Engaging the Land Sector Gatekeepers in Crowd sourced Land Administration

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SUMMARY

Comprehensive Land Administration Systems (LAS) exist in only 50 mostly OECD countries and only 25 percent of the world's estimated 6 billion land parcels are formally registered in LAS. This leaves a large section of the world's population with reduced levels of security of tenure, trapping many in poverty. One potential solution to the security of tenure gap is 'crowdsourcing'. Establishing such a partnership between land professionals and citizens would encourage and support citizens to involve themselves in directly capturing and maintaining information about their land rights.

However, the crowdsourcing initiative challenges the status quo and is perceived as a particular threat to the current gatekeepers; National Mapping and Cadastral Agencies, the surveying and legal professions and those land and property investors taking advantage of the current chaos. This poses particular problems when designing pilot / proof of concept projects to ensure engagement with these key stakeholders to bridge crowd sourced land rights with formalised land rights. This paper proposes an approach to designing and implementing the crowdsourcing pilots and explores the range of decisions made in introducing radical change into a very conservative land sector and ensuring that citizens accept this opportunity of empowerment.

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1. INTRODUCTION

Land Administration Systems (LAS) provide the formal governance structures within a nation that define and protect rights in land, including non-formal or customary institutions. Despite their pivotal support of economic development, effective and comprehensive LAS exist in only 50 mostly OECD countries and only 25 percent of the world's estimated 6 billion land parcels are formally registered in LAS. This leaves a large section of the world's population with reduced levels of security of tenure, trapping many in poverty. Missing and dysfunctional LAS can precipitate problems such as conflicts over ownership, land grabs, environmental degradation, reduced food security and social unrest.

This security of tenure gap cannot be quickly filled using the current model for registering properties that is dominated by land professionals. There are simply not enough land professionals world-wide, even with access to new technologies. To quickly reduce this inequality we need new, innovative and scalable approaches to solve this fundamental problem and global challenge.

One potential solution to the security of tenure gap is 'crowdsourcing'. Crowdsourcing uses the Internet and on-line tools to get work done by obtaining input and stimulating action from citizen volunteers. It is currently used to support scientific evidence gathering and record events in disaster management, as witnessed in the recent Haiti and Libya crises. These applications are emerging because society is increasingly spatially enabled. Establishing such a partnership between land professionals and citizens would encourage and support citizens to involve themselves in directly capturing and maintaining information about their land rights.

Following the launch of the Crowdsourcing Support of Land Administration initiative in November 2011 (McLaren, 2011) there has been considerable interest from UN-FAO, World Bank, DFID (UK) and RICS in piloting the concept. The pilots would have the following aims:

- to test the concept of participatory or crowd sourced approach to capturing land rights information to support land administration and to understand citizens' and communities' reaction;
- to understand what land rights information needs to be captured along the continuum of rights to provide a fit for purpose level of security of tenure (this will vary across cultures);
- to identify a range of technology tools available, affordable and appropriate to support the approach; and
- to judge how best to engage with Land Administration authorities in adopting radical change.

However, the crowdsourcing initiative challenges the status quo and is perceived as a particular threat to the current gatekeepers; National Mapping and Cadastral Agencies, the surveying and legal professions and those land and property investors taking advantage of the current chaos. This poses particular problems when designing pilot / proof of concept projects to ensure engagement with these stakeholders to bridge crowdsourced land rights with formalised land rights. This paper details the proposed approach to designing and implementing the crowdsourcing pilots (McLaren, 2012) and explores the range of decisions made in designing the pilots to introduce radical change into a very conservative land sector and to ensure that citizens accept this opportunity of empowerment.

