile 2010). The STDM prototype was then launched during the FIG Congress in Sydney, Australia, April 2010 including the new joint publication with FIG and ITC: *'The Social Tenure Domain Model - A Pro-Poor Land Tool.* STDM was also highlighted in the *Sydney Declaration* (www.fig.net). Finally, the tested STDM prototype including the designs was finally turnover by ITC to UN-Habitat/GLTN Secretariat in August 2010.

Since then, UN-Habitat/GLTN Secretariat keeps working on its enhancement and further development in three areas: adding more functionality, improving the user-friendliness of the software and reshaping STDM system to cater for the information needs and requirements of informal settlements. GLTN, besides the mandates of UN-Habitat, sees the importance of prioritising on addressing the issues related to informal settlements because of its huge potential to contribute to poverty reduction and positive potential impacts at a global level. An STDM pilot in Mbale Municipality was undertaken in 2011-2012 in partnership with Shack/Slum Dwellers International, Cities Alliance and International Federation of Surveyors and national and local authorities and stakeholder groups.

The pilot experience is very successful and subsequently informs the GLTN Secretariat and partners in replicating and scaling up the process and greatly assists in its current technical development.

4. THE STDM PILOT IMPLEMENTATION IN UGANDA

Building from the prototype version as tested in rural land administration context in Ethiopia, an 'intermediate version' of STDM was developed using some data from a Kenya-based urban NGO called Pamoja Trust. The intermediate version replaced Integrated Land and

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Water Information System (ILWIS) as the GIS component with Quantum GIS and STDM system was further developed as a QGIS plugin. In June 2010, a joint project proposal between UN-Habitat/GLTN Secretariat and SDI aimed at piloting STDM in Uganda was developed and submitted to Cities Alliance for funding purposes. The proposal was approved in July 2010. The Project was also supported by FIG Foundation and other GLTN donors such as the Governments of Sweden and Norway.

The Project was implemented alongside with the existing larger project called Transforming the Settlements of the Urban Poor in Uganda (TSUPU) aimed at re-enforcing the linkages between various urban sector programmes and initiatives by introducing systemic changes in delivering urban services, improving urban management and developing planning and policy frameworks. The Project is led by the Government of Uganda through the Ministry of Land, Housing and Urban Development (MoLHUD). For piloting purposes, the Municipality of Mbale was chosen. The project design was based on two pillars: strengthening partnerships at all levels and building from community strengths and processes. Working under these two pillars, Cities Alliance, SDI, UN-Habitat/GLTN Secretariat, MoLHUD, Actogether (an urban NGO in Uganda) and Mbale Municipality have provided advisory, technical and capacity development inputs to the project. Most of the work including mapping, enumeration, community mobilisation, local consultations and sensitization and data entry, analysis and validation were done by Mbale Slum Federation and community members themselves.

4.1 Purpose, Partnership and Processes
Purpose
The specific objective of the Project was to pilot test STDM and to document the processes and capacity building requirements around its use and application, in a selected municipality in Uganda for wider learning and application. The long-term objective is to address the land information requirements of women and men living in slum communities and to build their capacity in the use and application of the land information systems based on free and open source software packages and in mainstreaming the thinking behind the continuum of land rights. This is expected to form a basis for dialogue between local communities and cities in negotiations for improving tenure security, inclusive planning and enhancing access to basic services and infrastructure.

Partnership
There are various partners in the project and they can be classified according to their roles and responsibilities such as: the facilitators, the supporters and the implementers. The various partners and their corresponding roles are described below:

The 'Facilitators'
Cities Alliance – Aside from being the funding agency for the Project, Cities Alliance strategically placed the Project to coincide with the TSUPU programme implementation and link the Project with the national and local authorities. Cities Alliance also assisted the Project in its national and global advocacy efforts.

International Federation of Surveyors (FIG) – Since the STDM inception, FIG has been supporting the development of STDM and the promotion of continuum of land rights.

Moreover, through its Foundation, FIG has provided some grant funds to support data capture and documentation and provided a set of handheld GPS receivers from Trimble, Inc. – a member of FIG Foundation. The support facilitated field work implementation.

The 'Supporters'
UN-Habitat/GLTN Secretariat – Aside from co-financing the Project, UN-Habitat/GLTN Secretariat facilitated the planning and consultation workshops and meetings, provided technical support and facilitate capacity development initiatives. Specifically, UN-Habitat/GLTN Secretariat led in the customization of STDM to suit the local context and facilitated the implementation of the associated capacity development initiatives.

