Social Tenure Domain Model: Towards Addressing the Information Requirements of Informal Settlements

Danilo ANTONIO, Kenya

SUMMARY

Urbanization is unstoppable. Alongside with this development trend is the tremendous challenge brought about by the "mushrooming" of informal settlements inside and around the city proper in a relatively rapid rate that transform city landscapes and set the tone to the emerging new phenomenon – urbanization of poverty.

By 2030, 60% or about 5 billion of world's population will live in urban areas; 78% will be found in less developed regions (UN-DESA 2006, UN-HABITAT 2006). In the recently published State of the World's Cities (2010/2011) by UN-HABITAT, it was highlighted that urban slum population is expected to increase to 1.4 billion by 2020. Such realization has triggered a continuing debate in the global development discourse. As Koffi Annan, the former United Nations Secretary General, rightfully pointed out; "sustainable urban development is one of the most pressing challenges facing the human community in the 21st century" (UN-HABITAT 2001). On another hand, Tibaijuka (2009) asserted that 'there can be no sustainable development without sustainable urbanization.'

In this context that the Global Land Tool Network (GLTN) has been exploring solutions to address the challenges brought by rapid urbanisation, amongst others, through the development of pro-poor and engendered land tools. GLTN, as facilitated by UN-HABITAT, is a global partnership of key international actors (now at 45) who are working together to address land tenure and land reform issues. Since early 2000, GLTN partners have been developing the principles, conceptual designs and the technical aspects of the Social Tenure Domain Model (STDM) – a pro-poor land rights recording system. By August 2010, a peer-reviewed design and a working 'prototype' has been developed in partnership with the Faculty of Geo-Information Science and Earth Observation (ITC) of the University of Twente, International Federation of Surveyors (FIG) and the World Bank.

This paper will provide an update on the enhancement mades on STDM prototype and its further development towards addressing the land information requirements of informal settlements using the available data and 'approach' from an urban NGO in Kenya. It will argue that development of pro-poor land tools like STDM to provide tenure security for all especially for the poor and vulnerable groups is a pre-requisite for good land governance. As a way of conclusion, the paper will confirm that STDM as pro-poor land tool and a new way of thinking, is already operational to bridge the technical gaps in recognising the continuum of land rights particularly those rights held by the poor in the developing countries.

TS07G - Innovative and Pro-poor Land Records and Information System, 5391
Danilo Antonio
Social Tenure Domain Model: Towards Addressing the Information Requirements of Informal Settlements

1/25

Social Tenure Domain Model: Towards Addressing the Information Requirements of Informal Settlements

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1. INTRODUCTION

By 2030, 60% or about 5 billion of world's population will live in urban areas; 78% will be found in less developed regions (UN-DESA 2006, UN-HABITAT 2006). In the recently published State of the World's Cities (2010/2011) by UN-HABITAT, it was highlighted that urban slum population is expected to increase to 1.4 billion by 2020. Such realization has triggered a continuing debate in the global development discourse on a new phenomenon - the urbanization of poverty. As Koffi Annan, the former United Nations Secretary General, rightfully pointed out; "sustainable urban development is one of the most pressing challenges facing the human community in the 21st century" (UN-HABITAT 2001). On another hand, Tibaijuka (2009) asserted that 'there can be no sustainable development without sustainable urbanization.'

UN-HABITAT further stressed that if no decisive action is taken and unless radical efforts are made to deliver affordable land and housing at scale, cities will be hosts to hundreds of millions of new slum dwellers (UN-HABITAT 2003, UN-HABITAT 2009b). 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).

The Global Land Tool Network (GLTN) has been exploring solutions to address the challenges brought by rapid urbanisation, amongst others, through the development of pro-poor and engendered land tools. GLTN, as facilitated by UN-HABITAT, is a global partnership of key international actors (now at 45) who are working together to address land tenure and land reform issues. Central to this urban debate is that most people living in slums do not have registered land rights (Augustinus 2010) and in effect, is excluded from the 'benefits' of urbanisation. Evidence shows, particularly in Asia and Latin America, that as a country becomes more urban, its per capita income also tends to rise (UN-HABITAT 2008a). The urban poor, however, has been excluded from this economic phenomenon as "informal settlements' are not covered by conventional cadastres or formal land administration and information management systems as normally use by government (national and local) authorities to extend public services and infrastructure and undertake development planning and city management. Informal settlements or slums, shantytowns, bidonvilles, asentamientos irregulares, elendsviertel, mudun safi, truchobi, gecekondu, favelas, ghetto, katras, umjondolo, iskwater or by another name - have been defined as lacking one or more of the following five conditions: security of tenure, access to water, access to sanitation, durable

TS07G - Innovative and Pro-poor Land Records and Information System, 5391
Danilo Antonio
Social Tenure Domain Model: Towards Addressing the Information Requirements of Informal Settlements

FIG Working Week 2011
Bridging the Gap between Cultures
Marrakech, Morocco, 18-22 May 2011

2/25

housing quality and sufficient living area (UN-HABITAT 2008a, UN-HABITAT 2006, UN-HABITAT 2003b and Palmer et al 2009).

Various literature 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, improvement of land 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 including slum dwellers are part of the 70% who have no legal, documented and registered land rights. What they have are informal, customary, unwritten, illegal and over-lapping land rights.

In this context that GLTN partners is promoting the concept of continuum of land rights (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 (UN-HABITAT, ibid). 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.
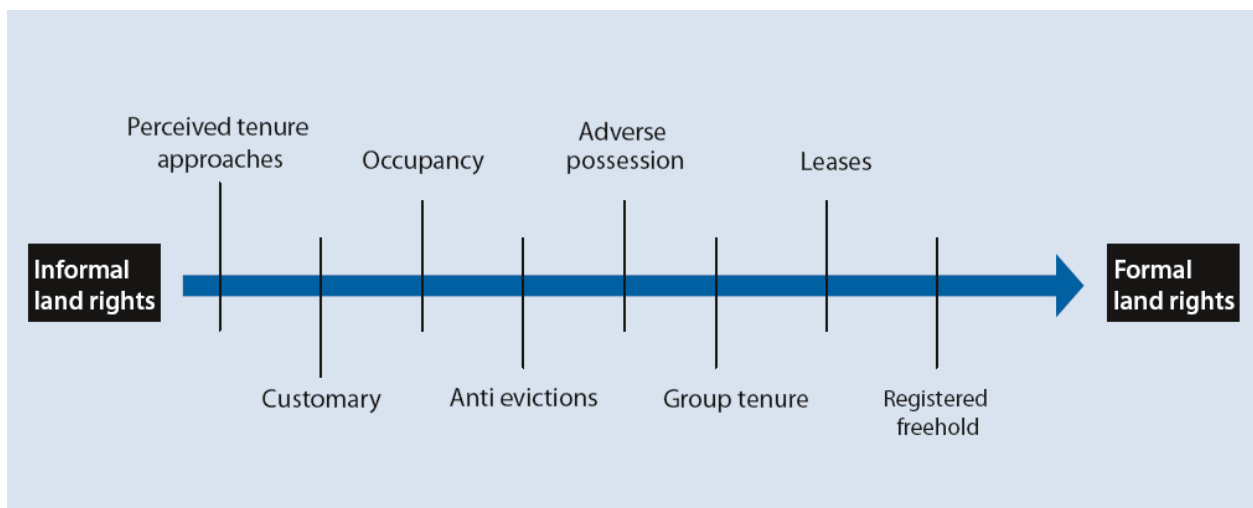

Figure 1. Continuum/range of land rights (UN-HABITAT 2008b).