2. OBJECTIVES OF PILOT PROJECT

There are many dimensions to the objectives of the proposed pilot project: ranging from understanding citizens' reaction to crowdsourcing through testing technology to judging how best to engage with Land Administration authorities. However, here are the key objectives:

- to test the concept of participatory or crowdsourced approach to capturing land rights information to support land administration;
- to understand citizens' and communities' reaction and engagement with the approach;
- to judge how best to engage with Land Administration authorities to bridge crowdsourced land rights with formalised land rights;
- to engage the surveying profession / land professionals in the crowdsourcing approach to establish a new relationship with citizens;
- to understand what makes a good 'trusted intermediary' of 'proamateur' to support the capture and maintenance of land rights information;
- to understand what land rights information needs to be captured along the continuum of rights to provide a fit for purpose level of security of tenure (this will vary across cultures);
- to identify a range of technology tools available, affordable and appropriate to support the approach; and
- to establish approaches for sustaining the maintenance of land right information after the pilot and expanding its use.

As with solutions to Land Administration, there will be no single solution for crowdsourcing support of Land Administration; the cultural, legal, land tenure, administrative and professional landscapes vary widely. Therefore, the project recommends initially running three pilot projects in a variety of environments to gather as much experience as possible to shape and guide the way forward.

3. GOOD PRACTICE IN IMPLEMENTING CROWDSOURCING

Prior to specifying the approach to piloting crowdsourcing in Land Administration, it is worthwhile reviewing some of the key lessons learned from wider crowdsourcing / participatory mapping initiatives (World Bank, 2012) that could be adopted in this project.

This will help shape the pilot and lower the associated risks.

3.1 Demand driven

The technological aspects of crowdsourcing are usually the easiest ones. The more difficult and challenging factors are community engagement, governmental cooperation, sustainability, and impact. In order to maximise the chances that the outcome of crowdsourcing will satisfy community needs and that the information will be used by relevant stakeholders, the design of the pilots should be as demand-driven as possible. The project needs to identify the target audience and have specific aims that are clearly understood by all stakeholders.

The participants need to understand that they are obtaining something that they value at the end of the process. Therefore, it is very important that formal recognition of land rights by the neighbours and authorities is clear and also that the participants understand what they will get and how they will benefit. It is only worth giving someone tenure security if (a) they feel that their tenure is in some way tenuous and that someone might kick them off their land if they do not get formal recognition; or (b) they want to do something with the land, such as develop it, sell or lease it, get a license to grow a cash crop, mortgage it, etc.

3.2 Timing of Initiative Implementation

The timing of project implementation is crucial for success. For example, there is no point in attempting to implement this work in rural areas either in the planting season or harvesting season.

3.3 Establish Partnerships on the ground

The effectiveness of crowdsourcing depends to a large extent on the cooperation of local communities. To ensure that the outputs from crowdsourcing will be used, sustained, and further developed upon completion, local Civil Society Organisations (CSOs), groups, and community members should be the entry point to the creation of the crowdsourced information and sense that they "own" it from its inception.

The crowdsourcing process should therefore rely on robust partnerships with groups and organisations that are permanently active in the community. Such partnerships are important at all stages of the crowdsourcing process:

- In the beginning, local CSOs, public officials, or civil society activists may help identify the information needs and demands of the community, and offer guidance with regard to the implementation of crowdsourcing of land rights within the particular local context.
- Then, local partners can help engage and mobilise the community to take part in the crowdsourcing process, organising community forums, igniting public interest in the platform, helping recruit community members to collect land rights information, and supporting them throughout the crowdsourcing process.

- After the completion of the land rights capture, local partners can serve as its "hosts," ensuring the utilisation and further development of the information.

3.4 Outreach and mobilisation

The core of crowdsourcing land rights is community engagement and empowerment, and thus local communities should be as aware of the crowdsourcing process as soon as possible. An early, major public awareness activity is crucial for success of the pilot work. Several aspects should be noted in this respect:

- **Infomediaries**: Initial outreach efforts should focus on potential "*infomediaries*"—local community leaders, social activists, and citizen journalists who could spread the word about crowdsourcing land rights, mobilise local residents to participate in the pilot process, and sustain community interest in the process. It is important to identify early on potentially committed *infomediaires* and keep them as informed and engaged as possible throughout the process.
- **High profile endorsements:** Public endorsements by high profile community leaders or politicians can be valuable to ignite initial public interest and draw attention to the pilot process.
- **Outreach to marginalized groups:** A special effort should be made to reach out to under-represented and marginalised groups in the community, who can be considerably empowered by participation in the pilot process. It may be particularly valuable to engage young women in the pilot activities, thus offering them skills that can be valuable for their future employment pursuits.
- **Communication of benefits**: Communicating the benefits of crowdsourced land rights in communities with low technological capabilities can be challenging. It is therefore important to convey to community members the benefits of crowdsourcing land rights information, highlighting the importance of acquiring technological skills, securing tenure for the community and thus helping improve the provision of public services, and amplifying the digital presence and voice of the community.
- **Persistence:** A persistent outreach approach is important for two reasons. First, it can help better understand the needs and concerns of the community, and adjust the crowdsourcing process accordingly. Further, it can increase the chance that the resulting land rights information will be widely used by the community and other stakeholders.

3.5 Capturing land rights information

The example of Interactive Community Maps (ICM) process (similar to crowdsourcing land rights) largely targets marginalised and poor communities, and thus it cannot rely on sophisticated and expensive technological tools. The tool kit for ICM is therefore basic: GPS units; laptops; photo cameras; video cameras; printer/scanner; batteries and chargers; pelican case. The overall costs of such equipment should not exceed $4,000-$5,000. Additionally, it is necessary to find space where community mappers would undergo trainings (2 - 3 weeks to ensure that public engagement skills are developed) and work with the mapping software. Be

prepared to use a variety of data capture techniques, including ground surveying using GNSS and tracing from satellite imagery. Capturing story telling is a useful technique for empowering residents by amplifying their voice and helping the sustainability of projects.

3.6 Effectively using the crowdsourced information

The information can be used in a variety of ways to improve service provision in the community and provide community members a platform where they can articulate their issues and needs. However, the working assumption of the crowdsourcing process should be that the information will be used by its stakeholders if it complements their existing strategies and can be seamlessly integrated into their on-going activities. Therefore, the current practices and information of the requirements of the stakeholders should be recorded at the beginning of the project prior to the intervention.

The project should also take measures to protect the information and ensure its appropriate use, to make sure that it is not used against the stakeholders, or in a way that doesn't match their interests and wishes.

3.7 Sustaining the land rights information

Sustainability is one of the most challenging aspects of crowdsourcing. While detailed land rights information can be created within several weeks, updating and sustaining the information requires long-term strategic planning and commitment. While initial crowdsourcing efforts are usually supported by development partners and ignite public interest, it may be difficult to sustain this enthusiasm once the land rights information is completed and the external partners leave the community.

4. OVERALL APPROACH TO PILOT PROJECT

There is a fundamental choice to be made in the approach to be adopted by the project: either top-down or bottom-up. The choice significantly affects the process of implementation, the role of the stakeholders and ultimately the success of the project.

The crowdsourcing initiative has been designed to radically change the status quo in the Land Administration domain. However, the principal defenders of the status quo are Land Administration agencies and the surveying profession (and land developers who take advantage of the disorder in the land sector). Therefore, a purely top-down approach, where these gatekeepers are given significant roles, is considered high risk.

Crowdsourcing based initiatives, by definition, are grass roots based and are normally created to challenge formal systems or to offset constraints and inadequacies. The OpenStreetMap crowdsourcing initiative is an excellent example. Therefore, a bottom-up crowdsourcing initiative for land administration would seem more appropriate where strong partnerships are formed amongst local stakeholders, including local communities, local government, NGOs and Civil Society Organisations (CSOs). However, the bottom-up approach to crowdsourcing

the community recording of land rights may just produce "islands" of land rights remote from the existing formal systems. This would limit the ability of communities to protect tenure interests and would inevitably reduce demand for the service.

The aim of this initiative is to enable communities to protect tenure interests and encourage them to engage in more formalised systems, where greater protection and opportunities are available; for those with no rights it will generate security of tenure and for those with customary rights it will create opportunities to engage in the land market. The initiative needs to create opportunities to bridge community based systems with these formalised systems. Therefore, a hybrid approach is proposed for this project. The project would be bottom-up, primarily run by local stakeholders, but with some oversight by Land Administration authorities taking a minor role in the pilots to provide guidance on how land rights captured can be formalised wherever possible. This hybrid project approach would also engage with Professional Surveyors' Organisations to increase surveying capacity by training cheap para-surveyors (proamateurs) that are volunteers from local communities or land right holders themselves.

