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Are Local Registers the Solution?

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Abstract

This paper explores the possibility of using local registers to manage and update land rights. Secure land rights are largely taken for granted in the developed world. Yet for many people in developing nations, clear and enforceable land rights are not a reality. In the developed world, land rights are almost always recorded in secure registers, but this is often not the case elsewhere. It is estimated that as many as 90 percent of the world's poorest people enjoy neither security of tenure nor secure access to land. In Africa, this means that more than 500 million and perhaps as many as 750 million people are living without sufficient legal security or proof of claim to the land they are occupying. Can we provide security of tenure through local registers consistent with the land administration legal and regulatory framework of a country without creating the huge national infrastructure associated with a centralized system? Could this be an alternative to the traditional top down centralized approach of so many land administration IT projects?

We also consider the governance and security arrangements required to guarantee integrity and how that might be achieved. Can local registers be a "good enough" solution? in the same way that we now accept image based first registration methods, and does this now fit with the fit-for-purpose philosophy?

While we have been able to develop successful low-cost approaches to the initial registration of land rights, we do not yet have simple systems that can be easily and cheaply provided at local level across a country to adequately manage this data, keep it secure, support transactions and respond to information requests. The responsibility for this management is normally with the designated Ministry or devolved body, and all too often regulatory bodies struggle with the need to be able to provide secure data management and also be able to provide the necessary services at the local level. Most computer-based management systems operated by Land Registry organizations are traditionally structured with centralized or distributed database architectures under the direct control of Ministry or Agency staff and are the results of intense effort over several years and involve considerable expense.

This paper advocates an approach based on simple local registers, managed and operated by local administration offices or communities providing legitimate tenure services directly at the local level. By ensuring the workflow encodes regulator steps, we can ensure that it is compliant with legal requirements and preserves the role of the regulator whilst also providing access to the register available on simple technology platforms. Back end security is provided transparently with linkage to formal national systems (when and if they are developed) or alternative secure back-up.

We look at examples drawn from recent Land Tenure Regularisation programmes in Rwanda, Ethiopia, Tanzania; the use of registers in informal systems and also generic solutions which have been developed on a country-independent basis and are designed to be adapted to particular country cases.

We conclude that local registers, combined with clear understanding of national land administration business rules are effective to support systematic registration programmes; support transaction processing and also can fit well to the land rights continuum approach.

1. Introduction

There have been many land registration / land administration systems successfully established (or re-established) in the Europe and Central Asia (ECA) region since the 1990's which have included the establishment of large nation-wide land administration IT platforms. Adlington and Tonchovska (2012) provide an excellent summary of the ECA experience of modernization from an IT viewpoint, emphasizing the difficulties of large centrally driven IT projects and advocating smaller step by step solutions. The World Bank has committed some $1.4 billion to land administration projects across the ECA region in the last 20 years or so which has leveraged considerable additional investments from national governments, much of which was also spent on IT systems for land administration.

Across Africa, the only country which has largely completed land registration (in this case registering long-term emphyteutic leases) is Rwanda *(Edwards, 2014)* and while there is a central IT system linked to the district level, the IT system to supply lower level access is still being developed. Elsewhere in Africa there are various information systems established at the central Ministry level, but there is no country wide coverage, and registration of land is still limited in most countries. Ministries tasked with responsibility for land administration are facing huge challenges – technical, human, legal, financial - tasks which they simply do not have the budget or resources to address systematically within reasonable timescales, even with loans, grants, or other foreign assistance.

A well-functioning land administration system with countrywide registration largely completed supports an active land (and property market) which is a key element of any economy and one of the essential components for growth *(World Bank, 2018)*. It also secures title and protects individual and community land rights (in the case of customary or community lands). Most countries in Africa have a first registration programme ongoing and in recent years we have seen very significant developments in low cost Fit-For-Purpose approaches *(Enemark et al, 2014)* with extensive community participation. While Rwanda is now a registration success story, Ethiopia is undergoing extensive large scale systematic Second Level Land Certification (SLLC) involving some 14 million parcels (*Leckie, et al, 2016*), and Mozambique and Tanzania are also poised to embark on large scale programmes. These programmes produce large amounts of registration data, yet in each of these cases there was no national land administration system that was operational and in place that could accept the data.

In any registration programme, the registration data is supposed to be loaded into national land administration systems that will manage the data securely, support land transactions, individual queries and provide information services for both public and private sector purposes. However, across Africa, these land administration systems consisting of national registers and supporting technical systems are only partially developed or deployed, meaning that the registration data is not securely housed and cannot be easily updated or used to inform other activities.

To address these gaps, other possible solutions are emerging (Box One) that provide tools for data capture and management tailored for land registration and administration. In some cases, these are tools for data capture that can provide input to existing systems and in other cases they offer completely independent digital land transaction services.

What seems to be emerging are

   a) Digital Tools to facilitate low cost capture of registration data with the aim to enter data into existing (or under development) national systems (SOLA, MAST, LAND)
   b) Digital Tools that can provide alternative land administration services to the national land administration system (Cadasta, Meridia, BenBen).

c) Tools that can do both a) and b).

Equally important is the Business Model that is being used to provide these tools and services and here the situation is not always immediately clear. While tools such as SOLA, MAST, TRUST have been developed largely with donor funding and are available completely free of charge (and no licensing fees), others, are basically providing services in return for a fee (BenBen, Meridia), or offer some tools/services free but charge for others (Cadasta). Different situations have different needs and will consequently employ different solutions, so it is encouraging to see the range of new innovative developments emerging. Elsewhere, there are numerous local versions of MAST type solutions emerging -for example SIGIT Lite in Mozambique (Balas, *et al,* 2017).

In this paper we are going to explore some of the implications of these new

> **Box One: Innovative registration and transaction support tools and services**
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> - **SOLA**: (open source solutions for land administration), developed with FAO support, Nigeria, Cambodia, Uganda http://www.flossola.org/
> - **STDM.** Social tenure domain model. https://stdm.gltn.net/
> - **Cadasta**: Provides tools to collect and document land rights on cloud base platform. (http://cadasta.org
> - **Meridia**: service provider offering transaction services for individual registration (http://www.meridia.land)
> - **LAND** initiative: Dutch Kadaster supported initiative promoting fit-for-purpose solutions – currently in Benin, DR Congo, Uganda https://www.kadaster.com/partnership-land
> - **USAID MAST** (Mobile Application to Support Tenure): originally piloted in Tanzania and now active in Burkina Faso, Zambia, Tanzania https://www.land-links.org/tool-resource/mobile-applications-to-secure-tenure-mast/
> - **BenBen:** providing digital land transaction services in Ghana. http://www.benben.com.gh/
> - **TRUST (Technical Register under Social Tenure)** Being implemented by DAI under USAID LTA project Tanzania. Free to use Local register solution linking to MAST. http://dai-global-developments.com/articles/from-land-tenure-regularisation-to-a-sustainable-land-register/
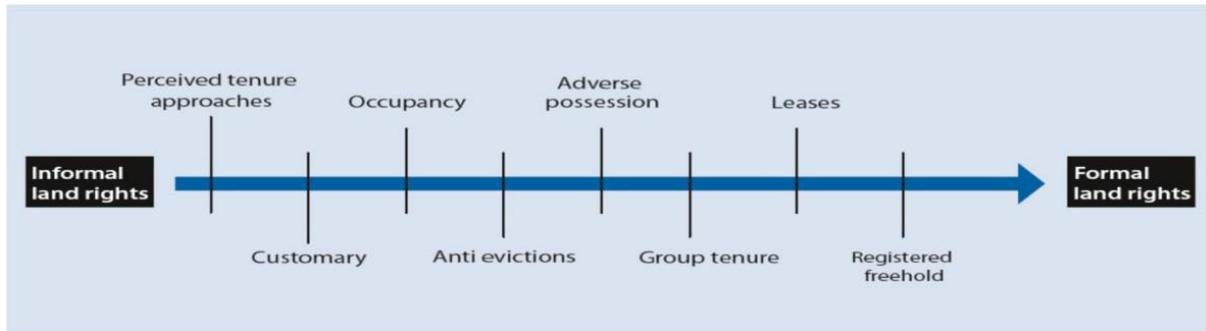
innovative approaches and show that they can be viable low cost (and low risk) alternatives to traditional top down land administration systems. We also wish to reassess exactly what are we registering. Most large registration programmes have focused on registering what are "formal" rights, but we think we should rethink our understanding and perception of what we should be recording / registering.