TS07G - Innovative and Pro-poor Land Records and Information System, 5391   3/25
Danilo Antonio
Social Tenure Domain Model: Towards Addressing the Information Requirements of Informal Settlements

FIG Working Week 2011
Bridging the Gap between Cultures
Marrakech, Morocco, 18-22 May 2011

GLTN partners are motivated to 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. By now, key land stakeholders are aware of the emergence of a technical solution - the Social Tenure Domain Model (STDM). STDM is a more flexible land information system that can handle various types of land rights and social tenure particularly in informal settlements. It is based on a global standard (the Land Administration Domain Model) being promoted by the International Federation of Surveyors (FIG). STDM is a specialization of LADM and through this standardization; data integration is possible (Lemmen 2010 and Enemark 2009).

2. LAND GOVERNANCE AND THE CHALLENGE OF SLUMS

2.1. The Challenge of Slums

The world is becoming urban. Half of humanity now lives in cities and by 2030, 60% or about 5 billion of world's population will live in urban areas; 78% will be found in less developed regions (UN-DESA 2006, UN-HABITAT 2006). In the recently published State of the World's Cities (2010/2011) by UN-HABITAT, it was highlighted that by 2050 urban dwellers will likely to account for 86% of the population in the developed world and 67% in the less developed regions. In simple words, by 2050, it is expected that 7 out of 10 people will be living in urban areas. However, the recent report noted that the urban population growth are actually slowing down particularly in Asia and Latin America but urbanization trend will still continue. What is interesting to note is that between 2005 and 2010, Africa - home for the two-thirds of the least developed countries (LDCs) in the world, experienced the highest urban growth rates in the world – an annual average of 3.3% and it is expected to remain relatively in the next 15 years.

By 2020, world's population living in slums will reach 1.4 billion (UN-HABITAT 2008a). The urban population growth in developing countries is characterized by informality, illegality and unplanned settlements and is, above all, is strongly associated with urban poverty. Urban growth in the poorest countries is almost synonymous with slum growth (UN-HABITAT, ibid). The urban population growth is unprecedented including slum growth in developing countries. But what does this mean in real terms? Augustinus (2010) explained that over the next 25 years, more than 2 billion people will be added to the growing demand for housing, water supply, sanitation and other urban infrastructure and services and by 2030, close to 3 billion people or about 40% of the world's population will require housing and basic infrastructure and services. It was further reported by United Nations (2010) that slum prevalence remains high in sub-Saharan Africa and has increased in conflict-affected countries particularly in Western Asia.

But not all is bad news. United Nations (ibid), reporting on Millennium Development Goals (MDGs) stated that over the past 10 years, the share of the urban population living in slums in developing countries has declined significantly: from 39% in 2000 to 33% in 2010. UN-HABITAT (ibid) further suggested that in 2010, the 'slum target' of improving the lives of at least 100 million slum dwellers has already been achieved. The reason is that the target was

TS07G - Innovative and Pro-poor Land Records and Information System, 5391   4/25
Danilo Antonio
Social Tenure Domain Model: Towards Addressing the Information Requirements of Informal Settlements

FIG Working Week 2011
Bridging the Gap between Cultures
Marrakech, Morocco, 18-22 May 2011

set too low and it only covers about 10% of the global slum population. With this development, United Nations (2010) recommended for a revised target to spur country level actions.

Meanwhile, UN-HABITAT (2003b) has laid down some key recommendations in addressing the challenges brought by slums:

- Urban development policies should more focused on addressing the issue of livelihoods of slum dwellers and urban poverty in general beyond the tradition of housing improvements and provision of physical infrastructure.
- Upscaling and replication of slum upgrading schemes particularly *in-situ* slum upgrading must continue including investing on the provision of infrastructures at a city-wide level.
- Slum policies to be successful must be accompanied by political will and its implementation must be inclusive and participatory.
- Urban policies should be geared towards creating safer cities.
- Slum prevention must also be given attention alongside with slum upgrading initiatives.
- Finally, that security of tenure is more important for many of the urban poor than home ownership, ***as policies based on ownership and large scale granting of individual titles have not always worked*** (emphasis by author).

UN-HABITAT further reiterated its global commitment in addressing unsustainable urbanization particularly on slums through the adoption and implementation of its Medium Term Strategic and Institutional Plan (MTSIP) (UN-HABITAT 2009b). UN-HABITAT, through Focus Area 3 – Access to Land and Housing for All, envisaged *'to help create by 2013 the necessary conditions for concerted international and national efforts to stabilize the growth of slums and to set the stage for the subsequent reduction in and reversal of the number of slum dwellers.'*

2.2. 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.

In the last 5-7 years, the term 'land governance' has been the centre of global research and debates. UN-HABITAT and FAO through Palmer, Fricska and Wehrmann (2009) have proposed a definition: ***'land governance*** *concerns the rules, processes and structures through*

TS07G - Innovative and Pro-poor Land Records and Information System, 5391   5/25
Danilo Antonio
Social Tenure Domain Model: Towards Addressing the Information Requirements of Informal Settlements

FIG Working Week 2011
Bridging the Gap between Cultures
Marrakech, Morocco, 18-22 May 2011

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. In regards to political economy on informal settlements, they posed the following critical questions: *'why do such settlements exist and persist; who benefits, how; what are the costs of informal settlements, and who bears them?*

As discussed above, rapid urbanisation is one of the key challenges in the 21st century. Patel (2007) further reminded us that while only two tasks for urban poor are seemingly linked to MDGs (i.e. targets on slums and water and sanitation), what is being inadvertently missed out is that almost all the MDG targets will increasingly be implemented in urban areas as the world continues to be urban. 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 global delivery of shelter 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, and
– Lack of sufficient pro-poor land tools to assist in the implementation of good land policies. GLTN partners are trying to address this issue but tool development process is not without challenges. Development of pro-poor and innovative land tools requires time and resources before such tools can be used by land stakeholders (e.g. governments, professionals, civil society organisations, academic and training institutions, etc.).