Slum Dwellers International (SDI) – As the key implementing partner of the Project, SDI provided the necessary political, technical and administrative support in the over-all project implementation. It mobilized the support of its national network (Actogether and Slum Federation) on policy dialogues, advocacy and project implementation. It also co-financed the Project.

Ministry of Land and Housing and Urban Development (MoLHUD) – The Ministry provided the needed political and technical support to the Project through the Commission on Urban Development. It enabled the Project to be mainstreamed in TSUPU project as well as it supported its implementation on the ground particularly by strengthening the linkages with Mbale municipal officials.

Actogether – As a leading urban NGO in Uganda, Actogether served as the technical arm of project implementation in Uganda. It provided the necessary and continuous technical and information support to Mbale Slum Federation and community leaders and members in its project implementation. It also provided the liaison and communication work between the global, national and local implementing institutions and stakeholders.

Municipality of Mbale – The Municipality through its leadership particularly the Town Mayor and Town Clerk has provided enormous technical, coordination and logistical support. Aside from hosting the slum federation office, it even allowed its limited staff and some council members to participate in the advocacy, community mobilisation and sensitisation and field implementation.

The 'Implementers'
Mbale Slum Federation – With the key support from SDI and National Slum Federation, the leaders and members of Mbale Slum Federation took the lead in policy and consultative dialogues with national and Mbale local authorities, community mobilisation, sensitization, capacity development, mapping, household interviews, enumeration and data collection and analysis. They served as the steady bridge between the technical and political partners and community members.

Community Leaders and Members – At the core of the project implementation are the community leaders and members of the two informal settlements. Most of them are active members of the Mbale Slum Federation. Most of the field enumerators are also coming from

their communities. They participated in the whole enumeration exercise and actively engaged from the project preparation, community mobilisation, data collection up to data analysis and validation.

Processes and activities
Building from the strengths of the Uganda's slum federation including from the tested participatory enumeration processes, the STDM pilot was implemented in two poor settlements of Mission and Bufumbo within the Municipality of Mbale. Participatory enumeration is a data-gathering process which is to a significant extent jointly designed and conducted by the people who are being surveyed (UN-Habitat 2010).

Below were the key processes and activities adopted and implemented by the project:

Planning and consultations – - Earlier in the project implementation, SDI and GLTN Secretariat conducted a series of consultation meetings with authorities (national and municipal), Actogether , slum federation and community members. Such consultations yielded in the understanding of STDM and its objectives, the finalization of the enumeration questionnaire, the development of an implementation plan, agreement on the roles and responsibilities as well as the identification and mobilisation of the needed support and resources.

Mobilization and sensitization process – The next step in implementing the project at settlement level is to mobilize community leaders and members through sensitization and awareness building process. Slum Federation leaders and members spearheaded this process in close collaboration with the Municipal officials with technical support from Actogether. Such process generated a wide support from the targeted communities and municipal council members on the project and its implementation. Enumerators from community members were identified and subsequently they were trained on mapping, data collection and administration of questionnaires.

Customization of STDM – Following the agreement with the local stakeholders and community members on the enumeration questionnaire and identification of the resources available such as satellite imagery and a handheld GPS, GLTN Secretariat proceeded to make some adjustments on STDM to customize the system to fit the purpose and local context and needs.

Mapping and structure numbering – With the assistance from Actogether, the Slum Federation and community members digitized the existing structures from the available satellite imagery and produce initial maps. Using the printed map, assigned enumerators numbered all existing structures and houses in the slum settlements using a unique code. Also, they made use of the handheld GPS to identify available community facilities such as water points, public toilet, dumping ground, roads, community centers, etc. and newly constructed houses/structures and update the map accordingly.

Interviews and data collection – As scheduled and communicated with the community, enumeration teams mostly accompanied by local leaders or elders and municipal officials,

conducted house to house interviews administering the questionnaire. In addition, they collected other information such as supporting documents and photos, with the unique code painted or written in the structure as a background.

Data entry and analysis – With the filled up questionnaires and gathered information including supporting documents and photos, the enumeration teams entered all the data into the STDM system. This process also included the updating of the initial digital maps. STDM, being a simple and user-friendly system, is able to undertake quick analyses and reporting. The slum federation leaders and enumerators were trained on how to use STDM to analyze the data and produce reports.