We think many of the emerging lines of thought are pointing to **Local Registers.** We have tended to think of Land Administration systems from a "top down" viewpoint, especially when it comes to IT implementation. However mobile technology and the widespread use of tablets, smartphones with simple user-friendly apps providing links to more complex back office systems located on cloud or centralized servers meaning that it is possible to place quite sophisticated data processing and display functions at the field or individual parcel level. Data can be captured locally according to business logic embedded in the app, verified against existing data, and then held as a local register record.

2.   Land Rights – What to register?

Traditionally we have distinguished very strongly between customary and formal tenure systems. In the same country there can be different laws; different processes, and different agencies responsible for their identification, adjudication, and recording. The continuum of land rights model *(UN Habitat, 2012)* shown in Figure One (overleaf) considers that land rights can have a continuous spectrum, and it is possible to record (or register) any of these rights. In Europe, there is a well-documented history of registering "formal rights" and by that we broadly mean leasehold and freehold – rights which we identify as "formal" in that they are recognized by the national land administration authority and recognized in the courts as proof of possession with the right to occupy, use, transfer, etc.

Figure One: The continuum of land rights (UN HABITAT 2012)

The continuum of Figure One is explored by Barry and Augistinus (2015) who counsel against a linear explanation of the continuum and propose it is a metaphor rather than a theory. The Social Tenure Domain Model (STDM) first put forward by Lemmen (2010) advocates recording all relationships between people and land, wherever they fall on the spectrum. Rights within the continuum can be documented or undocumented. Does a documented land right have more weight than an undocumented land right? Maybe not, but It certainly identifies and clarifies the assignment of the right. Does a documented customary right have the same weight in law as a "formal" title? This may have more to do with how we perceive these matters and our familiarity with them. Another example can be drawn from Tanzania – is a Certificate of Customary Right of Occupancy (CCRO) inferior in any way to a Certificate of Right of Occupancy (CRO)? One is issued on village land the other on general land which is often urban. Both are issued after a rigorous application process, but there is a perception that the CRO is somehow "stronger", though both are clearly defined in law with supporting regulations.[1]

So, this really is our first question: **What should we register?**

The continuum also includes informal land rights and embraces various instances with different kinds of tenure / occupancy (which may or may not be documented). A structured review of literature relating to legitimate tenure rights (*Payne, et al, 2015*) while recognising freehold title as the dominant tenure form legitimizing tenure rights concluded that

"A total of 25 high or medium quality studies described seven policies or interventions—including temporary occupation licenses, certificate of rights, land use rights certificates, among others—that fostered partial compliance with legitimate land tenure norms. They achieved increases in tenure security and positive development outcomes but have received less attention than land titling. As such, these strategies may deserve more consideration by both researchers and policymakers as they are less costly and more easily implemented than land titling, while achieving sufficient levels of tenure security to encourage investment and land property improvements".

This suggests that there is benefit in registering (or recording) across the continuum of Figure One and that the process of registering (or recording) gives greater weight to those rights – wherever they are on the continuum; formal or informal.

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[1] Though note that there is a restriction on the transfer of CCROs in that they have to be transferred to current residents of the same village or outsiders approved by the Village Council

- **Formal Registers.** We can consider a formal land and property register to be one established according to the laws and regulations of a particular jurisdiction. While the law may provide for a property register, it still must be populated and then systems and processes in place to support the further updating based on transactions. In the ECA region, many countries have registers substantially complete. In Africa, only Rwanda can claim a register that falls into this category.
- **Informal Registers.** Recently there has been more attention on the recording or registering of information in informal settlements as part of the incremental tenure security improvement approach. Here, by capturing information about lot, occupancy, usage; we can provide information that supports occupancy and helps protects against encroachment, disputes, or dispossession. In some cases, certificates of occupancy are prepared at the community level, and while these do not assign legal rights, they are accepted within the communities as evidence of a possession right: --- they have "social legitimacy". For all practical purposes, these evidences provide an alternative to a formal registration system.

In the following section we will look at some recent and ongoing initiatives;

a) The use of the Social Tenure Domain Model
b) The example of Rwanda: countrywide registration programme
c) The example of LIFT Ethiopia: parallel development
d) The example of MAST/TRUST in Tanzania: locally driven village registration
e) The incremental Tenure Improvement in Informal Settlements
f) The SOLA Open Tenure /Community server approach.

These examples include large national programmes as well as smaller, community-based initiatives. In all cases these programmes have taken place in an environment where there is not a nationwide land administration system in place and the programmes need to address the issue of sustainability – how to ensure that future transactions are properly recorded or registered. In countries where land administration is being established, it is not enough to put in place a system for updating, the system must be used, and this will only happen if there is a perceived benefit to the public (and the individual) in carrying out this subsequent registration. This topic is explored further[2][3] where the importance of the emergence of land markets and stimulus measures are discussed.

3. Case Studies.

In the following sections we will consider some examples of where local registration is taking place, both looking at formal and informal situations in Africa. We are not trying to catch all approaches; our aim is to show that local registers are already happening and to draw lessons from the experience so far.

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[2] Baldwin, R, Buckle, F, Adlington G, 2018. *Building land markets in developing economies*, World Bank Conference on Land and Poverty 2108, poster presentation

[3] Leckie , J., Mayr, C., Fiestas, I., 2018 - *Improving The Effectiveness Of Land Tenure Programmes Using A Market Systems Approach.* World Bank Conference on Land and Poverty 2108, poster presentation

Case A: Social Tenure Domain Model (STDM)

(STDM was the first conceptual land rights continuum model to be developed to include all possible people – land relationships (formal and informal) and has been instrumental as a guiding concept as well as being as a platform for recording land rights).

The STDM model has been highly influential in widening the debate on land rights and what should be registered or recorded. STDM is basically about people. It is about all people and all types of 'people – land' relationships (*Lemmen, 2010*). How can informal settlements be "illegal settlings"? People depend on land for living. Every human being needs a place – a safe place.

The STDM is an initiative of UN-HABITAT to support pro-poor land administration. STDM is meant specifically for developing countries, countries with very little cadastral coverage in urban areas with slums, or in rural customary areas. It is also meant for post conflict areas. The focus of STDM is on all relationships between people and land, independently from the level of formalization, or legality of those relationships. See Figure Two below
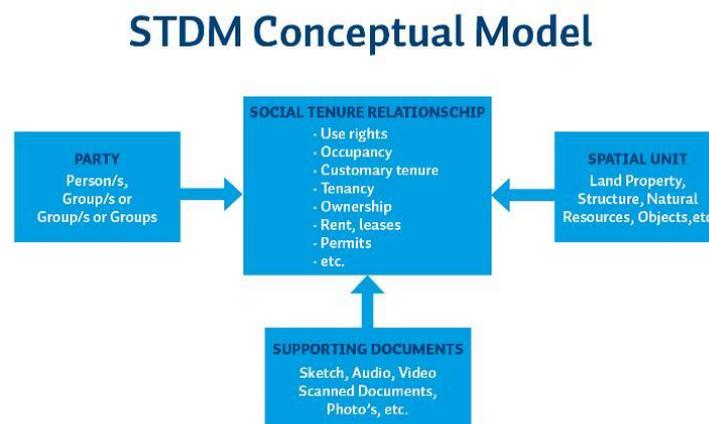

Figure Two: the STDM Conceptual Model

STDM conceptually expands our formal "party – land rights – spatial unit" model to include a whole range of "social tenure relationships" defined within the continuum of land rights (Figure One) that have social legitimacy. The continuum includes the diversity of tenure arrangements in practice, encompassing both *de facto* (in fact) and *de jure* (in law) rights. While the rights in this range may not all enjoy the benefits of a country´s formal administrative or legal recognition, social recognition might be high, providing the de facto rights of local legitimacy. A continuum of land rights can function when a land administration system includes information that caters for the whole spectrum of formal, informal, and customary rights.

Conceptually, the STDM is a so called "specialisation" of the Land Administration Domain Model (LADM) (ISO, 2012). The word "specialisation" means that there are some differences in terminology: a "real estate right" in a formal system is considered as a "social tenure relationship" in STDM. Note that a formal right is also a social tenure relationship, but not all social tenure relationships are formal land rights.

