Institutional Aspects of Implementing Inclusive Land Information Systems like STDM

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SUMMARY

During the past decade work has been done on the development of a pro-poor land information management software tool dubbed STDM (Social tenure domain model). STDM has the capacity to broaden the scope of land administration by providing an innovative land information management framework that integrates formal, informal, and customary land tenure systems and administrative and spatial components through tools that facilitate recording all forms of land rights, all types of rights holders and all kinds of land and property objects / spatial units regardless of the level of formality.

With the early focus of STDM being on the technical dimension, it is now time to look into the other issues that go with the introduction and implementation of such a tool. It entails additional effort related to assessing the implementation environment and developing strategies and plans to address institutional, policy, legal and capacity development issues. The need for this was pointed out already during the STDM workshop 'From concept to implementation' in March 2009 in Washington DC, as well as in some of the FIG coordinated reviews of the STDM.

This paper details the key issues that need consideration, including an analysis of the readiness for computerization at regional and district level, as well as the human capacity needs at those government levels, as well as at the village level.

It will further highlight the effects of recording (as an inventory in STDM) of rights outside of the formal (statutory) land tenure system in case of different legal and policy frameworks (esp. with and without formal recognition).

Finally it will describe the different roles land professionals have to play to get STDM introduced and then implemented for the different types of information. For instance during a participatory mapping like approach related to identification of spatial units in satellite imagery, the ´cadastral surveyor´ will have to perform the role of facilitator much more than that of a technological expert.

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1. INTRODUCTION

The Social Tenure Domain Model (STDM) is a pro-poor land administration tool. It covers land administration in a broad sense including administrative and spatial components. Conventional land administration systems relate names (or addresses) of persons to land parcels via rights. In the STDM, an alternative option for this is to relate personal identifiers such as photographs or fingerprints to a coordinate point inside the land in use by that person, via a social tenure relationship. Depending on the local conditions, there can be a variety of social tenure relationship types and other rights. The STDM thus provides an extensible basis for an efficient and effective system of land rights recording.

Now that the prototype of STDM is operational, and the first field test (in rural land administration in Amhara, Ethiopia) has been completed (August 2009), it is time to look into the other issues that go with implementing such a tool. Remarks that this was needed were already made during the STDM workshop 'From concept to implementation' in March 2009 in Washington DC, as well as in some of the FIG coordinated reviews of the STDM (Enemark 2009). This was picked up parallel to the field test, and unlike what the above observations suggest, this is the right time to do so, and it is not overdue. One cannot think of 'implementation details' up until a product is in sight. The development of STDM as a tool is a step by step approach, which started long before the term was even used. On the land tenure side this is the concept of the continuum of rights, acknowledging that there are many more social-tenure relations than statutory land rights, and on the land administration side this is the core domain modeling, integrating the legal-administrative registries and geospatial index mapping into one 'Land Administration Domain Model '.

The recent focus has been on proving this concept by the actual development of the software tool, going from conceptual, functional and technical design to actual source coding. The prototype is ready and is showing promise that the original concepts can indeed be implemented into a technical (ICT) tool. The next step now is to ensure that the tool can also really be used to fulfill its objectives, which include increasing tenure security for all land holders (not only the elite and middle class, but also the poor).

In addition to general knowledge, from literature and earlier experience, we base our findings on the recent experiences and current developments with regard to (rural) land administration in Ethiopia, especially in the Amhara region. For this a mission was undertaken from 22-29 August 2009 which overlapped with the second half of the field test of the STDM prototype. During the mission four interviews with stakeholders at the national level in Addis Ababa and six with regional stakeholders in Bahir Dar were held, mainly with land sector agencies, but also with other agencies implementing ICT at lower government levels, including the generic

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IT department. A short visit was made to a district land office about an hour drive North of Bahir Dar, to see the ongoing computerization of records of the first certification and have discussions with people involved in the exercise. Preliminary results were presented as part of the Workshop to Communicate the Findings of the Social Tenure Domain Modeling STDM on 28 August. Information collected during earlier missions in September 2005 and July 2008 and from the power points from a workshop in Bahir Dar in May 2009 (CIM Workshop 2009) was also applied.

In this paper we will describe why STDM is needed in addition to conventional land administration systems, who needs what mindset to implement STDM, what role information in STDM plays, how data to fill STDM can be gathered, as well as the consequences of STDM being an ICT based tool, its relation to land administration in general and the capacity needs. We end with a short conclusion.