Data validation and continuous updating – As part of quality assurance, the gathered information were validated by community members. This process enhanced the acceptability of the information and all stakeholders appreciated the fact that the turnaround time between the enumeration exercise and the production of results is relatively fast. After the validation period, enumeration teams and slum federation leaders updated the information in the system. Those community members who were not able to provide their comments and corrections during the validation period may come to the Slum Federation office to update the data. Some Slum Federation leaders and members were trained to manage the system and to continue the updating process.
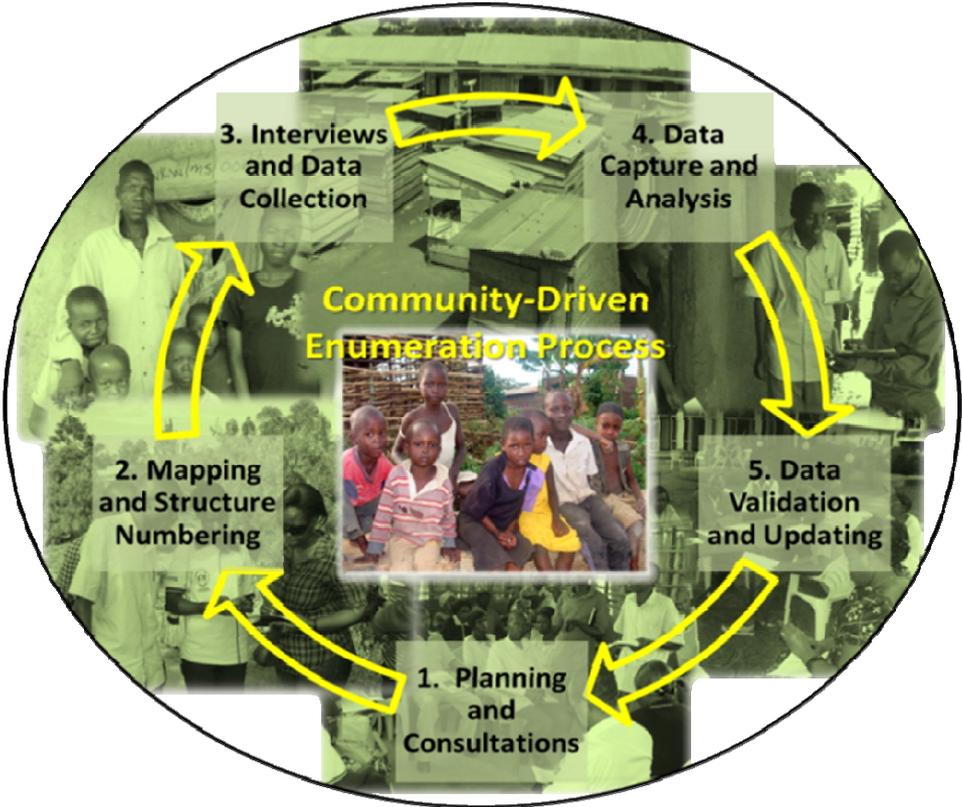
Figure 3 illustrates this process.