- "People" – land' relationships can be expressed in terms of persons (or parties) having social tenure relationships to spatial units.
- "Parties" are persons, or groups of persons, or non-natural persons, that compose an identifiable single entity. A non-natural person may be a tribe, a family, a village, a company, a municipality, the state, a farmers´ cooperation, or a church community. This list may be extended, and it can be adapted to local situations, based on community needs.
- "Land rights" may be formal ownership, apartment right, usufruct, free hold, lease hold, or state land holding. They can also be social tenure relationships like occupation, tenancy, non-formal and informal rights, customary rights (which can be of many different types with specific names), indigenous rights, and possession. In practice, there may be overlapping claims, disagreement, and conflict situations. There may be uncontrolled privatisation. Again, this is an extensible list to be filled in with local tenancies. A restriction is a formal or informal entitlement to refrain from doing something; e.g. it is not allowed to have ownership in indigenous areas. Or it may be a servitude or mortgage as a restriction to the ownership right. There may be a temporal dimension, e.g. in case of nomadic behavior when pastoralist cross the land depending on the season. This temporal dimension has sometimes a fuzzy nature, e.g." just after the end of the rainy season".
- Spatial units are the areas of land (or water) where the rights and social tenure relationships apply. According to the LADM/STDM ISO-standard those areas can be represented as a text ("from this tree to that river"), as a single point, as a set of unstructured lines, as a surface, or even as a 3D volume. This range of spatial unit representation can cover community-based land administration systems, or rural, or urban, or other types of land administrations, like marine cadastres and 3D cadastres. Surveys may concern the identification of spatial units on a photograph, an image or a topographic map. There may be sketch maps drawn up locally.

Pro-poor recording initiatives have a significant role in countries where there is a lack of political commitment or other constraints to recognize all legitimate rights. As well as providing local forms of security of tenure, the initiatives may also raise the profile of legitimate right holders and trigger incremental change at the national level. Wherever possible, local initiatives should coordinate with the national level to plan for future national recognition of the legitimate rights – and national government should provide guidance (*Enemark et al.*, 2016).

This implies determination whether legitimate rights, recorded under local proper recording initiatives, meet a set of conditions that will allow their integration into the national land register.

This process may also trigger a review for change of legislation to accommodate and recognize the various local and social tenure types in the national register. This mutual interaction between the local recording initiatives and the national approach for registration of tenure rights may act as a key driver for enabling consistent policies on change of legislation. The national recognition of tenure types is thus an ongoing journey towards incorporating all legitimate tenure rights in the national register (*Enemark et al., 2016*).

While there were some initial attempts to build and test a STDM practical tool, it quickly became apparent that any such tool must be adapted to local needs and requires a detailed understanding of the local "business rules" where appropriate. STDM principles are now embedded into SOLA Open Tenure and Community Server together with tools for local customization.

STDM is available as an open source resource that can be downloaded for free and customised to specific instances (https://stdm.gltn.net/). It is highly significant in that it was the first truly open source

free software platform developed that can be adapted to record land rights in different countries across the land rights continuum (informal to formal). While the initial version was based on the ITC ILWIS software, later versions are based on QGIS/PostgreSQL/ PostGIS. To date, STDM has been the subject of pilots in Ethiopia, Uganda, Iraq and Colombia, however it is not clear if these implementations have developed beyond pilots. A list of projects using STDM is attached in Annex One.

The **Lesson**, to be drawn from the STDM experience is that

- Conceptually it is relatively straightforward to extend the LADM 19152:2012 model (ISO, 2012) to include "social tenure relationships", as opposed to just formal land rights allowing us to capture specific types of relationships – not just formal rights.
- As for implementation, STDM allows us considerable freedom in choosing "what to register", though at the implementation level for it to be successful it must be adapted to the local rules and regulations (where they exist).
- STDM allows us to record transient relationships and allows overlapping social tenure relationships to be recorded: thereby recording actual status on the ground. Most rights registration systems require rights to be unambiguously defined spatially and legally.
- We can use the STDM approach just as easily in areas of informal housing as we can when assigning occupancy rights – we are just recording different social tenure relationships.
- While earlier efforts were focused on building a STDM software tool, the real value is to use STDM as a conceptual model that expands our traditional understanding of the registration process (for example, see later section in incremental tenure improvement).

Case B: Formal Registration in Rwanda

(This case is interesting as Rwanda is the first successful nationwide formal registration programme to be completed in Africa).

Rwanda is a relatively small country of approximately 26,000 sq. km and has the highest population density in Africa (416 per sq. km). Despite several attempts to undertake land reform since the 1994 conflict, by the early 2000's to avert a rise in the number of land disputes caused by increasing densities and weak land laws, the Government embarked on establishing a new land law. This was finally passed in 2005 (the Organic Land Law - OLL) following on from the Land Policy (established in 2004).

The OLL required a significant amount of drafting of subsidiary legislation and aimed to be inclusive of urban and rural land (an estimated 70% of the population are involved in agriculture which contributes one third of the country's GDP). Based on nationwide public consultations, Rwanda then commenced an active programme to reform subsidiary legislation with donor assistance. together with institutional reform and field testing of the laws with longer term ambition for full implementation. This formed the essential baseline work for the national Land Tenure Regularisation (LTR) programme to be implemented in several phases.

- Phase I (2005-2008). Involved drafting of the main decrees, establishing the institutions, field testing the laws, and ongoing public consultation to enable the implementation of the OLL. This culminated in the development of the Strategic Road Map (SRM) for the implementation of the OLL through an initial programme of land tenure regularization (LTR) nationwide that would make use of innovative low-cost methodologies.

- Phase II (2009-2013). The full implementation of the LTR programme resulting in all land parcels across the country being systematically identified, boundaries were finalised and claims adjudicated, and emphyteutic leases were printed and issued on more than 10.4 million parcels.
- Post LTR support phase (2013-2018). Donors provided direct support to the Rwanda Natural Resources Agency (RNRA) to complete the registration and issuance and support the further development of the Land Administration Information System (LAIS), capacity building, outreach, and public engagement.

There has much written about the Rwanda project, for example see *Rurawanga (2013)* for detailed history of land reform in Rwanda; *Buckle and Gillingham (2015); Sagashiya and English (2008)* for descriptions of the LTR project) and the intention is not to repeat that here.

This sequential and orderly development process leading to the first truly national registration programme in Africa has clearly demonstrated what is possible with political commitment and full public participation and consent. Although only a small country, registration was completed within a relatively short period of time (2009-2013). Several years of careful preparation, due diligence and well managed implementation has enabled the development of a land administration system that can register transactions and maintain an accurate public record of land assets at all levels.

The land authority in Rwanda (formerly the RNRA, now the RMLUA) has a central headquarters in Kigali and 20 district offices. Despite the land registration being largely complete in 2013, the LAIS information system was not fully implemented at district level until 2016. Some difficulties remain at the District Offices due to lack of integration of the spatial and non-spatial database, and this is now being addressed, and a new more integrated system is under development.

Starting from 2016, a nationwide network of Sector Land Managers (SLM) - there will be 416 in total - have been recruited and they are providing "front office" services at the local level.

The Post LTR donor support programme will end in 2018. A recent review of the Rwandan Land Tenure Regularisation project (August 2017) shows that there is now an emerging land market in Rwanda, with total transactions over 250,000 per year, and formal transfers (sales) increasing by an average of 60% each year from 2014 to more than 50,000 (Figure Three shows rate of growth by quarter during the period 2016-2017). If we consider all transactions related to change of ownership, this figure rises to almost 100,000 per year.
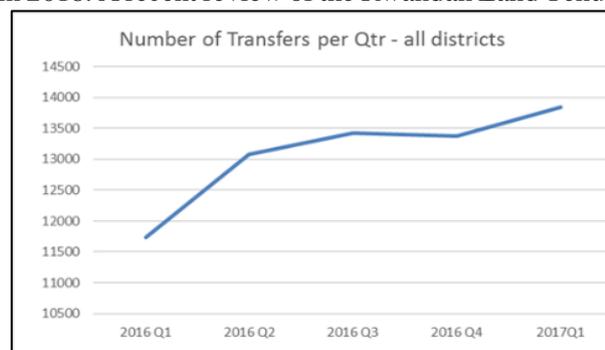
Figure Three: increase in transactions: Rwanda

The LTR project (2005-2018) was supported by DFID, the Dutch government, SIDA, EU and the Government of Rwanda. Viewed as a whole (2005 to the present), Rwanda has pioneered fit-for-purpose registration combined with community participation that completed registration across the entire country in less than five years (2009-2013), eventually registering more than 11.4 million parcels at an average cost of around $7 per parcel. Services to provide electronic registration of title are now available, and a mobile phone-based app that can provide information about land parcels has now received more than 600,000 requests since it was established less than 18 months ago. A major feature of the Rwanda approach has been to promote public awareness while striving to increase data quality,

reliability and provide services able to meet the needs of citizens which has helped to stimulate awareness and demand.