Central to discussion of good land governance is the provision of access to land and security of tenure to all with particular attention on the poorer segments of the society like women and slum dwellers. 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). UNESCAP/UN-HABITAT (2008) puts this in simple words, 'for the urban poor, there is probably no more fundamental problem than their inability to access decent, secure land for even the most minimum housing needs'. However, Antonio (2007) pointed out that provision of security of tenure is a significant

TS07G - Innovative and Pro-poor Land Records and Information System, 5391   6/25
Danilo Antonio
Social Tenure Domain Model: Towards Addressing the Information Requirements of Informal Settlements

FIG Working Week 2011
Bridging the Gap between Cultures
Marrakech, Morocco, 18-22 May 2011

requirement but not the only requirement particularly in curbing urban poverty. He further stressed that the accepted strategy is more diverse where securing tenure occupies a significant part of the whole. UN-HABITAT (1999) appropriately responded to this by saying 'Secure tenure, though one of a set of components that contribute to a successful improvement in the living and working conditions of the urban poor, it is considered to be of central importance because it has catalytic effect'. Security of tenure is the gateway to other processes and opportunities towards poverty reduction and sustainable development. In closing, provision of tenure security to all members of the society is a key manifestation and indicator of good land governance.

2.3. 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 on pasture lands, customary areas 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 an FIG-led standardised Core Cadastral Domain Model (CCDM), now called the Land Administration Domain Model (LADM) (Lemmen et al 2007, Augustinus et al 2006 and Lemmen and van Oosterom, 2006). 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 in August 2010.

TS07G - Innovative and Pro-poor Land Records and Information System, 5391   7/25
Danilo Antonio
Social Tenure Domain Model: Towards Addressing the Information Requirements of Informal Settlements

FIG Working Week 2011
Bridging the Gap between Cultures
Marrakech, Morocco, 18-22 May 2011

Since then, UN-HABITAT/GLTN keeps working on its enhancement and further development in three areas: adding more functionality, improving the user-friendliness of the software and reshaping STDM 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.

3. LAND INFORMATION REQUIREMENTS OF INFORMAL SETTELEMENTS

3.1. Land Information Management – Importance, Approaches and Trends

Since the launch of the dual campaigns: Global Campaign for Secure Tenure and Global Campaign on Urban Governance by UN-HABITAT, global awareness has steadily increased on the need to address the issues related to proliferation of informal settlements in cities and in peri-urban areas as part of promoting inclusive and sustainable cities. Some of the efforts are geared towards initiatives on slum improvement (e.g. upgrading, provision of infrastructure and services, tenure security, etc.) and on slum prevention (e.g. planning, land re-adjustments, rural-urban linkages, etc.). Subsequent UN-HABITAT-led campaigns followed such as the 'housing rights', 'cities without slums', 'right to the city' and recently, the 'World Urban Campaign'. Other efforts are more focused on developing, testing and implementing land information management approaches and tools particularly on informal settlements. This section will attempt to provide an overview of the latter.

Dale and McLaughlin (1988) offered us a clear guidance on the benefits of land information. They emphasised that land information is a prerequisite for making decisions related to land planning, development, investment and management. They further pointed out that land information reduces risks and uncertainties. Twelve years after, land information is still considered a necessity and an asset for informed policy making in the public and private sectors (Williamson et al 2010). It is further reiterated that a well-functioning land information system is one of the most important preconditions to providing land for housing the poor and an essential element for planning (UNESCAP/UN-HABITAT 2008). Meanwhile, Steudler et al (2010) explained that the introduction of information technology (IT) systems can assist good land governance in general and can improve transparency and communities themselves who directly benefits from transparency.

Moreover, FAO (2007) reminded us that the introduction of information technology and communications (ICT) has the potential to contribute to good governance of land administration by improving efficiency, consistency, accountability, transparency and accessibility. Land administration is defined as the 'processes of recording and disseminating information about ownership, value and use of the land and its associated resources (UNECE 2005). However, such definition may not be applicable to other regions particularly in the developing countries. Each country may have different descriptions and components of land administration systems. In general, a land administration system provides a mechanism to properly implement land management policies and strategies of a country. Lemmen (2010)

TS07G - Innovative and Pro-poor Land Records and Information System, 5391   8/25
Danilo Antonio
Social Tenure Domain Model: Towards Addressing the Information Requirements of Informal Settlements

FIG Working Week 2011
Bridging the Gap between Cultures
Marrakech, Morocco, 18-22 May 2011

somehow summarised the above arguments by saying that the provision of land information in all areas and for all citizens will support the country's quest to eradicate poverty.

UN-HABITAT (2004) and UNESCAP/UN-HABITAT (2008) have offered a simple description of a land information system which is often a computer-based systems for organising information about land, including a piece of land's location, size, boundaries, rights and tenure information, as well as its past and current use or possible uses with different degrees of accuracy depending on the purpose. It also warned us also that even the most sophisticated land records and information systems can be manipulated by powerful interest groups and at the end, the poor may be pushed out of the city and will be adversely affected. On another note, it must be emphasized that land information system need not necessarily be computer-based particularly in most parts of Africa where paper-based systems at the local level might be more effective (UNECA 2007). Moreover, within the land governance framework, land information must be freely available and accessible to all members of the society subject to the protection of privacy (FAO 2007).

Deininger and Enemark (2009) put the discussion in context by saying 'no development will take place without having a spatial dimension'. Land information management plays a critical role even in city-wide management including slum improvement initiatives. As emphasised by Uitermark et al (2010), to address the world's challenges nowadays including those issues related to rapid urbanization, environment, access to land and access to food and water resources, there is a need to get a complete overview of who is living where, under what tenure conditions and in what location. Moreover, UN-HABITAT (2004) encouraged governments and stakeholders to adopt a pro poor land management system which means making the poor visible and legal citizens of the country, enabling the settlements where they live to be included in the city planning and developing accessible and affordable standards and procedures for improving tenure security, building houses and providing services. It further suggested a range of innovative approaches which include local and inclusive land registers, simplified recording, better public access and building the capacities of civil society organisations. FIG/UN-HABITAT (2002) clearly illustrates the issues that need to be addressed in an attempt to develop a city-wide approach on land information management but also provided a list of good practices for reference. One of the key recommendations is the choice of an appropriate technology which should be easy to use and should facilitate interactions and interoperability among the various information systems and key stakeholders. As Payne, Durand-Lasserve and Rakodi (2009) further pointed out that pro-poor regularisation of informal settlements needs a combination of a system of good governance and innovative technical solutions that support the existing contributions by the urban poor to local and national development.