Figure 3. Community-driven enumeration process

4.2 Sample data generation and analysis

This part will illustrate some data manipulation, management and analysis within the STDM plug-in as part of Quantum GIS components. There are other features of STDM plug-in but due to limited space of this paper, only several functionalities will be highlighted. For the STDM pilot, satellite imagery was used to produce a settlement map wherein structures, houses, roads, water points, etc. were digitized. From the filled-up questionnaire, the data was entered into MS Excel for further processing. Once the information is entered and validated in Excel, the importing of such data to STDM is almost automatic. The imported data could be seen or checked within the data management window. The data management window (see Figure 4) is also the STDM module for editing, searching, attaching or viewing supporting documents, updating and managing the attribute data.
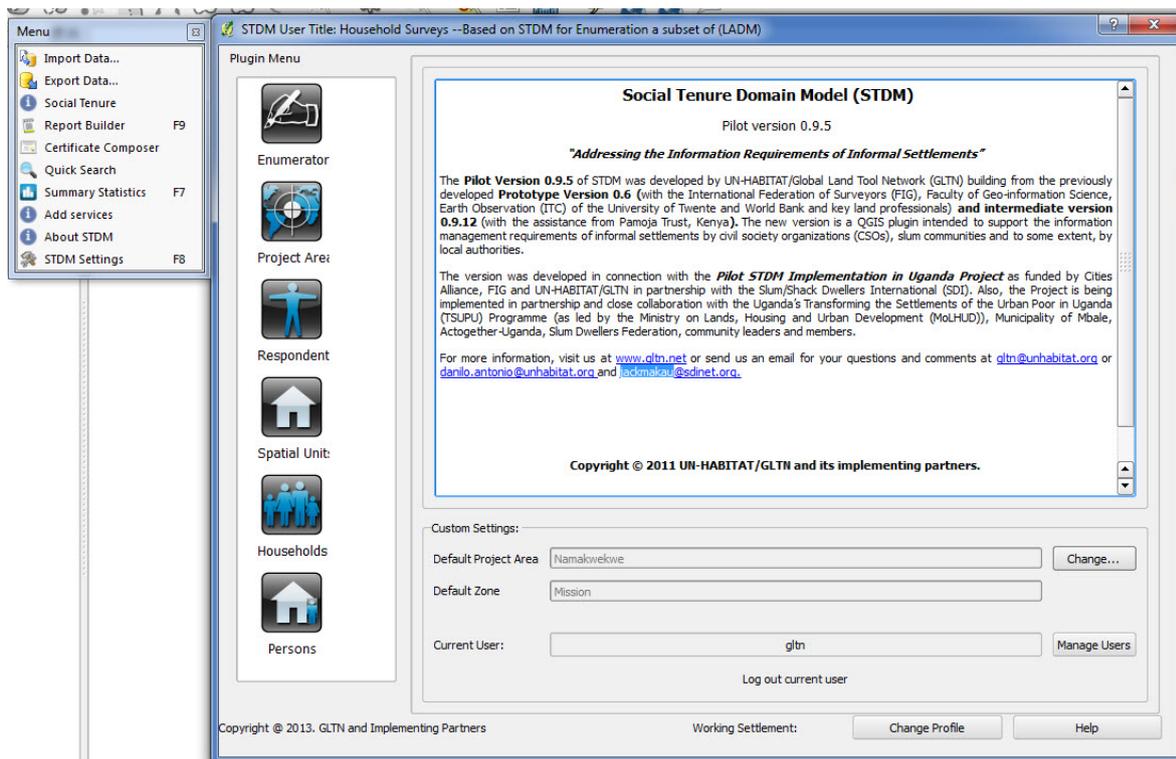

Figure 4. The data management window/module

With the STDM plug-in, almost any type of documents, scanned images and text, photos and videos can be uploaded into the system (see Figure 5 below). These supporting documents could link the parties' (individual, group or household) tenure status to specific spatial unit like structure (as used in the pilot), land and other properties.