The results of the assessment of these issues, with a focus on IT and capacity needs, that are included in the field report (Zevenbergen 2010), will not be discussed separately in this paper.

2. LAND ADMINISTRATOIN SYSTEMS AND THE NEED FOR STDM

Land administration is about managing land and information about land. It is about the tenure, use and value of the land, respectively supporting tenure security (ranging from protection against eviction all the way up to supporting an active land market probably under freehold tenure), land use planning and monitoring, and land and property taxation. Land administration deals with the humankind to land relationships, which vary according to the different circumstances, influenced by e.g. cultures, legal systems, geographic circumstances and economic and political power balances.

The term land administration is relatively new and encompasses elements like land registration, boundary surveying, cadastres and land records. These terms put the emphasis on the formal sector, and mainly include institutional and technical arrangements that were designed in Western, market driven countries, where successfully implemented land administration systems (LAS) are found. In most of the developing countries these systems have also been introduced, but with rather limited coverage and impact. Most countries are only partly covered by LAS (for Sub Saharan Africa this is usually estimated as below 10 %), and the LAS only serves a part of the society (the elite and perhaps the urban middle classes). Other segments of society are not benefiting from LAS and regularly the LAS even threatens their land tenure arrangements. These threats are especially strong for extra-legal tenure arrangements, like customary or traditional tenure arrangements in countries where these are not explicitly recognized by law (constitution, acts or the courts), and for those in informal settlements. Even though the areas covered by the conventional system usually generate a more than average part of the (formal) GDP, the other areas are vital for the livelihood of much of the population.

Furthermore LAS tend to be tailored for a 'straightforward' land tenure system, with a few rather 'strong' rights like ownership, freehold, leasehold and mortgages, and not for more complex sets of secondary rights (like access to fruits, passage, right of return, share cropping, renting). This type of rights is often unregistered in LAS, and 'forgotten' during titling. This type of rights serve more than average the poorer part of the society, and regularly find their

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roots in customary or informal arrangements. Secondary right holders may find tenure security within extra-legal areas, but usually lack tenure security in more formal situations. Clearly there are risks during formalization for such rights, since changes in the meaning of tenure arrangements are usually a consequence of formalization, and often lead to the extinguishing of secondary rights.

STDM on the other hand, describes the relationship between people and land whereby it strives to record all forms of land rights, social tenure relationships and overlapping claims or rights over land (Augustinus e.a. 2007). STDM is designed to support land rights recording in areas where regular or formal registration of land rights is not the rule. That is, STDM makes it possible to record rights, which are not necessary registered rights, nor registerable, as well as claims, that need to be adjudicated both in terms of the 'who', the 'where' and the 'what' type. The focus is on recorded rights (or social tenure relationships) and not only registered rights. This means recording any land rights; personal land use rights as well as real rights. STDM handles the impreciseness and possible ambiguity of the description of the rights, both in terms of 'who', 'what' and 'where'. STDM, therefore, records not only registered, but also the range of rights in the continuum simultaneously; e.g. there can be, apart from formal rights: non-formal and in-formal rights, customary types, indigenous rights, tenancy, and possession. Financially, STDM records options such as group loans and micro credit. Similarly, STDM records the types of person ('who', e.g.: a group with non-defined membership, a group of groups, natural persons, companies, municipalities, co-operatives, married couples, ministries, etc.). STDM also records a range of spatial units ('where', e.g. a piece of land which can be represented as a single point – inside a polygon, one point – street axes, a set of lines, as a polygon with low or high accuracy coordinates, as a 3D volume, etc.).

3. MINDSETS NEEDED FOR IMPLEMETING STDM

To successfully implement STDM, the right mindset needs to be in place at a number of levels.
1) The fact that more social tenure relations exist than statutory land rights, has to be accepted in the country, especially at the political and higher administrative levels. This is best expressed by inclusion in the (national) land policy, and might be backed up by provisions in the Constitution and/or land related legislation.
2) The relevant land agencies and involved private practitioners need to be willing to adapt their ways of working to allow for dealing with the concepts of STDM as compared to the 'conventional land administration' approach, including recognition of a range of rights and mechanisms to gather the date on these rights.
3) Realization of these concepts and their benefits to poor by many stakeholders, especially the poor themselves, who are not used to profiting from land administration tools.
4) Organizational capacity to implement STDM, in human capacity, equipment and materials at the relevant government levels. Expertise is needed both in land administration and in ICT for each office where the STDM software is implemented. The dilemma between community access and the scale needed for ICT support needs to be solved in an appropriate manner. Appropriate here may, depending on the scale

of operations and availability of resources (finance, expertise, etc), refer to support through mobile teams, instituting a small ITC unit, up to reverting digital data after data gathering into a local paper based system (with some kind of reporting mechanism).