Ali, et al, (2016) looked at the sustainability of the LTR programme in 2016 and considered a number of factors including continued informal transactions and also the distance to land office and the impact of the arrival of the Sector Land Managers (SLM) who provided a more local layer of land administration. The SLM began to be deployed in late 2014, and even by 2016 a positive effect could be seen: numbers of transactions increased, and more transactions taking place at greater distances from the district office (Figure Four). Their study had two main conclusions

   a) For land registries, the set up and operations phases should proceed jointly – the registration of parcels and the establishment of the system to manage the data and support the transactions. The populace need to understand the social and economic benefits of registration.
   b) Even if land administration systems are incomplete, careful analysis of registry data can identify strengths and weaknesses, gaps in land governance that can then be addressed which will have positive outcomes.
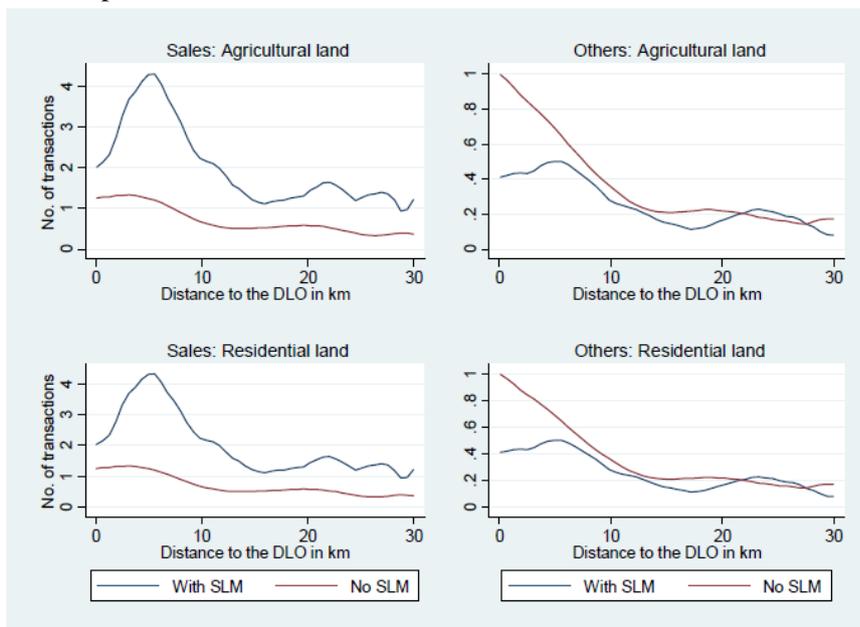

Figure Four:

Number of quarterly registered transactions with transfer of ownership rights by distance of cell to the DLO and sector land manager in 2015 *(from Ali, et al, 2016)*

The **Lessons**, to be drawn from Rwanda LTR are

- The LTR programme demonstrates that it is possible to register *en masse* within a relatively short period of time at very low cost (<$10 per parcel) using Fit-For-Purpose participatory techniques.
- A nation-wide programme takes time to prepare and requires long term strategies and plans with real political commitment – while the registration process took 4 years, the initial planning, testing and legislative required 3.5 years (Phase I). Including the post LTR support and finalizing the land administration system has extended the total time to over 13 years.
- The land administration system to manage secondary transactions (post first registration) needs to be constructed in parallel and must be able to receive the registration results. While the RNRA developed a centralized IT system (LAIS) in parallel with the LTR registration, this was not ready until some years after the registration was complete, resulting in the slow degradation of the register information.
- Public buy in at an early stage is vital. This not only involves understanding the benefits of first registration but also the registration of all transactions and parcel changes.

- The lack of availability of a system to register changes, has contributed to an initial low level of transactions as people were unwilling or unable to register these changes at local level.
- Registration can only work with strong local connections. The implementation of 'Sector Land Managers' (SLMs) interacting between districts, sectors and villages combined with strong outreach programmes including "Land Weeks" (where mobile campaigns are conducted within specific districts), has contributed significantly to bringing land administration to local levels.
- Finally, it remains essential that the public have a clear understanding of the benefits arising from the registration programme – while mortgages are often quoted as the prime incentive; in Rwanda given the mortgage terms and conditions, mortgage are only available for the more affluent members of the population. This situation may change but will take time.

Case C: Second Level Certification in Ethiopia

(This is an example of a large-scale mass registration programme operating at national level - it covers some 14 million parcels out of an estimated 40-45 million).

Ethiopia is a Federal Democratic Republic with nine national regional states, each of which is responsible for developing its own land administration regulations and processes while central government defines the underlying legal framework and principal legislation.

Historically, regions have been developing their own land administration systems in the rural sector and this has led to variations in practice, A World Bank Project (Harmonised Land Administration System) sought to address this and later projects have sought to emphasise the importance of a common approach - Each region is split into woredas which in turn are divided into kebeles. Each woreda represents the third-level administrative divisions of Ethiopia, after the federal and regional state governments. They are often referred to as districts and there are approximately 670 rural woredas in total and around 550 woredas in the Highland regions. Each woreda that is currently being supported by the Land Investment For Transformation (LIFT) programme in completing Second Level Land Certification (SLLC) comprises on average around 100,000 parcels of land being farmed by around 20-30,000 farmers[4]. Within each woreda there are on average around 27 kebeles and these represent the smallest administrative unit of Ethiopia, each with a population of approximately 4,000 people. There are more than 10,000 rural kebeles in Ethiopia, out of a total of around 15,000.

Regional rural land administration arrangements vary across the country. Some are organised under the regional Bureaux of Agriculture and Natural Resources (e.g. Tigray and SNNPR) while others (e.g. Amhara and Oromia) are directly accountable to the regional president. As stipulated in the Rural Land Administration and Use proclamations /regulations for Amhara, Oromia, SNNP and Tigray regional states, the process to execute a variety of permanent and temporary land rights transactions are handled via the Woreda Land Administration Offices (WLAOs) and Kebele Land Administration Committees (KLAC) located within the Kebele Administration Office facility. For virtually all transaction types, the KLAC can serve only as an entry point where the initial applications are received, checked for completeness and all the documents verified. Thereafter the documents must be transported to the nearest woreda office for formal registration.

Ethiopia has adopted a process of First and Second level certification. First level certification involves the assignment of holding rights to individuals and the issuance of a holding book. However, this does

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[4] DFID LIFT Project estimates

not describe the parcel and its boundaries. Second Level Certification completes the process by adding a parcel description. While First level certification has been extensively carried out across Tigray, Amhara and Oromia, the holding rights have not been updated, nor in most cases are there systems in place to manage the data and support the updating through registering transactions.

The UKaid-funded Ethiopia Land Investment for Transformation (LIFT) programme is being implemented by DAI and will complete the Second Level Land Certification (SLLC) of up to 14 million parcels (approximately 6.1 million households, with women accounting, jointly or individually, for 70 percent of land holders), and also establish at woreda level a system to manage subsequent transactions. The programme is implemented with the Government of Ethiopia, through the Ministry of Agriculture and Natural Resources' Rural Land Administration and Use Directorate (RLAUD), with comprehensive technical and delivery support provided by DAI Europe.

RLAUD is also developing a National Rural Land Administration Information System (NRLAIS) that will provide the national infrastructure to support land records management and updating at the federal, regional, zonal and woreda level, with a "window service" at the kebele level (funded by GoE, World Bank, Finnish MFA). NRLAIS will accept bulk registration data from projects such as LIFT and also support on demand registrations and transactions, as well as provide data/information supply. The system will have a textual component integrated with the spatial component and will be flexibly designed to allow regions to customise it for local needs. Each region will, however, adhere to a common data model and a set of standards that will allow sharing of data between Regions and with the Federal Government. NRLAIS was developed as a concept in 2010-2011 through the World Bank HLAS project and as of January 2018, the system is still at pilot test stage and is not yet operational.