Also, one of its main advantages is to have a powerful tool called Report Builder (see Figure 6) which can be used for data analysis and report generation. With this tool, various tenure relationships could be presented including those with overlaps or with disputes. The functionality is easy to use and even non-technical users like managers will find this specific functionality very useful.
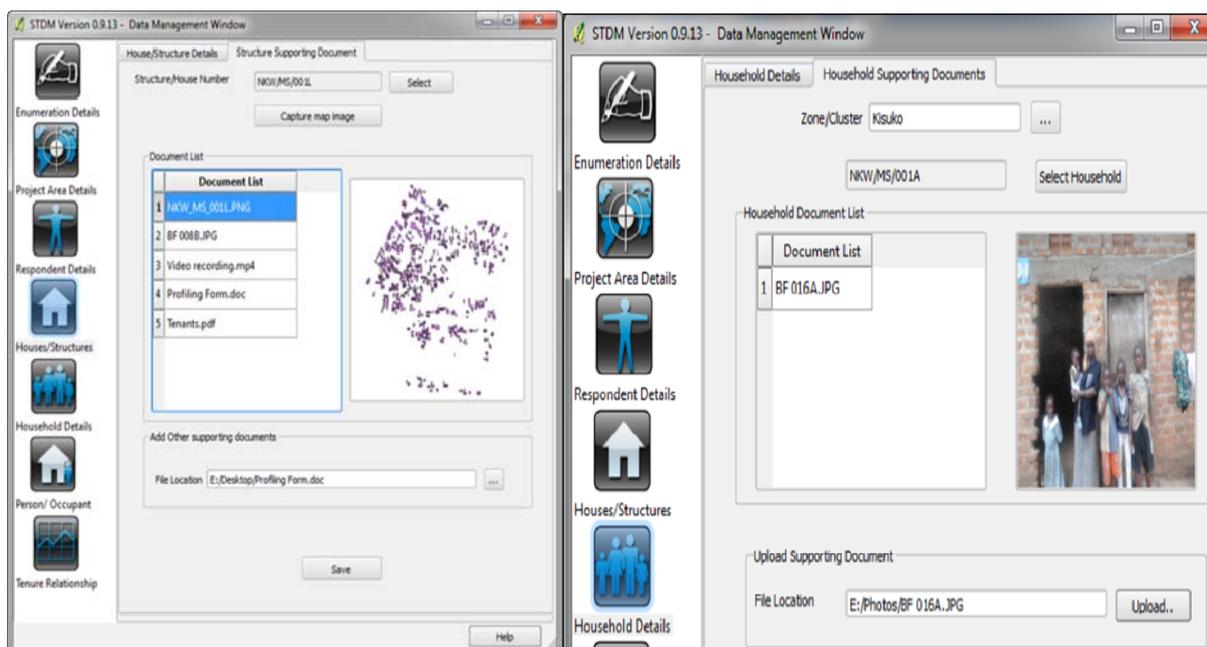
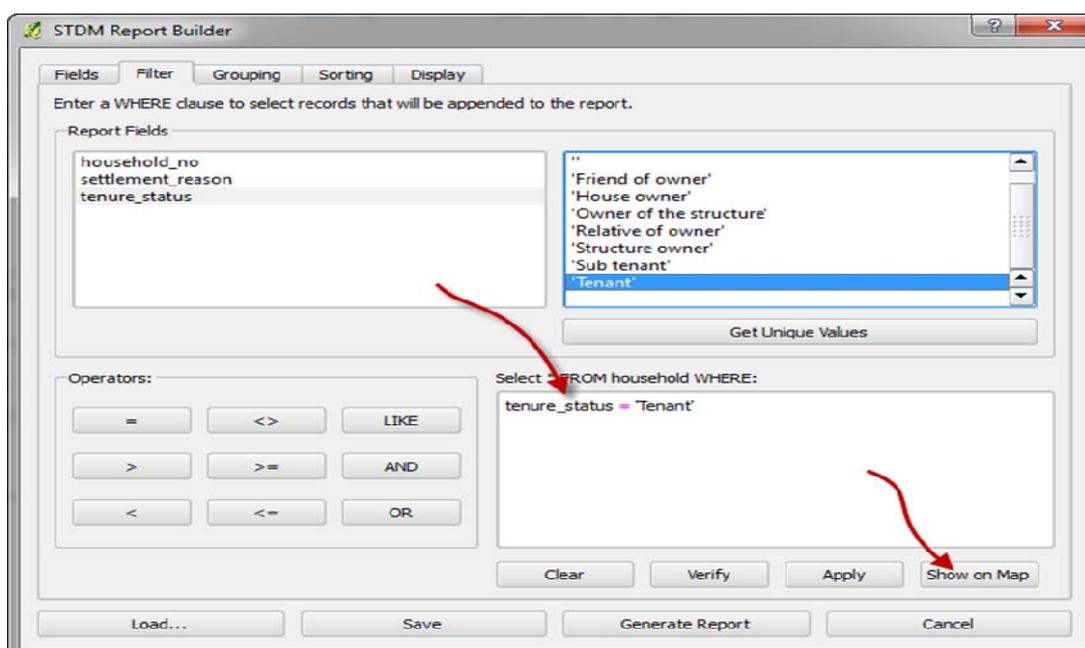**Figure 5. Uploading supporting documents**

Figure 6. Data querying and generating reports

Also, with the report builder, automatic reports can be generated including a table of information and/or a specific map showing the selected or queried data or information. Figure 7 shows this.
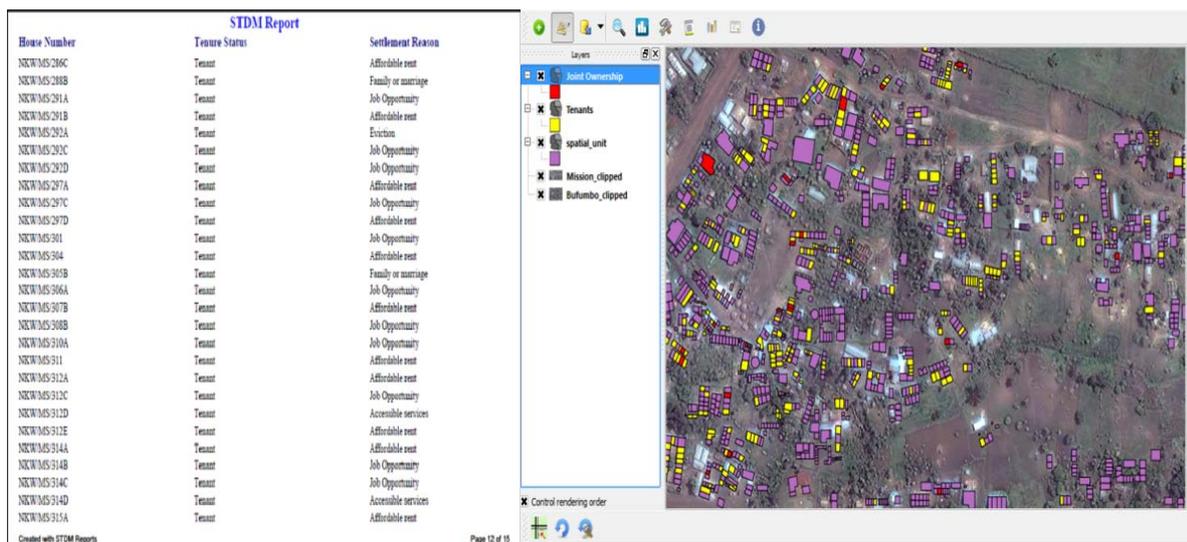
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Figure 7. Producing tabular reports and maps