UN-HABITAT (2004) suggested that as an alternative for cadastre and formal land registration systems, the local systems can be developed as they are seen to be more effective, simpler to maintain and are more transparent, low-cost and accountable. Fourie (2001) added that emphasis should be on the generation of more appropriate forms of spatial information for the regularisation and/or upgrading of informal settlements rather than on the production of a few accurate cadastral parcels. Van der Molen (2003) supported these

TS07G - Innovative and Pro-poor Land Records and Information System, 5391   9/25
Danilo Antonio
Social Tenure Domain Model: Towards Addressing the Information Requirements of Informal Settlements

FIG Working Week 2011
Bridging the Gap between Cultures
Marrakech, Morocco, 18-22 May 2011

arguments and said '…it would appear to be preferable to implement simple systems that can evolve into more complex systems over the course of the years'. He further suggested the following incremental approach:

- develop a long-term scenario specifying the land-policy tools ultimately to be supported by the land administration system
- assign priorities: in which sequence should tools be provided with support.
- decide on the minimum contents of the registers and maps
- design simple processes, and accept imperfections
- design systems which are scalable
- develop a migration path for the evolution towards the intended long-term use of the system
- anticipate ICT resources that can be introduced in the course of the years
- avoid accurate surveys of boundaries whenever possible during the initial phase
- avoid intensive investigations for the guarantee of titles, and
- accept the imperfections inherent in the recording of transfer documents (deeds).

Efforts on developing records and land information management systems are benefiting from the advances from the spatial, information and communications technology including the development of entirely new model and approaches (Williamson et al 2010). This is particularly true with the introduction of satellite images for cadastral and planning applications; use of mobile phones for data capture, data sharing and mapping; access to internet applications including the free access to a wealth of high resolution maps (e.g. Google Maps); use of hand-held GPS for mapping and faster computers. An example of this is the use of satellite imagery where the present resolution is good enough to be used for various purposes including on adjudication of land rights. Lemmen et al (2009) is quick to say that the idea to use satellite imagery for cadastral application is not new and they proceeded in providing some examples. The use of mobile phones for data capture, mapping and Geographic Information Systems (GIS) applications is now becoming a normal practice too. For instance, Google Map is extending their free services to the public. Now, you can now mark and drop coordinates (latitude and longitude) to your chosen map or area.

Moreover, the use of handheld Global Positioning System (GPS) receivers for GIS and mapping applications are now becoming popular for non-technical users and community organisations. For example, GLTN is currently working with the Society for Promotion of Area Resource Centres (SPARC) in India, an affiliate of Slum Dwellers International (SDI) on participatory mapping for city-wide slum upgrading in one of the municipalities. In this project, NGO leaders and community members are taking the lead in mapping the slum boundaries using handheld GPS receivers and processing them digitally with the use of Google Earth. On the other hand, Steudler et al (2010) has provided us a good overview of the current uses and applications of free (libre) and open source GIS packages, afforded us some risks and constraints and has described to us the opportunities and potential of using them. They further pointed out that the license costs of proprietary software often created serious constraints and even stopped programmes and that open-source applications are more flexible to meet the needs of the local conditions and the poor in general.

TS07G - Innovative and Pro-poor Land Records and Information System, 5391   10/25
Danilo Antonio
Social Tenure Domain Model: Towards Addressing the Information Requirements of Informal Settlements

FIG Working Week 2011
Bridging the Gap between Cultures
Marrakech, Morocco, 18-22 May 2011

Indeed, the use of IT systems, satellite imagery, hand-held GPS and GIS systems to create a land information system is no longer the 'exclusive privilege of the educated elites'. Organised poor communities and their networks are already learning to use these high-tech land information approaches and finding them to be a vital tool (UNESCAP/UN-HABITAT 2008).

3.2. Participatory Enumerations – An Entry Point for STDM

The trends and development in the land information management as a key response to the challenges brought about by the urbanisation of poverty and the challenges on slums hinted us to go back to the 'basics'. To go back to the basics means engagement to the lowest level of land management foundations by working with the poor communities and investigate what are their issues and how they are addressing or trying to address such challenges. In the same spirit that GLTN and various partners spend a week together on September-October 2009 to write a book called 'Count me in – surveying for tenure security and urban land management'. The book is about 'participatory enumerations', its purpose, applications and experiences from different countries and its potential for addressing issues related to land management and administration particularly in the urban areas. **'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). It is an innovative approach where the people who are being enumerated are involved in the inception, design, management and implementation, data analysis and use of the data. These new ways of data gathering in settlements which was first developed by NGOs and community organisations have been called by other names, including *community mapping*, *people's census* and *self-surveys*, to name a few.

Why **participatory** enumerations? UN-HABITAT (ibid) offered some responses below to this question:

- − Participation can provide transparency and build trust in the exercise
- − Once accepted, the local residents can easily cooperate and will provide the information required thus resulting to improved data gathering and better data.
- − Participation also means self-empowerment. Residents can initiate, retain control of the process and 'owned' the process.

The data on informal settlements are needed for a wide range of purposes: to enable the residents to demand their rights as citizens, to improve land tenure, to plan for the provision of infrastructure and services, to redevelop/upgrade the slums, to guide housing improvement, land allocation and adjudication and to use in land administration and information systems (UN-HABITAT, ibid).

Moreover, women have a critical role in participatory enumerations. For example, Huairou Commission, another GLTN partner, reported that enumerations (or community mapping) allows grassroots women to assess and record the community's needs and assets and to come

TS07G - Innovative and Pro-poor Land Records and Information System, 5391   11/25
Danilo Antonio
Social Tenure Domain Model: Towards Addressing the Information Requirements of Informal Settlements

FIG Working Week 2011
Bridging the Gap between Cultures
Marrakech, Morocco, 18-22 May 2011

up with solutions to the issues they are facing (Huairou Commission, 2007). Another example, which is considered one of the earliest, is that of India's experience on 'people's census' which helped prevent evictions and demolitions and become a powerful statement for the recognition of the rights of thousands of pavement dwellers (SPARC/PRIA, 1985). In Kenya, a closer review of the impacts of enumerations was done in Kisumu in 2008 where positive results were reported including the knowledge generation on the need for improving tenure security and providing service delivery in the area, the positive change on attitudes and relationship between house structure owners and tenants and the exercise led to other issue-based community mobilisation like formation of savings groups and addressing the issues related to vulnerable widows (Huchzermeyer 2008).

'Count me in' offered various case studies at different countries and situations and described to some extent the existing and emerging methods and approaches in details. As noted, one of the reasons that participatory enumerations is such an attractive and potentially effective tool is because of its nature – it is flexible and can be adapted to different needs and contexts. It is such an attractive tool that aside from NGOs and community organisations, others such as development projects or international bodies (such as UN-HABITAT), national and local authorities, research/academic institutions and various network and partnerships have been initiating and implementing participatory enumerations (UN-HABITAT, 2010).