The DFID LIFT project commenced in 2015, and registration began in earnest in 2016. By December 2017, almost 7 million plots had been demarcated and LIFT was working in nearly 90 woredas with some 35 of these woredas already completed. It is clear that there will be a time lag between the DFID LIFT project completing a woreda and any installation of the NRLAIS system at woreda level.

To bridge this gap, LIFT has developed an Interim Woreda Rural Land Administration Information System (iWORLAIS) to support the processing of subsequent registrations through the Rural Land Administration System (RLAS) until the NRLAIS is fully tested and operational. iWORLAIS is a computerised system which registers rural land transactions at the woreda level to ensure that the Land Register is continuously updated based on the (Federal) RLAS Manual which presents procedures and workflows for undertaking the registration of a total of 17 types of rural land transactions.

The design of the RLAS is based upon a thorough review of land related policies, the legislative and regulatory frameworks and organisational structure in Ethiopia and on the understanding of procedures for land transactions and capacity constraints as assessed during a rapid field assessment in 24 woredas.

The RLAS/iWORLAIS development resulted in:
- A RLAS Manual that describes, in a structured and transparent way, the processes (procedures, data, and actors) for various (post-SLLC) land transactions. The Manual also provides standard forms for the land holder to apply for a land transaction. The RLAS Manual was adapted to the legal and regulatory specificities of each Region and translated into the respective regional languages in 2016.

- The iWORLAIS computerised system (based on the procedures and workflows described in the RLAS Manual) to support registering rural land transactions at the Woreda level to ensure that the Land Register is continuously updated
- Refurbished offices and equipment installed (Figure Five).
- Training of Land Administration Experts (through a cascade training system),
- Awareness training for Woreda Stakeholder's Institutions, Kebele Leaders and KLAC Members,
- Installation of iWORLAIS on the Woreda Land Administration Office (WLAO) computer networks and migration of SLLC data from iMASSREG to iWORLAIS, making the RLAS/iWORLAIS system ready to register post-SLLC land transactions.

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Figure Five: Sodo (SNNP) Woreda Land Administration Office before (2014) and after (2016) rehabilitation

In an effort to bring the registration process closer to the farmer and make registration a more local process, LIFT is now preparing a trial to test the option for local kebele offices to accept and then digitally transfer documents for registration, direct to the WLAO. This would allow a faster process as well as providing a service where farmers can gain a better understanding of the importance of formal registration of their transactions thereby encouraging them to use the service for all transaction types. The KLAO /KLAC would also take on a more prominent role in raising public awareness and supporting farmers through the registration process. This could also become a forerunner for kebele based registration which would be a genuinely local response to land registration. A recent survey carried out LIFT confirmed that "When asked how they learned about the need to register transactions, the KLAC was most commonly mentioned, followed by 'during social events', 'other kebele official', 'learned from neighbor', and 'learned from family members'[5]

Figure Six (overleaf) shows examples of typical large and small woredas in Ethiopia and shows the typical distance to travel to a woreda office can be up to 50km (large woreda), or up to 20km (smaller woreda). Regardless, these distances represent a journey that by foot or public transport will take many hours to complete. The infrastructure in rural Ethiopia is poor and roads are often little more than tracks that can be impossible to use, particularly during the lengthy rainy season. In addition, farmers are very busy and poor, with few having access to mobile phone technology and the greatest source of

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[5] LIFT Customer Satisfaction Survey (Sep 2017)

information remains word of mouth. This is particularly true of government processes and procedures where a great reliance is placed on local institutions to answer questions and raise awareness about legal processes and claiming individual rights. This in itself indicates that any move towards a centralised approach at the expense of local institutions and local registers is not a realistic or feasible option in Ethiopia for the near future.
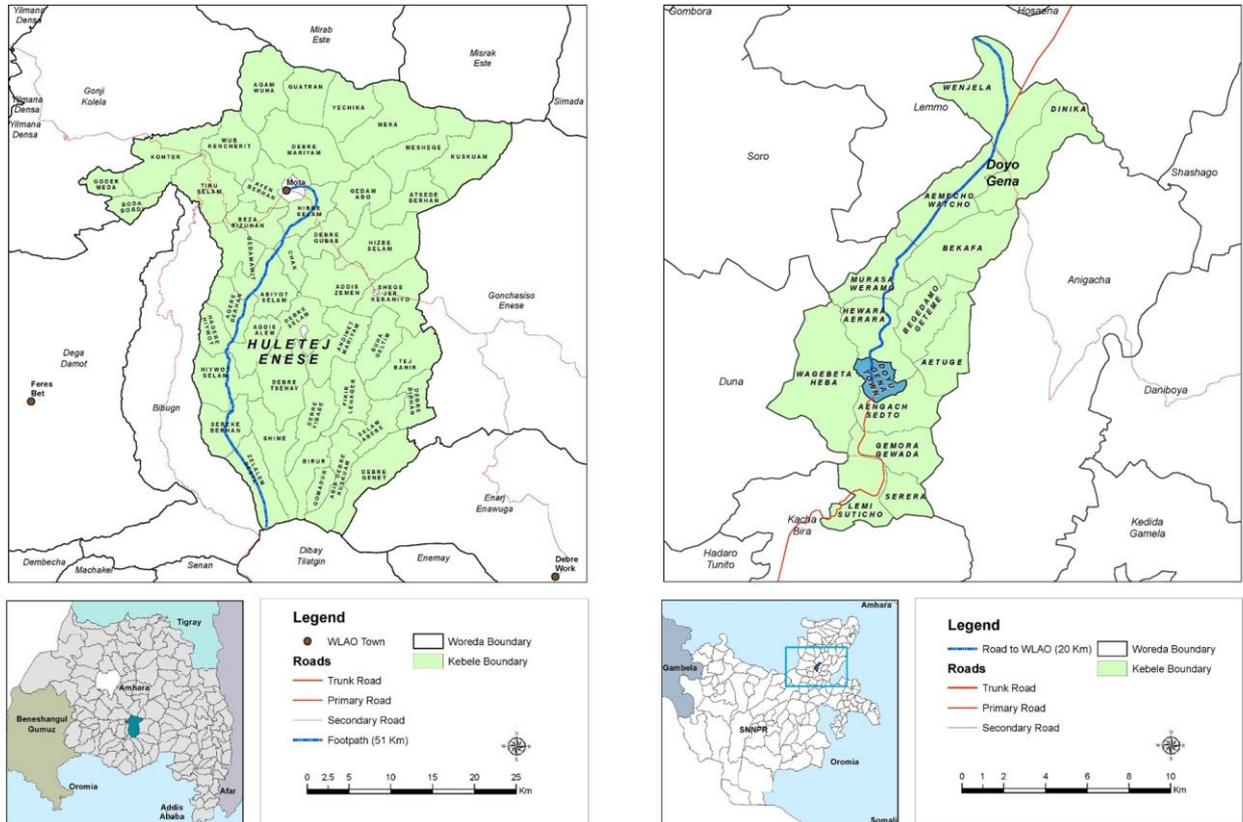

Figure Six: a) Mota, Amhara. (Larger Woreda), Distance to WLAO approximately 51 kms. b) Doyu Gena, SNNPR. (Smaller Woreda) Distance to WLAO approximately 20kms.

Lessons: Ethiopia

- Ethiopia is putting in place a local registration system at Woreda level to manage registration data and support transactions which is being installed in parallel with the completion of SLLC at each woreda. Tests to further decentralize to kebele level with "application windows" are under preparation.
- While a centralized system (NRLAIS) is under development, it is not clear if the GoE and regional states have the necessary financial and technical resources to deploy NRLAIS at central, state, zone and woreda level across the country.
- The local register system data content is designed to fit with the NRLAIS system and can be migrated if NRLAIS becomes available.
- In the meantime, the local solution ensures the sustainability and integrity of the SLLC registration data is protected.