Also, STDM plug-in can produce a 'certificate' or even a tenure instrument combining the collected data/information and the generated map. As STDM promotes the continuum of land rights, this 'certificate composer' will be of big use once the legal arrangements are in place and once the authorities decided what tenure instrument to provide for poor people. For the pilot area, the communities and authorities have initiated discussions to produce certificates of residency (see Figure 8). While this instrument may not be an instrument for tenure security, the community members find it useful as this will open up more development opportunities for them and they believe that such instrument will give them the first grip onto the tenure ladder.

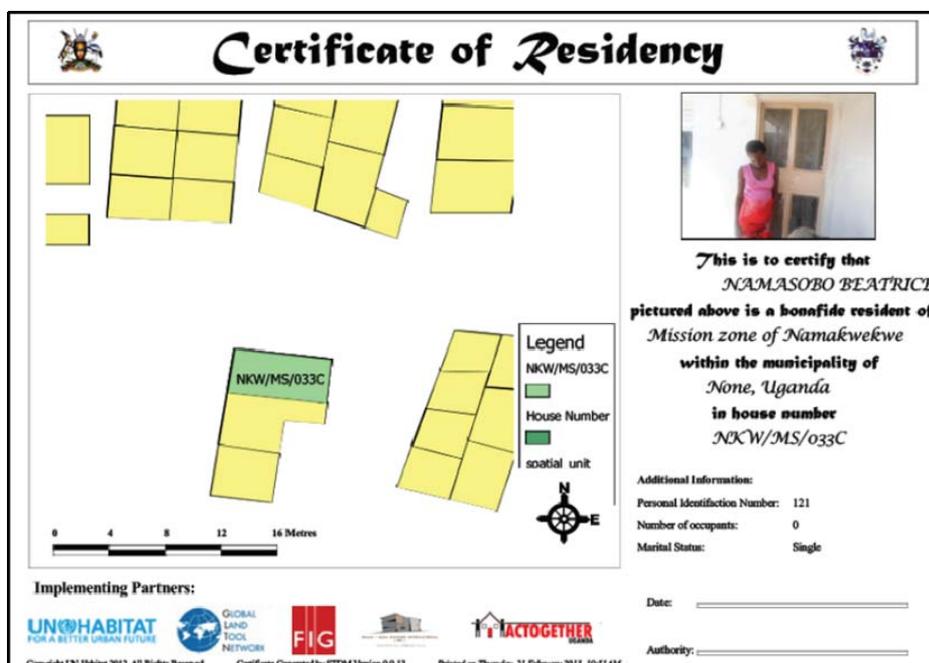**Figure 8. Generating 'certificates'**

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4.3 Initial Impacts, Challenges and Lessons Learned

Most stakeholders including slum dwellers themselves appreciated the added value of STDM in addressing their information requirements. They believed that information is power and that STDM has provided that empowerment. Moreover, some stakeholders including government officials appreciated STDM as a potential tool for much larger urban development objectives. In summary, here are the initial impacts/achievements of the project.

- STDM was tested and proven to be technically sound to address the information requirements of informal settlers as well as government authorities.
- Community members are able to use and interact with STDM system and are confident to continuously manage and update the information.
- Data analysis informed communities' plan to pursue priority projects such as roads, lighting, water and sanitation. Communities are now negotiating with local authorities on possible community development initiatives as informed by collected data using STDM.
- The process provides an opportunity for the authorities and slum communities to initiate the dialogues for inclusive planning, access to basic services and infrastructure and potential tenure security improvement.
- Data generated, for instance the house numbers, will be used as a physical address system which will then enhance slum dwellers' access to other services.
- A regional learning center was established in Kampala, Uganda for capacity development and future requirements of STDM use and application particularly in the region.
- Increasing demand to use and apply STDM for several purposes in various situations.
- International acknowledgement of the STDM pilot experience and international recognition of STDM as a tool to promote tenure security and inclusive urban planning.