The Land Administration and National Mapping authorities do have an important role to play and the pilots should consider including further data capture activities that would potentially attract their greater involvement and support. These incentives could include, for example:

- Using crowdsourcing data to also update old base maps which is a responsibility of national mapping agencies;
- Targeting crowdsourcing exercise in countries that have done national or regional systematic registration of land rights, e.g. Rwanda or Ethiopia, and using the data to fill in the spatial data (or as in Ethiopia spatial framework) gaps;
- Undertaking crowdsourcing in countries that have completed large areas of systematic demarcation of land parcels (especially producing Survey Plans or General Plans) some time ago that have been overtaken by sub-divisions. Crowdsourcing could be used to collect spatial data for sub-divisions;
- Crowdsourcing in very dense urban slums with very tiny land parcels (where detailed boundary surveys are meaningless) to generate land rights data and socio-economic data required for planning the updating of infrastructure and social services, e.g. Kibera in Kenya.
- Using crowdsourcing to create employment for para-professionals (para-surveyors and semi-skilled GIS/IT experts) such as those in Rwanda since its national program is now virtually complete.

In circumstances where there is limited top level support or this support erodes over time then a purely bottom-up approach will have to be adopted for the pilot. This bottom-up approach may have to be initially implemented to stimulate attention and to demonstrate the feasibility of crowdsourcing to the central government organisations.

5. SCOPE OF PILOT PROJECT

This section outlines the potential scope of the project and makes recommendations on a set of criteria to guide the locations of the pilots.

5.1 Activities

The primary activity of the project is to capture land rights information (including existing land rights information), obtain societal evidence and authenticity of the land rights and, where possible, secure an appropriate level of formal acceptance of the land rights by the Land Administration authorities. The scope should include formal as well as customary tenure types.

It is highly likely that the pilot areas selected do not have any corresponding base / topographic mapping. It is therefore an opportunity for the project to capture other information of interest to the community and authorities providing services. This could include:

- Community mapping – this could be captured from some sort of aerial imagery, or looking forward, some drone/balloon mapping so there is some sort of base information. This innovative approach will be useful in highly dynamic environments like slums and informal settlements;
- Other socio economic information decided by Civil Society Organisations (CSOs), e.g. garbage, water, health and other socio-economic information;
- Community based reporting and media to support more effective sustainability of the initiative beyond the pilot phase.

The range of information requirements to be included in the pilots will be determined at the start of the projects through engagement with the communities. It would be beneficial to have one pilot that hits the ground cold and other pilots that build on existing initiatives with capacity on the ground.

Recommendations:
- There should be a number of pilots – maximum three, depending on funding.
- Pilots should include both formal and customary tenure types.
- Investigate the need to also capture base mapping and socio-economic information.
- Consider pilots that build on existing information service initiatives (preferred) as well as green field sites.

5.2 Type of Communities

At the initial stages of testing crowdsourcing, it would be beneficial if the communities selected for the pilots have a degree of social stability, have established CSOs and have a meaningful level of engagement with Local Government. Other participatory mapping

projects have been more successful if the community representative on local government is involved in the project and provides some form of endorsement. This makes it easier to engage with the communities.

Pilots should be selected in a variety of environments to experience the range of problems in different living environments. The big decisions here are:

- **Rural vs. urban vs. peri-urban:**
  Initially probably best to focus on a rural area where there is some social stability and where there is no requirement for higher spatial accuracies to be recorded. However, it is important to be cautious about the scale of the pilot area – some rural / forest community settings may be too large.
- **Customary vs. formal tenure:**
  It would be good to have a mixture of these tenure types. STDM can be used to support the capture and management of customary tenure land rights information – although these will be more dynamic in nature.
- **Informal Settlements / Slums:**
  It would be good to include some informal settlements / slums in the scope of the pilot to understand the issues of crowdsourcing in these environments, such as overlapping claims – probably a second phase.