Case D: Registering Customary Certificates of Occupancy, Tanzania

(This is an example where a local initiative at village/district level seeks to be sustainable at the local level using locally trained staff and robust data capture and data management tools that support local registers and can be operated at the village/district level)

Tanzania was one of the first countries to establish a national land policy and legal framework that recognized customary land rights and granted them equality with formally assigned land rights. The National Land Policy of 1995 paved the way for the Land Act of 1999 and the Village Land Act of 1999 which set out the overarching legal framework and recognised three broad categories of land: General, Reserved, and Village. General Land is mostly urban and includes all land that is not village or reserved. Reserved land includes forests, national parks, public reserves and game parks, recreation etc. The Land Act covers both general and reserved lands and empowers the Ministry of Lands, Housing and Human Settlements Development (MLHHSD), through the Commissioner of Lands to be the body responsible for issuing grants of occupancy. The Village Land Act deals specifically with village land (approximately 70% of the country), which is administered under a system decentralised to zone, district and village level. There are 8 zones set up specifically for land administration purposes each under the authority of an Assistant Commissioner for Lands. There are 170 districts; 135 of which cover village land in approximately 12,500 villages. Each village is responsible for managing its land through a 25-member Village Council established by the Village Assembly.

There have been various attempts to register village land and grant CCRO (Certificates of Customary Right of Occupancy), but no initiative has yet been implemented on a national scale (though there are plans for a World Bank funded project that could cover up to 5,000 villages). The Ministry of Lands, Housing and Human Settlements Development (MLHHSD) has undertaken various initiatives to develop computer-based systems to manage its data and support its processes, and there are a number of systems in place at the departmental level in Dar es Salaam. MLHHSD is now developing a unified system - the Integrated Land Management Information System (ILMIS) that is intended to computerise all of the Ministry business units, however the current plans do not include the management of village lands, although it has been said that the scope of ILMIS could be extended to cover these in future.

DAI is implementing the USAID Land Tenure Assistance (LTA) project as part of the USAID Feed the Future programme since January 2016 in the Iringa and Mbeya Districts which will register 41 villages using participatory and fit for purpose approaches. It will cover some 50-60,000 parcels. The project builds on an earlier pilot (February 2015 – May 2016) that developed and tested the USAID Mobile Application for Secure Tenure (MAST) application that uses mobile devices to identify, demarcate and record land rights.

The project is being implemented by DAI and by mid-February 2018 had completed mapping for over 29,000 parcels in 22 villages and more than 22,000 CCROs have been registered at an average cost of under $10 per CCRO[6].

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[6] Sullivan, T., Msigwa, M., Issa, M., English, C., 2018. *Mobile Applications for Secure Tenure (MAST) and the Technical Register for Social Tenure (TRUST) – development and applications in Iringa and Mbeya Districts in Tanzania*. World Bank Land and Poverty Conference 2018, 57 pages.

MAST consists of main 2 parts – a mobile application, used to capture the data in the field and a web-application for storing collected data, verifying, editing, and approving land rights. Although MAST allows capturing the data and processing it to a final approval or rejection, there are no other functions to support further maintenance of records and support various land transactions. To address issues with maintenance of adjudicated records and support sustainability it was decided to design and develop a Technical Register under Social Tenure (TRUST) registry application for local district land offices. TRUST has to integrate tightly with MAST to source adjudicated land records from there (See Figure Five).
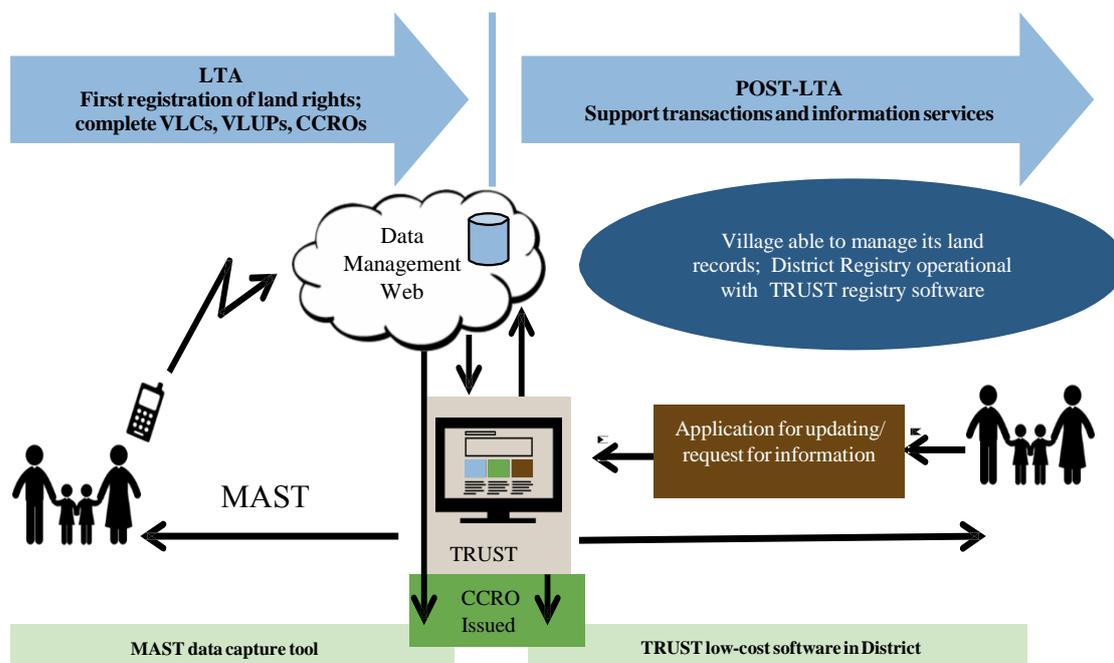

Figure Seven: Integration of MAST and TRUST provides a long term sustainable local solution.

Figure Seven shows how MAST is used to support the first registration of village land and then TRUST is used to manage any secondary transactions (transfer, mortgage, restriction, etc.). It can also provide information, respond to queries, searches, and has the necessary internal management tools to ensure security and integrity of data. Table One (overleaf) lists the functions and transactions supported by TRUST.

MAST is completely licence and copyright free as it was developed through USAID support and the source code resides on GitHub (MAST is officially published on GitHub - https://github.com/MASTUSAID). While the initial system developed through the earlier pilot had limited functionality and was not optimised for scaling up, the current version further developed by DAI has enhanced data capture, printing and reporting functions (see *Sullivan, et al, 2018).*

TRUST has been developed using the same principles: opensource, licence free, but firmly adapted so as to implement all of the rules and regulations of the 1999 Village Land Act and supporting regulations.

TRUST will be used by the District Land Office (DLO) staff to support processing of land claims and post registration transactions in relation to village land. TRUST will facilitate establishment of the robust processes supporting all stages of the land rights registration, allowing monitoring and analyzing of every step, from submission to the final approval or rejection by the Authorised District Land Officer.

Table One: TRUST functionality	
Operations • Creation and managing parcels • Creation and managing parcels using external tools • Map viewing • Creation and editing various applications • Application withdrawal • Application assigning • Application re-assigning • Dashboard viewing **Transactions supported** • Registration of customary rights of occupancy • Transfer of customary rights of occupancy • Transmission of customary rights of occupancy • Surrender of customary rights of occupancy • Variation of customary rights of occupancy • Rectification of customary rights of occupancy • Registration of assignment on customary right of occupancy • Removal of assignment on customary right of occupancy • Registration of mortgages • Mortgage discharge • Mortgage variation • Registration of caveats • Caveat withdrawal	**Processing, Management, Reporting** • Approval or rejection of transactions • Management of right holder details • Displaying parcel and rights history • Generation of Adjudication form, CCRO, Transaction sheet • Management of digital copies of documents • Applications search • Right holders search • Parcels and rights search • Generation of various reports with customized criteria • Management of users and their rights in the system • Management of reference data tables • Audit trail