There is no single methodology or procedure followed in participatory enumerations and its design and implementation will depend on many factors including its purpose, the capacity of the implementing organisation and residents, the resources available and the specific situations and contexts. However, UN-HABITAT (ibid) offered some building blocks of a participatory enumerations process by building on the existing experiences particularly that of the processes and 'rituals' of the Shack/Slum Dwellers International (SDI):

- Decision to undertake the enumerations
- Building of trust and laying the foundation for participation between the parties
- Planning and establishing who will do what
- Finding resources
- Putting together and training an implementation team
- Informing and mobilising the community
- Gathering secondary information
- Designing enumeration instruments and procedures
- Obtaining materials and equipment
- Conducting the enumerations
- Capturing the data
- Verifying the data
- Analysis
- Reporting
- Using the information
- Storing and accessing the information
- Updating the information

TS07G - Innovative and Pro-poor Land Records and Information System, 5391   12/25
Danilo Antonio
Social Tenure Domain Model: Towards Addressing the Information Requirements of Informal Settlements

FIG Working Week 2011
Bridging the Gap between Cultures
Marrakech, Morocco, 18-22 May 2011

GLTN supports participatory enumerations and sees an opportunity on this process particularly on improving tenure security of the slum dwellers. The implementation of STDM fits the co-management approaches inherent of participatory enumerations process and STDM can viably complement its huge potential applications towards inclusive planning, slum improvement and land information management initiatives.

4. THE STDM INTERMEDIATE VERSION – ADDRESSING THE INFORMATION REQUIREMENTS OF INFORMAL SETTLEMENTS

4.1. Development of STDM Intermediate Version – An Introduction

Building on the STDM prototype, GLTN has further developed STDM towards improving its user-friendliness and to support land information management within the informal settlement context. During the development and testing of an updated version, GLTN has utilized the data sets collected from informal settlements by Pamoja Trust, an Urban NGO in Kenya. Pamoja Trust is collecting data from slums particularly in Kisumu, Kenya using participatory enumerations to seek better access to land, shelter, basic services and infrastructure. They have been collecting an enormous data on informal settlements and GLTN, for testing purposes, has decided to only incorporate those data that pertains to land tenure and other related information.

The intermediate version of STDM is primarily composed of the following free and open source software packages: PostgresSQL 8.4, PostGIS 1.5, Quantum GIS (QGIS 1.5) – replacing ILWIS which was used for the prototype version and a custom-made QGIS plugin. To reiterate, the intermediate version is still based on the core STDM model where 'people – land' relationships can be described as persons (or parties) having social tenure relationships to a certain spatial unit/s. *Parties* could mean tribes, people, cooperatives, organisations or governments; *social tenure relationships* could include formal, informal, customary and overlapping rights and *spatial units* could be represented as a sketch, point, line, polygon or text-based spatial description (Lemmen 2010).

Building upon the previously developed prototype version, below is an overview of the key additional features of the intermediate version:

− Transformed the STDM prototype into an updated version by replacing ILWIS by QGIS (as a front-end), by introducing STDM database as a QGIS plugin and by reconstructing the primary and foreign keys in the original PostgreSQL/PostGIS STDM database to respond to the land information requirements of informal settlements.

− Redeveloped the STDM's attribute data entry modules and enhances its user-friendliness as guided by the questionnaire and information requirements from Pamoja Trust.

TS07G - Innovative and Pro-poor Land Records and Information System, 5391   13/25
Danilo Antonio
Social Tenure Domain Model: Towards Addressing the Information Requirements of Informal Settlements

FIG Working Week 2011
Bridging the Gap between Cultures
Marrakech, Morocco, 18-22 May 2011

- Tested and refined the intermediate version by doing the following: entering or importing data sets including attribute and spatial data; deciding the minimum tables required for informal settlements' requirements and for testing purposes, manipulating, testing and analyzing data sets in a single PC and in a LAN environment; exploring the use of the other available QGIS plugins, other GIS functionalities and database management options; and exploring and generating possible outputs as per users' needs.

- Developed a faster installer package (a single .exe file). The installation process could take about 30-50 minutes depending on the speed of the computer with limited interaction from the user during the installation process (e.g. entering a password as required by PostgreSQL). When using STDM for the first time, there is also a need to perform initial configuration to activate the STDM plugin in QGIS, setting up the database connection properties and assigning a project area.

- Developed quick guides for users and database administrators.

4.2. Using STDM Intermediate Version – Approaches, Sample Processes and Possible Outputs

Building on the work of Pamoja Trust in Kisumu, Kenya, this section will summarize the key steps in building a land information system applicable for informal settlements using the intermediate version. In doing so, it will also demonstrate some of the key features and functionalities of the STDM intermediate version.

4.2.1. Data Collection

There are two types of information being collected – the *attribute data* (or textual information) which is based on data collected through a questionnaire and the *spatial data* which is normally a base map showing the entire area of the informal settlements.

For the attribute data, normally NGOs like Pamoja Trust are using questionnaire to collect information about the informal settlements (settlement profiling) and the informal settlers (household profiling). What normally happens is that members of the NGO and representatives from informal settlements are conducting the field surveys using the sets of questionnaire. Once ready, the data collected are encoded in a spreadsheet (e.g. MS Excel, OpenOffice, etc.). The data from the spreadsheet can directly be imported to the STDM database using different techniques. During the testing, it was found out, however, that OpenOffice has more advantages and much easier to use as it allows direct manipulation of PostgreSQL database using a native SDBC driver and it enables appending of spreadsheet data into an existing PostgreSQL table rather than creating a new one and most importantly, OpenOffice is another free and open source software package. Of course, direct entry to STDM data entry modules including attaching photos, scanned documents and maps is also possible, see Figure 2.

TS07G - Innovative and Pro-poor Land Records and Information System, 5391
Danilo Antonio
Social Tenure Domain Model: Towards Addressing the Information Requirements of Informal Settlements