However, the pilot project while perceived as highly successful by most stakeholders has faced some challenges too. The key challenges encountered by the pilot project include the following:

- Transition in Management within Actogether. Actogether as an urban NGO has a critical role in coordinating activities at community level in regards to provision of technical training, resource administration and coordination. It is unfortunate that during the data collection stage, a transition of management in Actogether has transpired which influence the over-all coordination. Partners like the Slum Dwellers International and the Ministry of Land, Housing and Urban Development (MoLHUD) have to intervene to resolve the management issue and to prevent further delays and impacts in the project.
- Difficulty in synchronizing timing and interventions of various projects. The pilot project was designed to coincide with the TSUPU programme. However, participatory enumerations work for the target five (5) municipalities were almost completed before the pilot project was able to start. This situation did not offer an ideal situation in choosing the settlements for STDM pilot purposes. Also, interventions from FIG Foundation including the provision of handheld GPS receivers came a lit bit later.
- Some Apprehension in using a new tool as STDM. As expected, there were some apprehensions in using STDM because some staff was used to using other tools in mapping and database management and some staff were concerned about introducing a system like STDM might delay the whole enumeration process. The project partners have to address these issues through a sensitization and capacity development process.

- More time is required for sensitization and training. During the assessment, it is clear that more time should have been allocated in training the enumerators not only in administering the questionnaire but also in sensitizing the community members and local leaders.

There are valuable lessons learned during the project design and implementation. Here are some of these lessons learned:

- The Project is a good model for partnerships. The partnership between the international organizations, national institutions, local authorities and community stakeholders proved to be the 'facilitating' agents of change and innovations. The project is well received because all stakeholders are part of the implementation and existing projects/initiatives were considered in the design and implementation.

- The Social Tenure Domain Model (STDM) was proven to be technically sound, simple to use and can reflect realities on the ground. Stakeholders appreciated the capability of STDM in capturing the information on informal settlements using simple technology and utilizing the existing capacities of community members. Also, slum dwellers including government stakeholders appreciated the capacity of STDM to generate reports and undertake analysis as soon as the data have been captured or entered into the system. Also, as slum dwellers themselves are able to interact with the STDM system, it only proved that the system is simple to use and can be replicated elsewhere.

- A combination of pro-poor land tools and approaches can be effectively implemented. The project implementation has demonstrated that multiple tools and approaches can be used and can complement each other. In this case, the community mobilisation and sensitization approaches by slum federation/SDI, the participatory enumeration process and STDM complement each other and proven to be effective.

- Ownership by the community of the process is critical for success. Building from community network of SDI and slum federation, the Project has demonstrated that a people- centered and community-drive approach is vital to its implementation. The community members are central to the mapping and enumeration process from planning stage up to its implementation and post-implementation activities (i.e. validation of results). In this context that community easily accepted the results as they owned the process and they are the core players during the data collection process (i.e. enumerators also are community members).

- Capacity development is a catalyst for sustainability. The project is clear that one of the most important elements of sustaining the development of a land information system like STDM is about capacitating the users on its use and on data updating and management. Aside from designing the information system in a simple manner for the slum dwellers to be able to comfortably use it, the Project was able to provide enough capacity development with the various stakeholders including government authorities, community leaders and slum federation members through various for a, meetings and orientation/briefings. Similarly, select slum federation members were formally trained to act as STDM operators. The project was also able to establish a Regional Learning Centre for the use and application of STDM. The Centre will serve as the regional training hub for STDM use by other interested slum federations in Uganda and from other countries.

- Pro-poor solutions have huge potential to impact on the lives of the poor. The project has illustrated that a combination of pro-poor and affordable tools plus strategic partnership have a huge potential to impact on the lives of the poor. The results of the engagement of various actors in the project and the information being generated by STDM have strengthened the dialogues and partnership particularly of that of the slum dwellers and government authorities and among the members of the communities. It also showed that the use of information technology, GPS, GIS and land information system is not anymore the monopoly of the experts and professionals and that slum dwellers themselves can benefit from its advantages and use such technologies to articulate their needs and priorities, amongst other things.