5) Impact of the information contained in STDM with the public administration and courts, in the way that the information is taken into consideration and influences the decisions made with regards to land. This will not be easy when strict 'evidentiary' rules exist, compared to allowing (and weighing) all information as 'free evidence' (see also par. 4).

6) Awareness and a culture of updating; for the social tenure holders the realization that they should report changes in their social tenure relations and for the administrative system supporting STDM that they process reported changes and keep the requirements for reporting simple enough to remain accessible for all, including the poor.

4. ROLE AND MEANING OF INFORMATION FROM STDM

Information, better called data at its prime level, as a matter of principle cannot be trusted at face value. With regard to technical data like the geospatial position determined through for example surveying, this notion is dealt with via adding so called meta data (data about data), specifying the level of data accuracy, when and how it is generated, etcetera to the data set. For attributes dealing with social phenomena, like social tenure relations, this relates to the process used to gather the data, and the status of the organization/people involved. This has a practical side, do we trust the information we see (and thus the process and organization behind it) and a formal side, is the information somehow authenticated because for example a licensed person gathered the data according to the prescribed procedures within his or her legal mandate.

In practice, the meaning of information and its trustworthiness stems from the nature of institutions, the "rules of the game". Society has created institutional arrangements, including organizations to support them, which its members can trust. In a democratically constituted government, these reflect some form of popular will. Licensed persons who are trained and managed via these institutions collect and manage information. And because of these the average person trusts the information that they avail.

With regard to land rights, one can see a range of consequences of (legally) registering a right:
1. mere information stating who claims what rights and where
2. registered right takes priority over non-registered right
3. protection of third parties
4. registered right assumed to be correct
5. registered right guaranteed (with indemnification)

Without detailing this difference here, deeds registration relates to numbers 2 and 3, whereas registration of titles relates to numbers 4 and 5, with Torrens titling (to be found for statutory land rights in e.g. East-Africa) relates to number 5.

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The consequences within a certain land administration system follow from the legal system (legislation and court decisions). Even at the highest level of consequences the data as such can be factually wrong, for example, due to mistakes, manipulation or lack of updating. Normally the strictness of procedures and qualifications needed to perform different tasks on the dataset are higher when the consequences are far reaching. Unfortunately much of the conventional land administration systems in developing countries legally provide for the highest consequences, but are challenged with regard to delivering the needed procedures and qualified staff at scale, and often at all. The costs involved are usually high and both human and material capacity are limited.

Put another way, many LAS in developing countries are based on a legal framework that subscribes to highest surveying accuracy standards. The reality of these countries is such that these standards are often unattainable for lack of resources and trained personnel to generate and manage these dataset. The net effect of this approach is that LAS end up serving a minority that should, by the virtue of being powerful, deserve and/ or can afford such a service. The majority of the population remains outside the system with the effect that its property rights are exposed to the whims of vested interests and the powerful political elite.

When STDM as a tool is introduced without any legal backing it starts at the lowest level of consequences for all the social tenure relations which are not already covered by the statutory system. Even for land rights under the statutory system it depends on the exact wording of the law (especially with regard to computerization) whether such data has a higher level of authentication then the rest (in some countries still only paper records can be authentic). Of course in practice the reliability of the data is influenced by the way the procedures are designed, executed and monitored, the people involved and the way they operate, the participation of the social tenure holders and the level of trust it starts to build up. This could grow step by step, and then it depends on public administration and courts whether they are starting to take this information into account when making decisions (at least at the level of 'free evidence'). Especially in post-conflict (and disaster) areas, there is a practice of defining alternative hierarchies of evidence for instance to deal with past injustices and to support restitution to returnees. In a truly pro-poor environment this would also hold for customary and informal areas to protect the ones really on the land and using it, against those who hold some 'absentee' registered land right over it (which might have been acquired through manipulation of the system or via a grant under an incorrect assumption of being empty state land).