14/25

FIG Working Week 2011
Bridging the Gap between Cultures
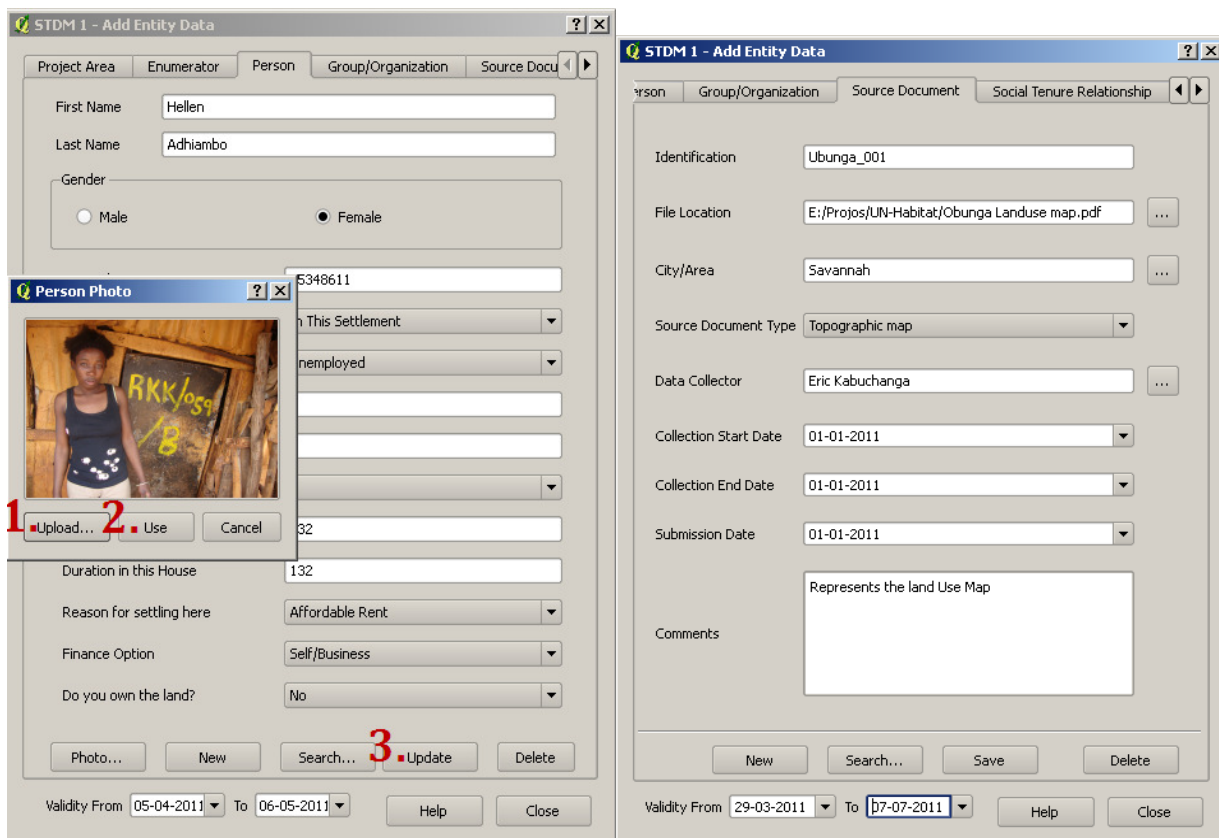Marrakech, Morocco, 18-22 May 2011

Figure 2. Data entry and uploading of images and documents.

For the spatial data, an NGO usually starts creating a base map using any available paper-based map which needs to be digitized for inclusion into STDM, or by accessing an available map from internet sources (e.g. Google map) and if budget allows, procuring a high resolution satellite image. These maps once in digital form can be easily imported to STDM. There is a need to geo-reference the map using QGIS Georefencer plugin if not yet georeferenced. One of the advantages of the intermediate version is that QGIS is its front-end which means that anyone can access and can use the available QGIS plugins and other functionalities anytime. The next step is to do on-screen digitizing of the housing structures and any other visible land features using the spatial unit manager of STDM to create shape (vector) files. This will define the spatial component of STDM database. To reiterate, *spatial unit*, doesn't have to be polygon-based. For example, in Figure 3, housing structures can be represented by a point or by a line too. The housing structure on the map will be used on the ground and each structure will be uniquely numbered accordingly.

4.2.2.   Determining the Social Tenure Relationship

Once the attribute and spatial data has been entered into STDM particularly the information on persons (parties) and spatial unit id (the housing structure number), the social tenure relationship can now be determined. Since the data on both persons (parties) and spatial unit

id have already been saved in the STDM database, what we need to do is to search them accordingly and identify the relationship.
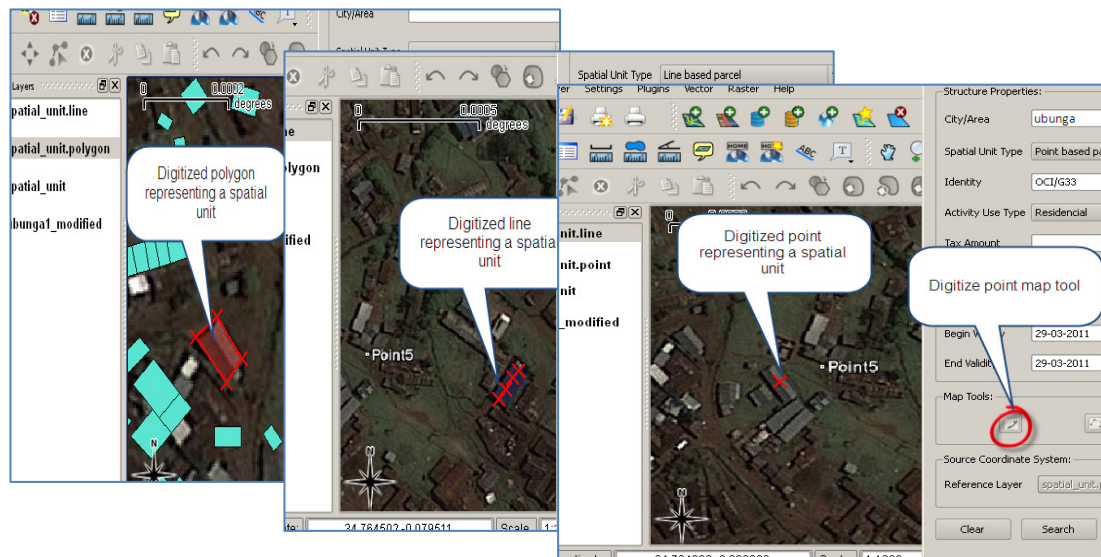

Figure 3. On-screen digitising.

STDM database also includes a table on source documents wherein any scanned documents, images and maps can be uploaded. This also strengthens the social tenure relationship. For example, a rent contract can be uploaded to show the relationship of a person being a tenant to the house structure. Another example is uploading a map showing the house structure with the house structure id (number) to show the location of the 'claim' and its relationship to other structures within the informal settlement. At a glance, Figure 4 shows these possibilities.
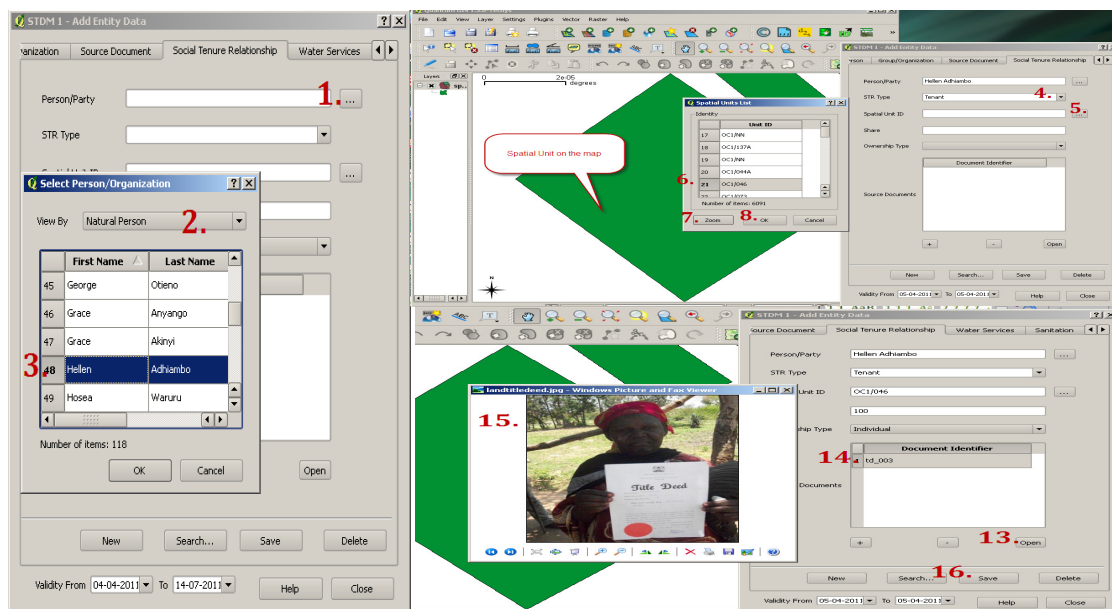

Figure 4. Determining social tenure relationship.