5. OPPORTUNITIES FOR SCALING UP AND WAY FORWARD

With the successful implementation of the STDM pilot in Uganda, the demand for its application and implementation has steadily increased including for potential use/application in other situations/contexts like natural resource management, applications in post crisis situations and customary tenure. For example, the pilot project has been scaled up to additional nine (9) municipalities in Uganda in the context of profiling and mapping all informal settlements using STDM. Also, STDM capacity development initiatives have increased (and will continue to increase!) targeting the members of Young Surveyors Network which is affiliated with FIG, countries implementing related projects or programmes on settlements upgrading like Kenya, Burkina Faso, Ghana, Mozambique, Philippines, India, Colombia, Vietnam, Thailand, Nepal and other potential countries in Asia, Latin America and Africa and GLTN partner-organisations undertaking related enumeration and mapping work like Habitat for Humanity International and Huairou Commission.

It is becoming clear that STDM is one significant tool that grassroots organisations can use for advocacy and development objectives like inclusive planning, tenure security improvement and provision of basic services and infrastructure. It is expected that STDM will be implemented in several countries in the immediate future. For example, STDM implementation has already started in Haiti, Kenya and Colombia.

In regards to further development of STDM as an information system, it is envisioned that more partnerships will be forged and mobilised including tapping the support and cooperation of other GLTN partners (i.e. Kadastre), universities and research organisations, developers' community and key individuals. While STDM can be transformed or customised into a functional land information system for cadastre and land registration systems and other conventional approaches, the objective of its development will continue to focus on providing alternative solutions towards bridging the information divide and targeting the information requirements of the urban and rural poor. STDM development is expected to be focusing on addressing affordability issues, scalability, user-friendliness and simplicity, participatory and inclusive process and building from communities' strengths and capacities and good practices.

It has to be noted that STDM is not just an information system or a land tool. It embodies some fundamental principles towards helping the poor and it calls for a paradigm shift in the development thinking towards bridging the information divide and towards recognition of the continuum of land rights approach. It is an innovation, a new way of thinking and perhaps in the future - it will be a new way of doing business in the land sector.

STDM, for now, is a tool for capturing, recording, analysing and generating data or information. And that STDM and the knowledge that it can generate is possible to be in the hands of the poor with little help and support from authorities, NGOs and land professionals. Such information and the related processes can become a powerful tool as catalyst for change towards improving the lives of the poor.

A clear challenge ahead in implementing STDM, as indicated in the pilot experience is how to turn around the mindsets of technical people in various institutions such as in the land ministries, universities and private sector including those land professionals working with civil society groups and local communities, to embrace the concepts behind STDM and start working outside the 'conventions'. For example, it will be difficult to convince an experienced technician to build or manage land information systems using open and free software packages.

The opportunities for further piloting and implementation of STDM in different contexts and countries will surely provide more lessons and experience over time. But at this stage, it is necessary to take into account the above considerations with an intention to document more lessons.

6. CONCLUSIONS

For the last decade, land professionals have been instrumental in coming up with technical solutions to improve land administration and management systems in every country. With the modernisation of the information and communications technologies, such solutions become more powerful, faster, more efficient and relatively cheaper. Nowadays, organised poor communities and their networks are already using advanced technologies and systems with little support from land professionals and they finding them to be a vital tool (UNESCAP/UN-Habitat 2008). Indeed, the use of IT systems, remote sensing technologies (i.e. satellite imagery products), GNSS technologies (i.e. GPS units) and GIS systems to create a land information system is no longer the 'exclusive privilege of the educated elites'.

Social Tenure Domain Model (STDM) offers these related opportunities for land professionals, researchers, grassroots organisations and government authorities. These opportunities include the empowerment of the grassroots communities to develop and manage its own information system (and its own data) with all the benefits of the advanced technologies can offer, with less investment of resources and with less reliance with high paid experts. STDM can build on their strengths and good practices (i.e. enumeration) too. STDM also offers great opportunities for land professionals as they can now extend their services to all, they can now offer people-centred and affordable solutions and they can also contribute to

the further enhancement of STDM framework. With STDM, land professionals can easily promote and communicate their plans, strategies and services to civil society organisations, government authorities and other stakeholder groups. With STDM, it is now possible to bridge the information divide and to serve all members of society and to undertake development interventions such as tenure security for all at scale. Government authorities and decision makers will definitely benefit from its use, recognition and implementation.

By next year, STDM source codes will be published by UN-Habitat/GLTN to openly disseminate more information about STDM and its use and application, allow more interaction with users and potentially to attract more developers for its enhancement and further development. STDM will evolve and will be improved over time with more and more partners. It will further explore other opportunities by implementing in other contexts (e.g. customary areas) and select countries. The consolidated lessons and experience of STDM work in the months ahead will inform its strategy for implementation in the coming years.

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