Recommendations:
- Pilots should be conducted in communities with relative social stability.
- Pilots should be selected in a variety of environments across the urban, peri-urban and rural environments.
- Pilots should include formal and customary tenure land rights.

5.3 Geographical Extent

Each of the pilots should start with a community that incorporates between 500 and 700 parcels. However, the pilot location should allow for expansion into neighbouring communities if progress in defining and agreeing land rights is initially effective.

In rural and forest settings, the geographical extent of the parcels can be very large. Pilots should be selected to avoid parcels with large geographical extents.

Recommendations:
- Initial pilots should include a between 500 and 700 parcels.
- Pilots should have the ability to network and expand to neighbouring communities.

5.4 Approach to Land Rights Capture

The initial approach to crowdsourcing in the project would not involve sporadic (ad hoc), open crowdsourcing where any member of the community could directly capture and record

their land rights. Instead 'trusted intermediaries' would be used to help community members capture their land rights in a more structured approach (systematic community run initiative, a systematic customary run initiative, a systematic land agency initiative, e.g. first registration). These trusted intermediaries would be trained and supervised by local surveyors / land professionals. However, some communities may opt for real crowdsourcing with ad hoc capture of land rights within their communities.

Engaging with communities and building trust around sensitive issues such as land ownership can be very time consuming. Therefore, it would be ideal if pilot areas could be selected where NGOs are active and already have trusted intermediaries to collect health and agricultural information, for example. These existing trusted intermediaries could also be directly used by this pilot project.

The pilots will include the maintenance of the recorded land rights and responsibilities for this process will have to be determined.

Recommendations:
- Initially a systematic approach to land rights capture would be adopted, with ad hoc capture (true crowdsourcing) being a later phase.
- Trusted intermediaries would be trained and supervised by local surveyors to capture land rights information.
- Pilots should build on the infrastructure and capacity of existing projects where possible.

5.5 Land Rights Information to be Recorded

The specific land right information to be captured along the continuum of rights will be influenced by the culture of the society, type of tenure, technology adopted and skills of trusted intermediaries within the pilot. For each pilot, it will have to be determined what information has to be captured and verified to provide security of tenure. The range of information and capture techniques could include:

- Parcel centroid:
  - marked up paper maps or on printed aerial imagery & digitally photographed.
  - recorded using the GNSS capability.
  - identified and recorded on imagery, or by providing verbal recording.
- Parcel boundaries:
  - a textual description of the boundaries.
  - a verbal description of the boundaries.
  - video and commentary of the boundaries – this could include contributions from neighbours as a form of verification (mobile phone numbers of neighbours could be provided).
  - marked up paper maps & digitally photographed.
  - identified and recorded on imagery.
  - boundary points recorded using the GNSS capability.
- Information about owners.

    - This will often include the recordation of family groups and guidance should be given to the *intermediaries* to ensure recordation of females (including junior wives, etc.), dependants (such as widows, mentally impaired, etc.), absentees and rights such as rights of access or other easements, e.g. the right to access forest, etc.
- Documents supporting land rights
    - Documents could be photographed and verbal information could be videoed.

Once the land rights have initially been recorded for a community or part of a community, it is imperative that the results are on public display so that the whole community can see what and who is recorded. This is essential as a protection against errors and abuse, and for public information and for societal acceptance.

The pilots could adopt a strategy to improve levels within the continuum of rights and continuum of accuracy for the parcels involved in the pilots over time. For example, the rights for the entire community could be recorded initially and then individual parcel rights captured as a subsequent phase of the pilot. Another example of incremental improvement might involve upgrading an initial centroid recording phase with the definition of parcel boundaries. In this example, initial phase a parcel could be simply defined by the coordinates of the centroid of the parcel and a national insurance or tax reference of the owner. A subsequent phase would record the coordinates or video of the parcel boundary points and more detailed land rights information.

Open standards will be used wherever possible. For example, land rights information will conform to the LADM/STDM model and the software technology components will be Free and Open Source Software (FOSS).

The lifecycle of pilots should be long enough to ensure that land rights maintenance activities are included in the pilot. This will support more effective sustainability. Therefore, pilots should be designed to have a timeframe between 12 and 18 months.