TS07G - Innovative and Pro-poor Land Records and Information System, 5391   16/25
Danilo Antonio
Social Tenure Domain Model: Towards Addressing the Information Requirements of Informal Settlements

FIG Working Week 2011
Bridging the Gap between Cultures
Marrakech, Morocco, 18-22 May 2011

4.2.3. Data Analysis and Generating Outputs

Once the data have been entered and uploaded to STDM, the various data elements are integrated and can easily be manipulated and analyzed using PostgresSQL/PostGIS and/or QGIS functionalities. Please take note that STDM database can be extended to include information on water, sanitaton, open spaces and people's livelihoods, to name a few. Through PostgresSQL/PostGIS, the spatial and attribute data can be manipulated and analyzed including combining databases or tables and a customized tabular outputs or presentation can be generated. Likewise, QGIS offers various GIS functionalities including spatial analysis and display of the data. In fact, advanced spatial analysis and modeling can be done using the various functionalities available in QGIS. As in ordinary GIS applications, one can view, edit, analyze, display and manipulate spatial information through the application of spatial overlay techniques, choosing any variations on symbology and properties and other techniques. User guides and manuals for all the components of the STDM intermediate version (i.e. QGIS, PostgresSQL and PostGIS) are easily accessible from the web.

One of the features of QGIS is a *map composer* wherein spatial and attribute data can be displayed, customised and can be printed accordingly. The features of map composer in QGIS are able to bring in select area of the map, put an image, generate textual information like map titles, put a north arrow and a scale bar, prepare a template for future use, put a table with select attribute informaton and other useful things. Some example outputs that can be generated are shown in Figure 5.
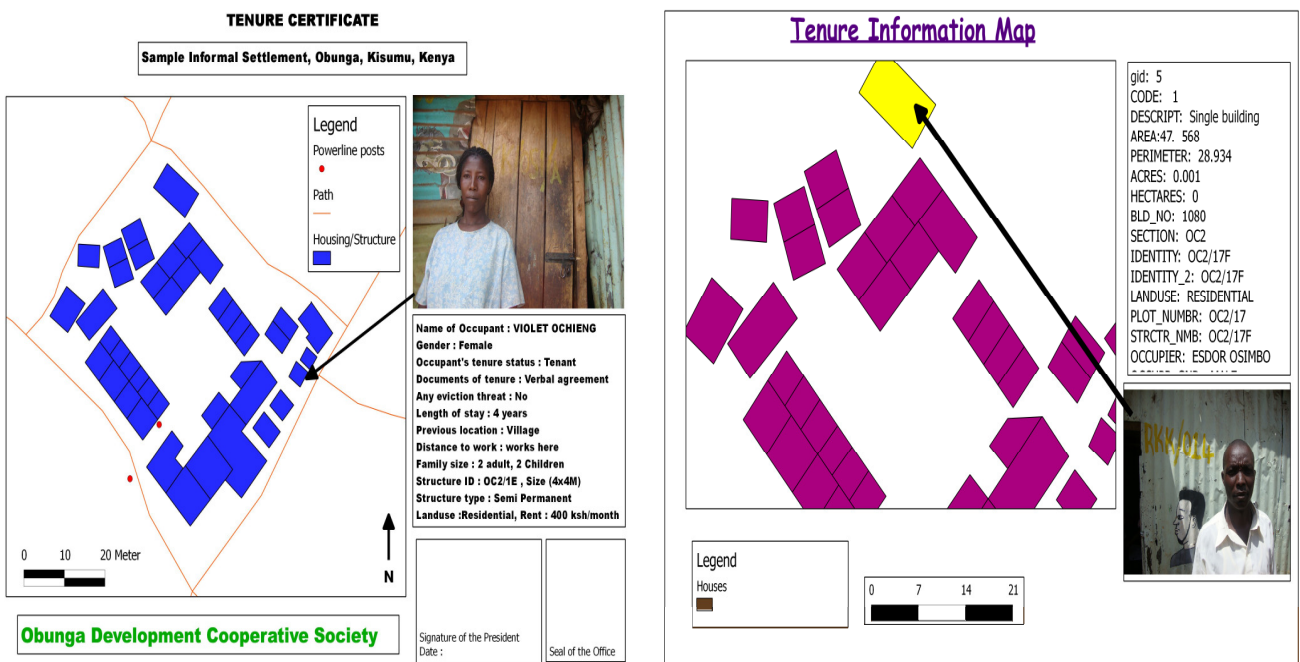

Figure 5. Examples of outputs that can be generated using STDM.

TS07G - Innovative and Pro-poor Land Records and Information System, 5391
Danilo Antonio
Social Tenure Domain Model: Towards Addressing the Information Requirements of Informal Settlements

17/25

FIG Working Week 2011
Bridging the Gap between Cultures
Marrakech, Morocco, 18-22 May 2011

5. KEY CONSIDERATIONS

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. 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. In adopting and implementing STDM, some issues as well as strategies need to be considered. Some of these factors for consideration were already provided to us by Zevenbergen and Haile (2010), other considerations were learned from the development of the SDTM intermediate version and some useful experiences and lessons learned came from the review of literature.

Zevenbergen and Haile (ibid) rightfully pointed out that implementing STDM will require the right mindset at all levels, such as:

- Acceptance by the country that more social tenure relations exist than statutory land rights.
- Acceptance by the relevant land agencies and private practitioners of dealing with the concepts of STDM including establishing a mechanism for data gathering of a range of rights held by the poor (continuum of land rights).
- Acceptance of the STDM concepts and its benefits by land stakeholders particularly by the poor themselves.
- Acceptance of the fact that implementing STDM, a land rights recording tool, will require investments on resources to procure the needed equipment, to build capacity and to some extent depending on the level of scale, to recruit land administration experts.
- Acceptance of the data generated by the communities through STDM. It is not 'automatic' that the data will be accepted by government authorities or by the courts for presenting 'evidences'.
- Acceptance that capturing the data is not an end in itself, it has to be updated on a periodic basis. In most cases, the updating part will be more difficult and costly as compared to building the initial database.