It will maintain both spatial and attribute data of the land parcels linking them together with rights records in one single database. TRUST development will allow keeping adjudicated records up to date and provide end users with reliable solution for customary land rights registration.
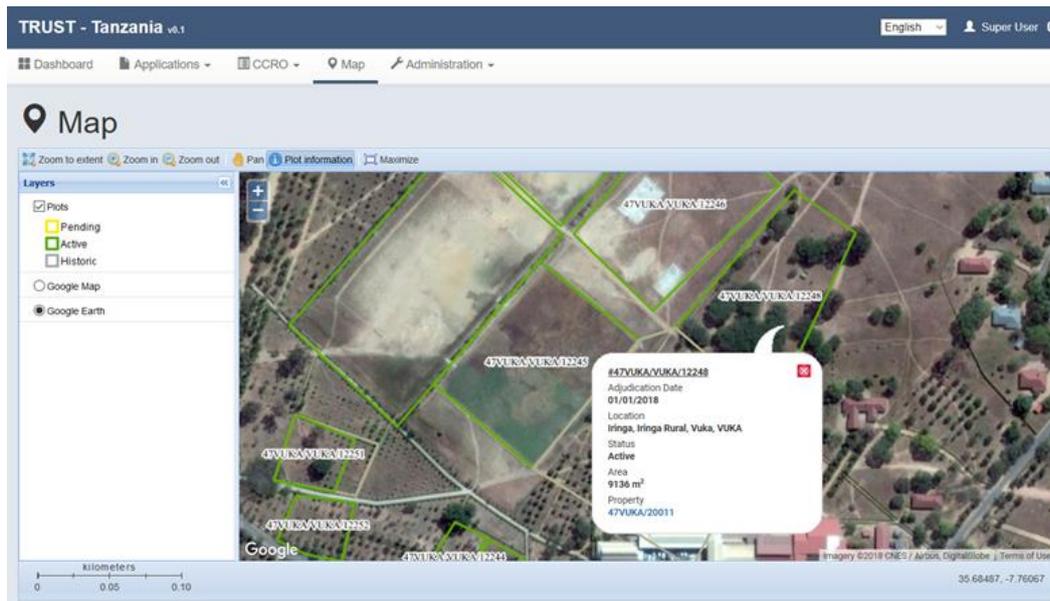
TRUST was installed in Iringa in February 2018 and it is currently undergoing functional testing and also facilitating the training of staff. Initial feedback from staff is positive. The system will continue under test until late April 2018. Figure Eight and Nine show screenshots of TRUST workflow.

Figure eight TRUST Dashboard.

Figure Nine: Parcel Query

For the purpose of better compatibility and reducing maintenance cost, TRUST has to use the same platforms and tools as MAST. It has to be a cross-platform Web-based application with defined roles and access rights to the system. The priority has been given to re-using MAST database and extending it further to accommodate TRUST needs. Nevertheless, creation of a new database could be considered as well for better security purposes and distributing workload and responsibilities between these two applications. This remains a future option

TRUST Platform and tools	Product
Development environment	NetBeans
Development platform	Java EE 7
Web application framework	JSP, JAX-RS (Jersey)
Web client frameworks	JQuery, OpenLayers, JQuery plugins
Programming language	Java
GIS tools	GeoTools, GDAL
Database Management System	PostgreSQL Server plus PostGIS
Web server	Apache Tomcat
Operating system	Windows/Ubuntu/Mac (cross platform)

National level compatibility: There has been consultation between the ILMIS team and the LTA team to ensure a common understanding of the necessary data requirements, subtypes, range, and data model. In principle, the TRUST data (or a subset of) could be migrated to a future ILMIS system allowing consolidation and integration across multiple districts at the zone, region, or even central level.

Although TRUST will be designed initially to deal with customary occupancy rights, it can be easily extended to cover other type of rights as well (e.g. occupancy rights - CRO). In the end, all land related transactions can be automated with TRUST. A gradual approach to the land office automation will be appropriate, taking it into series of steps. Once the first version of TRUST is introduced and stay operational for some months, next version can be considered for development.

Lessons: Tanzania

- It is possible to develop low cost, licence free applications that can efficiently capture local land rights (MAST) and also provide local registry solution (TRUST). TRUST is installed as of February 2018. The challenge will be – will it be used by District/Village staff?
- The local TRUST register is operated by DLO staff in accordance with the Village Land Act and supporting rules, regulations.
- While ILMIS (the centralized system) is still under development, it is not clear if the GoT and regions have the necessary financial and technical resources to deploy ILMIS central, region, zone and district level across the country.
- The local register system data content is designed to fit with the ILMIS system and can be migrated to regional platforms to consolidate data if ILMIS becomes available
- TRUST ensures the sustainability and integrity of the CCRO registration data is protected.

Case D: Incremental Tenure Improvement in informal settlements

(This example briefly considers the role of local registers on informal settlement improvement)

The problems of informal settlements and improving livelihoods and land access for the poor are issues which are present not only in developing countries but also in many middle-income countries, and how we deal with this will be one of the big challenges of the next century. These problems are particularly acute in Africa where it is estimated that 50% of the population will be urban by 2040 (Habitat, 2010) but the majority will be housed in informal or illegal settlements scattered on the urban fringe or located on disadvantaged land which is not considered suitable for residential development. Once established, these slum areas take on a life of their own. For many new arrivals in the city, without jobs or money, this is where the new arrivals end up, looking for somewhere to stay; looking for a job, somewhere where they can make a life.

UK DFID supported the Urban LandMark initiative in South Africa which addressed the problems of informal settlement in urban townships by adopting a market-based approach (http://www.urbanlandmark.org.za/).. The programme developed tools and techniques for progressive and incremental improvement which have resulted in better access to land, improved tenure security and greater self-regulation. This approach relies on building on what already exists within settlements; creating local registers and issuing occupation certificates. Schreiber and Barry (2017), have produced an excellent analysis of this approach and its use in Cape Town, South Africa which resulted in the establishment of a local registry office and the issue of 6470 occupancy certificates in the Monwabisi Park and the associated improvement in municipal services. While the occupancy certificates do not provide legal title, within the community they are accepted as evidence of occupancy and can be used by householders to access services and protect against attempts to occupy the land. The register is maintained by the community itself and with the support and recognition of municipal officials

Lessons learned

- Local registries can provide community-based ledgers that identify and track occupancy, households and changes in informal communities benefitting the local community
- These registers do not replace formal systems. Rather they are a stepping stone towards formalisation as they map existing people-place relationships
- These registers provide real benefits (access to services, protection against incursion) to the community

Case E: Other solutions for Local Registers: There are other developments taking place that can also provide local registry solutions which are currently being piloted in several countries

SOLA. The original SOLA software for land administration agencies that require a secure, robust and transparent tenure registration solution. Registry provides integrated registration and cadastral functions, case management and a LADM compliant database (see http://www.flossola.org/). SOLA does not use any commercial tools and can be completely run with zero license cost (in case of deployment on Ubuntu or other free Unix platforms).

SOLA Platform and tools	Product
Development environment	NetBeans
Development platform	Java EE 7
Web application framework	JSF, METRO WSIT
Programming language	Java
Client platform	Java SE, SWING
GIS tools	GeoTools, GDAL
Database Management System	PostgreSQL Server plus PostGIS
Web server	GlassFish
Operating system	Windows/Ubuntu/Mac (cross platform)

The original SOLA software has now evolved into a suite of solutions under the SOLA umbrella (See Table Two below), and SOLA is currently being piloted in a number of countries including Ghana, Nepal, Lesotho, Nigeria, Sierra Leone, Samoa (pilot and operational).

Table Two: SOLA Functionality

- **Registry** - The original SOLA software for land administration agencies that require a secure, robust and transparent tenure registration solution. Registry provides integrated registration and cadastral functions, case management and a LADM compliant database.
- **Systematic Registration** - Designed to support systematic registration activities where tenure information is collected for the first time. Systematic Registration produces public display listings and maps, generates title certificates and can transfer data to district or national land offices enabling centralized control and maintenance of tenure records.
- **State Land** - Based on the original SOLA software, State Land assists both national and local governments to manage land and property that is owned, occupied or controlled by the state from acquisition through to disposal.
- **Open Tenure** - A mobile application developed for both Andriod and iOS devices that facilitates recording of tenure rights by a community
- **Community Server** - A web based portal for recording and moderating the tenure rights captured by a community. Community Server is integrated with the Open Tenure mobile solution but can also be used independently.
- **Web Admin** - A web based administration console providing a single port of administration for all SOLA solutions deployed within a host organisation.

(source: http://www.flossola.org/index.php/about/about-sola)

OpenTenure/Community Server. Open Tenure is a mobile application developed for both Android and iOS devices that allows citizen recording of tenure rights.