The advantage of STDM without much legal consequences is that data gathering can be quick. The data is then available to everybody. A buyer could for instance combine his local knowledge with the data and decide to buy a property. This prevents freezing the land market until the government and courts have settled all claims. An example is the claims register currently being setup in Timor Leste. This advantage is the largest in post conflict or post disaster areas where unclarity is the rule and the gathering of data is already a big step.

The fact that information is available, even without immediate legal consequences, usually influences the 'playing field' as can be seen for example from the effect of enumerations on

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slum dwellers when they are under threat of eviction. Of course this effect increases when experience is showing that the information is reliable and represents de facto social tenure relations whose existence as a matter of principle is acknowledged at least by the land policy or constitutional provisions or another legal framework where broad policy directions are set out . But even when the land policy (or even law) acknowledges social tenure relations which are totally undocumented, these relations continue to be under threat, since it is hard to prove them and others might try to acquire registered rights over the same land.

From a legal perspective information on unregistered social tenure relations that has been documented through STDM could be considered to be part of the information a prudent land purchaser or acquirer should have checked (caveat emptor) to be considered of good faith (which he needs for certain protections under systems with consequences 1 through 4) or even as overriding interests that still can be found under consequences 5.

All in all there is an advantage of having unregistered social tenure relations documented in STDM together with registered rights, showing the full de facto tenure situation on a map. The legal consequences of registration of rights differ between countries, but STDM will not directly change that for the newly documented relations. The information will nevertheless start to have some impact, the magnitude depending on the land policy and law context at hand. If the STDM approach manages to start being trusted, this impact is certainly going to grow step by step.
Clear procedures and actors with the required skills are highly recommended when introducing STDM and gathering data, since this will help to build the trust on both sides. If land registries and cadastral agencies that provide cadastral information and the people who provide rights such as land lawyers and surveyors are pushing the system then it is more likely to succeed.
Guidelines describing what needs to be covered should be developed to complement the software as such.

5. DATA GATHERING FOR STDM

To really make an impact any land administration system needs to cover a more or less comprehensive area as complete as possible. This is easiest realized when data is gathered in a systematic area-wide sweep. In titling projects this is often referred to as adjudication, a process aiming at ascertaining which rights are attached to which piece of land (and solving any competing claims and other disputes). Although there is a lot of experience with titling, the processes tend to be expensive, usually slow and rather legalistic and carry some of the risks mentioned in par. 2 in relation to secondary rights and poorer parts of society. Although community involvement is part of most procedures, the experts in surveying and land rights tend to dominate the operations.

The STDM tool, however, is very appropriate for a participatory data gathering which needs to be organized at community level (the sizes of these communities will differ between places and contexts). Mobile support teams to take care of the ICT and other expert tasks can go around assisting communities in doing this. Care should be taken that the community keeps

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feeling STDM is supplying them with the documentation of *their* social tenure relations for their own benefit on the one hand, and on the other hand that the procedures used are transparent, fair and equitable to start building trust for the data entered into STDM, both by the community and by the formal public sector and courts. Depending on the mutual trust between those two and the wider land policy and law context this can be quite hard to do. Lessons from different approaches in enumerations on the one hand and in adjudication for statutory land registration on the other hand should be studied. In any case the data collected should always be put up for inspection with the opportunity of objections to be considered by an appropriate dispute resolution mechanism. Even when data does not get a legal, authenticated meaning, it is very important that everybody feels it has been fairly done and under certain circumstances usable. Areal imagery, increasingly even high resolution satellite images, can be a base that establishes a geometric index for overlapping land rights, and be understandable and participatory for grass roots people (see e.g. Lemmen e.a. 2009). Right now such imagery is however still expensive to acquire. The first version of the STDM prototype allows for such imagery to be the base of data entry, but does not focus on mass entry.

Once the data is collected an appropriate level of computerized updating needs to be established. Presently areas with low ICT penetration and limited land transactions (through market and non-market means) might be better of with updating on a paper system created from printing the results of the (mobile) STDM supported data gathering. The system should be kept close to the people (often within the community) to build trust and receive update information, with the possibility to combine data at higher levels for specific needs. This is easy to set up when everything is computerized and networks work well, otherwise this needs close attention, and the added value needs to be balanced against the costs.