We can also learn something from participatory enumeration process. For STDM implementation to be successful, the engagement of local residents and stakeholders from the design to implementation phase is extremely important to get buy-in and ownership. It is them that will maintain the system, update the data and sustain the initiative. UN-HABITAT (2004) further suggested identifying relevant local tools and methods as part of the initial stages. I will even add to identify relevant land-related skills available in the community and any public forums or venues used by the community by which STDM implementation can be discussed.

Another consideration is the amount of data for collection using STDM. There is always a tendency that the 'initiators' of the data gathering process tends to collect more data more than

TS07G - Innovative and Pro-poor Land Records and Information System, 5391   18/25
Danilo Antonio
Social Tenure Domain Model: Towards Addressing the Information Requirements of Informal Settlements

FIG Working Week 2011
Bridging the Gap between Cultures
Marrakech, Morocco, 18-22 May 2011

what they really need, what they initially planned and what they can afford. There is also a tendency to implement data gathering process in 'one go' for different uses and purposes without considering costs, timing and the existing level of capacity. STDM is flexible enough to build a land information system in an incremental approach.

Lessons from existing GLTN grassroots' project in India revealed that it is best to implement the data collection process in an incremental and phased approach. The project is convinced that conducting a detailed household survey is not necessary for the purpose of developing a top-level city-wide development plan. They chose to do first an informal settlement profiling including the generation of maps showing the boundaries of the slums for the whole city. However, the local government insisted that the data gathered is not enough for the development of a city-wide strategy which includes slum improvement interventions. I agree with the grassroots organisation on this as they consider cost and timing. To emphasise their point, conducting household-level surveys on a city-wide scale will only be completed in several years which means the data will become obsolete and cannot use anymore for planning purposes (SPARC, 2011).

Equally important is data sharing. It has been a culture among technical people from government institutions to NGOs up to community level that the acquired data are not freely shared even if the data may actually be used for other development purposes and may actually benefit a similar organisation or community. On a personal account, for example, a government official is making it difficult for the government's largest slum-upgrading project to have access to available high resolution remote sensing data. The capital city of the country is fully covered by this satellite image which could be of big help to the project implementation. *Did I say that the official is a manager of the same project?*

One of the key considerations in implementing STDM is to recognise the role of land professionals in the process. As Lemmen (2010) described, surveyors as land professionals are needed to support in the management of this type of data acquisition of 'people – land' relationships particularly pointing out that surveyors understand that accuracy of surveys and maps should be based on its use and purpose. Augustinus (2010) further argued that STDM will provide an option for land administrators and professionals to deliver services to all citizens and thus increasing their market share. A clear challenge ahead in implementing STDM is how to turn around the mindsets of technical people in various institutions including those 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 manage land information systems using open and free software GIS/LIS packages.

The opportunities for further piloting and implementation of STDM in different contexts 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 during its field implementation.

TS07G - Innovative and Pro-poor Land Records and Information System, 5391   19/25
Danilo Antonio
Social Tenure Domain Model: Towards Addressing the Information Requirements of Informal Settlements

FIG Working Week 2011
Bridging the Gap between Cultures
Marrakech, Morocco, 18-22 May 2011

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 are becoming more powerful, faster, more efficient and relatively cheaper. But land professionals do not remain as purely technical people and are continuously evolving with time. A new breed of land professionals are emerging. I will call them the *'reformed'* professionals. These are the professionals who are looking at the 'whole' situation and not just focusing on isolated cases, who are exploring the 'out of the box' thinking rather than staying in their comfort zones, who are searching for solutions for the majority of the people and not just producing products for the few, who are 'engaged' in shaping the future and not just a mere 'observer' and finally, those who are championing the genuine 'cause' to achieve sustainable development and poverty eradication.

STDM is now available and ready for implementation. It will need to further explore other piloting opportunities in other contexts (e.g. customary areas). Further improvements and refinements will still be identified as it is being implemented in the field and as advances in technology continue to offer more opportunities for enhancements. STDM will evolve and will improve over time. It is good to know that most land professionals, if not all, welcome its development with enthusiasm. The development of the Social Tenure Domain Model (STDM) offers a solution as well as an opportunity. It is land governance tool that will bridge the technical gaps to allow the poor to be recognised as citizens and enjoy the benefits attached to it. STDM is an opportunity to be able to serve all the members of society and to undertake land interventions at scale. Such solutions and opportunities will soon bring pride to the ranks of land professionals who were able to assist in the STDM development, who are continuously supporting it, and who will be able to internalise its concepts and who will start offering STDM as an alternative pro-poor land tool. Soon, there would be more 'reformed' land professionals.

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TS07G - Innovative and Pro-poor Land Records and Information System, 5391   20/25
Danilo Antonio
Social Tenure Domain Model: Towards Addressing the Information Requirements of Informal Settlements

FIG Working Week 2011
Bridging the Gap between Cultures
Marrakech, Morocco, 18-22 May 2011

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TS07G - Innovative and Pro-poor Land Records and Information System, 5391   21/25
Danilo Antonio
Social Tenure Domain Model: Towards Addressing the Information Requirements of Informal Settlements

FIG Working Week 2011
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Marrakech, Morocco, 18-22 May 2011

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Danilo Antonio
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FIG Working Week 2011
Bridging the Gap between Cultures
Marrakech, Morocco, 18-22 May 2011

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Danilo Antonio
Social Tenure Domain Model: Towards Addressing the Information Requirements of Informal Settlements

FIG Working Week 2011
Bridging the Gap between Cultures
Marrakech, Morocco, 18-22 May 2011

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Danilo Antonio
Social Tenure Domain Model: Towards Addressing the Information Requirements of Informal Settlements

FIG Working Week 2011
Bridging the Gap between Cultures
Marrakech, Morocco, 18-22 May 2011

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BIOGRAPHICAL NOTES

Danilo Antonio is a Programme Officer at Land, Tenure and Property Administration Section (LTPAS) ofUN-HABITAT. Among his other functions, he is the current task manager of STDM and the over-all coordinator of the Global Land Tool Network (GLTN) - a global partnership of key international actors working together to address land tenure and land reform issues mainly through the development of pro-poor and gender responsive land tools (more information at www.gltn.net). He has completed his Master of Science on Land Management and Land Tenure with *'High Distinction'* at Technische Universitaet Muenchen, Germany. His thesis, *'Intermediate Land Tenure Instruments for the Urban Poor: Concepts and Realities - The Case of Land Proclamations in the Philippines'* was awarded *'Best Thesis'* by the Masters' Programme of the University in 2007. As a public servant for 15 years, he has been a key driver of change and reform of the Philippines' land tenure, administration and management system particularly through his previous senior positions to the World Bank-AusAID assisted Land Administration and Management Program (LAMP). He has been a trainer and a lecturer at the Geodetic Engineering Department of FEATI University, Philippines. Also, he has contributed to land sector reforms in the Philippines in the areas of professional development, training and capacity building, institutional development and change management.

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Danilo Antonio
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