People designated as Community Recorders use their mobile device in the field to record details of a tenure right claim describing the tenure right and all owners (rightsholders) and a map of the boundaries

of the land claimed. Photos of the owner(s), the land claimed and supporting documents can captured and linked directly to the claim.

When the recording of a claim is complete, the Community Recorder uploads a claim to the Community Server for community-based review and moderation. The Community Server web application also publishes "community recognized" tenure rights and can generate a certificate for owners of a recognized tenure right. Open Tenure is designed to work where internet connections are unavailable or unreliable. Likewise, Community Server can be implemented for internet access (typically through an IaaS Cloud Server) or on as a stand-alone PC connected to a wireless router allowing mobile devices loaded with Open Tenure to upload and download claims/recognized tenure rights and imagery data wirelessly.

Community Server Stores and provides web access to community collected tenure data and manages the processes leading to the community recognition of tenure rights. Aerial or satellite imagery of the community area can be hosted using any WMS compliant map server and configured for download by the OpenTenure mobile apps. Community Server is cloud compatible and LADM compliant. Community Server doesn't use any commercial tools and can be complete run with zero license cost (in case of deployment on Ubuntu or other free Unix platforms).

Name	Product
Development environment	NetBeans
Mobile Development environment	Android Studio, Xcode
Development platform	Java EE 7
Web application framework	JSF, JAX-RS (Jersey)
Web client frameworks	JQuery, OpenLayers, JQuery plugins
Programming language	Java
GIS tools	GeoTools, GDAL
Database Management System	PostgreSQL Server plus PostGIS
Web server	GlassFish
Operating system	Android/iOS/Windows/Ubuntu/Mac (cross platform)

OpenTenure and Community Server are officially published on GitHub - https://github.com/OpenTenure. They both have an open-source license - BSD3. Implementation countries – Myanmar (pilot), Angola (pilot/operational), Uganda (pilot), Guatemala (pilot), Sierra Leone (pilot in March 2018), Nigeria (pilot).

See
http://www.flossola.org/index.php/solutions/open-tenure (OpenTenure),
http://www.flossola.org/index.php/solutions/community-server (Community Server).

Lessons Learned

- There is a growing availability of open source platforms and tools that can be used to capture, validate and manage land rights at the local level which can be relatively easily commissioned and deployed.
- These systems are digital and based on simple platforms (android devices, phones, tablets etc.).
- This approach allows communities to initiate their own programmes, however where existing laws and regulations exist, it is important that these are reflected in these tools or there is a risk they will lack legitimacy.

4. Conclusions

The starting point for the design of fit for purpose systems for land administration is the legislation. There are clear variations in how this is drafted and the manner in which it is to be applied and implemented, particularly with regard to local systems. Whilst the legislation may be sympathetic to local systems, whether these are based on, or make provision for customary norms or local legislation, the implementation of laws, however well-meaning are often perceived as being imposed and/or a challenge to local systems. This perception might be mitigated, somewhat, if subsidiary legislation, regulations and procedures are drafted and applied flexibly whilst maintaining the original spirit of the legislation. These must not be perceived as a challenge to local authorities and customary norms but need to be designed, incrementally implemented, to meet local requirements and public expectations.

In some countries, and in geographically specific areas within those countries, local customary authorities are weakening in the face of a combination of government legislation, land use pressures, demographics and increasing economic growth. Challenges to land rights such as investment, government infrastructure etc. come from without. Local systems must therefore have clear lines of defence against illegal and inappropriate expropriations, whist not acting as a constraint to any real opportunities that may arise.

None of these observations are new. What is new, and still evolving, is the response to these challenges by Government and local authorities. Clarification of rights and resolution of land use issues under first registration and regularisation procedures is a major undertaking that has been demonstrated to be both beneficial and feasible. However, this must be supported by adequate sustainability planning that enables and facilitates local transactions – often at village level. This requires careful design and public consultation for cost efficient service delivery involving district and village institutions which depends on effectively managing and storing public records to enable these to work effectively.

In the design process lessons must be taken from local informal and customary systems to maximise public buy-in with a view to 'do no harm'. Local systems are already working and often serve communities well. Designs must adhere as much as possible to the current arrangement and even reflect its best features in the design process. Adopting this approach will help to ensure ownership and public buy-in to land administration systems and the advantage of new safeguards.

There are a number of key lessons that emerge from the case studies.

1. The fit for purpose approach combined with technology allows us to initiate both small and large-scale registration programmes at much smaller unit costs than was previously possible – costs of $7 per parcel are quoted for Rwanda, and $10 per parcel for Tanzania LTA while Ethiopia is aiming to achieve less than $5 per parcel.
2. It is essential that there is a system in place to accept the results of any mass registration programme and that the putting in place of a functional land administration infrastructure should proceed in parallel with the registration.
3. Very large, top down centralized land administration systems can absorb enormous amounts of time and resources and often fail to deliver on promises; we need an alternative approach.
4. Technology now allows us to produce local register systems that can be deployed at district or even village level that can be fully in line with national laws and regulations.
5. There are now a number of open source digital tools available to support rights registration and the management of transactions that can be adapted for local use. While the software may be

free, there are costs for customization and there need to be clear arrangements in place for system management and data security.

6. Data captured on local systems can be migrated to national systems when they become available providing that there is agreement on the underlying data model, content and mapping.
7. Ownership, involvement, awareness at local levels are essential for the local approach to work and will require facilitators and
8. There has to be clear, visible benefit to citizens and communities arising from a registration programme and an improved land administration system
9. In informal communities such as townships where there is no tenure legitimacy, local registers can facilitate an incremental improvement in tenure.
10. These developments are taking place and involving actors other than just the traditional technical and professional staff from land administration agencies.

By way of final conclusion, we think a paradigm shift is coming. Just as traditional national mapping authorities are no longer the sole providers of geographical data, we think there is a change coming in the way that national land registries build and maintain their data. How that will emerge and who will be the new data providers and managers is yet to be seen, but we would argue that local registers will be a key element.

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Annex One: List of locations where STFM is currently in use or being piloted.
(from C Lemmen, March 2018)

Uganda
- With Actogether, 89 settlements profiled in 14 municipalities with an estimated 180,000 households; for settlement upgrading, planning and tenure security improvement
- With KCCA, 5 settlements were enumerated and mapped; improving tenure security is underway, KCCA to use data for planning and for service delivery.
- With Ministry of Agriculture, STDM was used to map smallholder farm in Bugala Island to link productivity and tenure security
- With UCOBAC, STDM is being used to issue customary land certificates; Support to government with the same purpose is also underway

Kenya
- STDM is used in enumeration and mapping in 1 slum settlement in Nairobi and 2 settlements in Mombasa; Government approved settlement plan and community land certificate is being processed in Nairobi; Mombasa county issued occupancy certificates to be converted soon to titles.
- STDM implemented in Bomet County to secure grazing land rights and access to water points
- STDM implemented in Mwea to secure irrigation rights and document farm land allocation
- STDM was used to establish a Land Information System in Turkana County; to be replicated in other 7 counties through FAO VGGT programme.

D R C
- STDM applied in land mediation and land tenure security improvement in Luhonga and Masiani in North Kivu with Beni University (UCBC)
- STDM is being applied for Community Land Use Planning and establishment of LIS in at least three provinces

Namibia
- STDM used for implementation of the Flexible Land Tenure Act in order to promote tenure security in Gobabis Municipality

Philippines
- STDM implemented to enhance settlement planning and upgrading in Muntinlupa City; about 10,000 households

Zambia
- STDM used for customary land certification in Mungule and Chamuka Chiefdoms; customary land certificates are being issued.
- STDM used for occupancy licenses in Kanyama informal settlement; about 10,000 households will receive occupancy licenses

Nepal
- STDM was used to map and enumerate earthquake affected families in three sites in Nepal; data generated is being used to access grants from government and other infrastructure work

Iraq
- STDM was implemented in Sinuni municipality for settlement upgrading and tenure security improvement; land certificates were issued

Sudan
- STDM is implemented in the context of village land use planing and customary land recognity in post conflict setting

Past and other experiences:

- Piloting on STDM family lands in **St Lucia and St Vincent**
- Implementation by Development Workshop in **Angola**
- Piloting of STDM in Colombia for settlement planning and upgrading