Recommendations:
- Introduce the concept of incremental improvements along the continuum of rights and continuum of accuracy during the lifecycle of the pilots until fit for purpose is achieved.
- Pilots will adopt open standards, e.g. the LADM/STDM model and FOSS, where appropriate.

5.6 Bridging to Formal Land Administration Systems

Crowdsourced land rights are verified recordings (using societal evidence) which are largely unconstrained by laws and forms of registration, which vary from country to country. Despite this separation, the initiative should define a generic process for the transition of the verified recording of land rights to more formalised registered land rights. This bridging could possibly be provided by an extension to Solutions for Open Land Administration (SOLA) in much the same way as SOLA is being extended to cater for First Registration. This would be

a key role for the Land Administration authorities. This bridging approach fits well under the implementation of the Voluntary Guidelines for Responsible Governance of Tenure – enabling technology.

Recommendations:
- Build a generic process for the transition of the crowdsourced verified recording of land rights to more formalised registered land rights.
- Ensure that the implementation of the initiative is consistent with the Voluntary Guidelines for Responsible Governance of Tenure.

5.7 Legal Framework

One of the objectives of the project is to formally register the land rights with the Land Administration authority. The underlying legal framework within the corresponding countries hosting the pilots must have the flexibility to accommodate less stringent definitions of the land rights. The legal framework within the pilot countries must provide the beneficiaries with what they demand, i.e. tenure security or access to land markets, and the country selection is therefore also very important. For example, the legal framework in Malawi would support this crowdsourcing approach. (However, success would require the Surveyor General to support the approach and give his agreement).

Recommendations:
- Ensure that the legal framework within the pilot areas is flexible enough to accommodate land right definitions along the continuum of rights and has the capability to lead to formal rights.

5.8 Sustainable Maintenance of Land Rights

A key deliverable of the pilot project is to provide sustainable resources, processes and support services to continue the maintenance of the captured land rights and to expand the services to capture new land rights information in surrounding communities. It is therefore essential that the intermediaries trained during the pilot are retained and provided with sufficient support and incentives to convince them to continue. One way to achieve this is to combine the intermediary's land rights capture and maintenance responsibilities with other information services activities. This combined job would then have a better chance of generating sufficient income to retain the intermediary.

The support services established during the pilot with the technical solution and infrastructure providers, professional surveyors, NGOs and national land administration authorities, for example, need to continue beyond the pilot period. Training courses for intermediaries need to be readily available to quickly train new intermediaries when current intermediaries resign or stop performing.

To retain public interest in the project it would be useful to include community based reporting and media in the project rather than just include land rights information that may not

involve high maintenance cycles.

Recommendations:
- Combine the intermediary's land rights capture and maintenance responsibilities with other information services activities to generate sufficient income to retain the intermediary.
- Continue to provide support services established during the pilot with technical solution and infrastructure providers, professional surveyors, NGOs and national land administration authorities.

5.9 Timeframe

The lifecycle of pilots should be long enough to ensure that land rights maintenance activities are included in the pilot. This will support more effective sustainability. Therefore, pilots should be designed to have a timeframe between 12 and 18 months and avoid any potential community conflicts on timing, e.g. don't try to work in rural areas either in the planting season or harvesting season.

Recommendations:
- Duration of pilots would be between 12 and 18 months.

6. PARTNERS AND THEIR ROLES

It is essential that this initiative attracts the support of a range of partners in designing and implementing these pilots. The inclusion and role of the partners in pilots will vary locally and from country to country depending on their presence and their level of involvement in land governance. The range of potential partners will include:

- **Federal Land Institutions:**
  Ideally, it would be good to have the support of the federal agencies and their regional offices involved in land administration and management. The pilot needs to form a bridge to formalise the land rights recorded in the pilots through support and cooperation with these national agencies.
- **Local Government:**
  This form of participatory mapping is a great opportunity to also capture socio-economic information of interest to local government who deliver local services. Therefore, a local government partner is an essential partner in these types of projects – as long as there is trust between the community and the local government.
- **NGOs:**
  At least one of the pilots should be established where there are NGOs already operating locally with information services initiatives, such as collecting health and agricultural information. The crowdsourcing pilot could then piggy back on their project and share resources. NGOs like Slum Dwellers International (www.sdinet.org)

should be encouraged to support the pilot.