6. STDM – AN ICT BASED LAND ADMINISTATION TOOL

Although STDM is in the first place a concept that allows the documentation of a wide variety of social tenure relations, the developed tool is computer based. Reasons for this include integration of different (overlapping) tenure relations in one place and on a common graphical index (map), better backup facilities, easier data management especially for updating, and extensive possibilities of (re)use of the data in other processes. Also the more innovative and participatory 'surveying technologies' like satellite imagery only get their full potential when used in a digital environment.

STDM is designed as open source software relying as much as possible on other open source packages (except for the MS operating systems) keeping licensing fees to a minimum. Hardware costs are constantly dropping with increased performance becoming available. Nevertheless several ICT related challenges can still be found in parts of the developing world.
Electricity coverage in developing world is expanding, but there are still frequent disruptions which create operational risks or call for investments in UPS and diesel power generators. Network connections are also still an issue. Not only do these depend on continuous electricity as well, the extension and bandwidth are still limited though growing. To fully

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profit from the backup and data sharing possibilities networks are needed, and the bandwidth needed for digital maps is much more than for attribute data.

Computer viruses are a constant threat to all ICT based activities but in the developed world under control through constantly updated virus scanners. These updates need to be pushed constantly to all sensitive equipment and thus depend on licenses and networks to do so, which are a big issue in e.g. Africa. This was reiterated by an article on guardian.co.uk called 'Computer viruses slow African expansion; Hampered by pirated software and super-slow download times, computer users in Africa are finding PC viruses hard to eradicate'.

STDM as an ICT based land tool requires that the people going to work with it must have basic ICT literacy. The level of literacy needed depends on the function a person has in relation to STDM. Those that look up data (and perhaps print extracts from it) need less advanced literacy than those entering data, whereby those loading complete satellite images need more than those just changing names of social tenure holders.

Although ICT literacy is increasing everywhere, those with these skills are hard to hire at government salaries, and when trained internally might leave for other opportunities. STDM furthermore, especially since it involves a server-client structure, requires support by more specialized ICT-experts. Although this support might not necessarily be a full time position for every office running STDM, the monitoring should be regular and response time to problems should be quick, since loss of the data would be very bad for many reasons, not the least for the confidence and trust in the system. The problem of attracting and keeping this type of staff is presently even stronger than for the general ICT literate staff. Care should be taken that land administration is more or less in line with the level of computerization of the whole government sector at different levels. This makes it more easy to share ICT-experts, setup training, network connections, backup facilities and retain staff.

ICT also needs a continuous cycle of replacing and upgrading hard- and software, which costs money and needs expertise to deal with. This becomes a clear risk when a digital system is set up via a (separately funded) project, whereas the later costs should be borne by the normal budgets, which does not always appear to be sustainable.

For more and more areas computerization at district level becomes realistic, but more remote areas might still be faced by too many challenges. Investments to computerize land administration should be balanced against level of land market activity and ICT-penetration in other government offices in those places. Land administration should not go its own route, but linkup with the wider ICT and/or E-government strategies.

7. STDM – A PART OF LAND ADMINISTRATION

Even though STDM has emerged to counter the lack of effects or even negative impact to the poor by conventional land administration systems, it is highly desirable that STDM is seen as a component of land administration. In many countries land administration as such is still weak, and different functions as land registration, surveying and mapping and valuation are performed by different agencies with different types of experts. Land administration calls for close cooperation, if not integration, of these functions, and needs experts with broad,

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interdisciplinary knowledge to take the bulk of the work at the local level (some disciplinary specialists are likely to be needed at higher levels).

STDM can, certainly in the beginning, be limited to areas largely outside the conventional land administration system. Especially areas where tenure security is at immediate risk, like a slum whose area is considered for (formal) development or customary areas open for (large) investments via natural resource concessions or commercial farming. Land rights already registered in the conventional system should be shown also in STDM, although overlaps are conceptually possible. Sometimes land acquired by the government, but not yet converted to a new use, is still considered for instance community land by the people, and such a 'double' claim should be visible in STDM. Depending on the (technical) quality of the records in the conventional land administration system, and its level of computerization, the STDM software could also be used to make this into a digital land registration system. For now, this is however, not the first aim and priority of STDM. To really work, this would also call for other changes like streamlining procedures and organizational structures. As many land registration projects show, such changes are not easy realized, and run the risk of power play by the vested interests. In the short to medium run STDM as a pro poor land tool should focus on areas with little to no registered rights. Conversion or even integration with the conventional land administration system will be one of the later steps in the step by step approach.

8. CAPACITY NEEDS

The needs in land administration capacity are complex. Not every STDM operator needs to have a bachelors, let alone a masters, degree in land administration. Focused training at practical level is needed for those. Such training should not be one off (supported) activity but calls for a permanent program to supply new people every year, as well as provide additional training for those already working in the field.
Capacity at bachelors and masters level is also needed, partly for training the practical staff, for management and supervisory functions, for the most complex cases and for further development of the system, procedures, norms etc.
Short term staff capacity has to be built through short, tailored training, but at the same time people should be sent to larger programs (abroad and/or to (re)established national programs). These programs need to be innovative in the sense that they emphasize the thinking underpinning equitable land administration system. Incentives should be made available to retain staff trained in such a manner.

Vested professional interests are a potential threat to introducing STDM even though it aims primarily at groups not presently served by the professionals. An open mind is needed at all levels, with the professors at universities, the private practitioners, land agency staff, politicians, registered land rights owners and other social tenure holders.

Only recently educational programs aiming at an interdisciplinary land administrator have emerged in a few places in the world, combing, legal, geo-ICT and economic knowledge. In other cases existing programs, esp. in land surveying, have shifted focus, sometimes in the direction of land administration ('cadastral surveyor'), but sometimes also into the direction

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geo-ICT for any application (geo(infor)matics). Not every country needs to have all types of education available at Masters level, assuming there is ample opportunity for cooperation and student exchange.

Better qualified staff is hard to get and retain, and often not interested in working in the more remote areas. This calls for systems that are not overly strict in formal requirements, but get their trust from participation and transparency instead. STDM is clearly tailored to handle such an approach.

9. CONCLUSIONS

STDM as a pro poor land tool is just one piece of the larger puzzle that needs to be put in place to reach land policy goals like increased tenure security for all. The tool is needed to overcome the problem that conventional land administration systems only serve part of society (the elite holding statutory land rights). Of course the tool's impact will depend heavily on the awareness and acceptance of the underlying concepts by all stakeholders, including the poor being targeted.

STDM as a means to document unregistered social tenure relations differs from conventional land registration in that the information is not always authenticated by law. Using clear procedures and skilled staff during data gathering and updating of STDM will help to increase the weight of the information within public administration and courts, but no guarantees can be given for this.

Although the concepts of STDM are universal, the tool is being developed in a computerized way. This has many advantages, but also challenges the human and material capacity at community level in more remote areas. A fallback option with computerized data gathering by mobile teams and paper based updating at community level is likely to be needed in quite some areas for the years ahead.

STDM aims to be an integral part of land administration, and thus has to bridge community acceptance with acceptance by the different types of experts in the conventional land administration system. This also calls for changes in the mentality and training of those experts.

Community level updating does not require high levels of specific expertise, but needs a broad, interdisciplinary knowledge of 'land'. Quick training is needed at the start of setting up STDM, but ongoing training facilities at different levels are needed to make the system sustainable. At the Masters level specific programs can be shared between countries.

This paper, and the report it has been based on (Zevenbergen 2010), are only a first step in describing the institutional aspects related to STDM. More follow up will be needed, including the composition of guidelines for implementation and example mechanisms for data gathering, updating and data use.

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BIOGRAPHICAL NOTES

Jaap Zevenbergen has recently become a professor in land administration systems at ITC, now a faculty of the University of Twente in the Netherlands, after working many years at the Delft University of Technology. He combines a legal and surveying background and has focused on cadastre and land registration for many years in research, teaching and consultancy work. During the last few years he has contributed to the ongoing work by the World Bank and UN-HABITAT to develop pro-poor land tools.

Solomon Haile was in the Ethiopian public service between 1987 and 2001. As a public servant, he has gained enormous experience in development planning (including physical planning) as well as in international development cooperation. Before leaving his government job, he was Head of the Amhara State Planning and Economic Development Bureau.

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Solomon holds MSc in Geo-informtaics from International Institute for Aerospace Survey and Earth Science (ITC) and PhD in land management from Vienna University of Natural Resources and Applied Life Sciences. His research work has focused on land use planning as well as tools and process of innolvatiive land rights demarcation. Currently, he works for GLTN as training officer based at Training and Capacity Building Branch (TCBB) of UN-HABITAT.

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