- **Civil Society Organisations (CSO):**
  CSOs may help identify the information needs and demands of the community, and offer guidance with regard to the pilot implementation of crowdsourcing of land rights within the particular local context. Local partners can help engage and mobilise the community to take part in the crowdsourcing process, organising community forums, igniting public interest in the platform, helping to recruit community members to collect land rights information, and supporting them throughout the crowdsourcing process.
- **Local Surveyors Organisations:**
  Local surveyors will be needed to train / supervise / quality assure the trusted intermediaries as they capture and manage the land rights information. The associated Surveyors Organisation need to be brought on board. FIG and RICS should also provide support.
- **Private Sector Technology Companies:**
  The development of new technical platforms to support the crowdsourcing pilots would be enhanced by the direct involvement of private sector technology companies. Sponsorship from position technology companies, mobile phone manufacturers, mobile phone service providers and mobile phone infrastructure companies would be excellent. The focus of this pilot is directly within their domains and could create good marketing opportunities.
- **Universities:**
  University research capability should be engaged to investigate, and potentially develop, technical solutions. For example, Imperial College London and University of Washington (Seattle) have already developed crowdsourcing technical toolkits. As well as technical research, it would be beneficial to have Social Psychologists / Human Geographers to research communities' perception of security of tenure before and after the pilot projects; this would help to understand and redefine security of tenure along the continuum of rights that is fit for purpose.

7. LINKING TO WIDER TECHNICAL COMMUNITIES

The innovative use of mobile technology is changing the developing world and is becoming a global development tool. There are many professional communities using mobile phone technologies to deliver innovative services to developing countries. See the recent World Bank e-sourcebook on ICT and Agriculture (World Bank, 2013) for some excellent examples. It is there imperative that this initiative shares experiences and knowledge with these wider development communities, both globally and locally.

The adoption of open source approaches to the project provides the opportunity to build open source communities in this application area. This will help to build capacity locally and provide revenue generating opportunities.

8. CONCLUSIONS

The aim of this initiative is to enable communities to protect tenure interests and encourage them to engage in more formalised systems, where greater protection and opportunities are available; for those with no rights it will generate security of tenure and for those with customary rights it will create opportunities to engage in the land market. The initiative needs to create opportunities to bridge community based systems with these formalised systems. Therefore, a hybrid approach is proposed for this project. The project would be bottom-up, primarily run by local stakeholders, but with some oversight by Land Administration authorities taking a minor role in the pilots to provide guidance on how land rights captured can be formalised wherever possible. This hybrid project approach would also engage with Professional Surveyors' Organisations to increase surveying capacity by training cheap para-surveyors (proamateurs) that are volunteers from local communities or land right holders themselves.

The Land Administration and National Mapping authorities do have an important role to play and the pilots design has consider including further data capture activities that would potentially attract their greater involvement and support. These incentives could include, for example, crowdsourcing to update old base maps and to collect spatial data for sub-divisions that have overtaken large areas of systematic demarcation of land parcels completed some time ago, and to create employment for para-professionals (para-surveyors and semi-skilled GIS/IT experts) in countries, such as those in Rwanda, where their national programs are now virtually complete.

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BIOGRAPHICAL NOTES

Robin McLaren is director of Know Edge Ltd a UK based, independent management consulting company formed in 1986. The company supports organisations to innovate and generate business benefits from their geospatial information. Robin has supported national governments in formulating National Spatial Data Infrastructure (NSDI) strategies. He led the formulation of the UK Location Strategy and has supported similar initiatives in Kenya, Hungary, Iraq, Western Australia and Canada. He has also supported the implementation of the EU INSPIRE Directive in the UK and was recently a member of the UK Location Council. Robin is also recognised as an expert in Land Information Management and has worked extensively with the United Nations, World Bank and EU on land policy / land reform programmes to strengthen security of tenure and support economic reforms in Eastern and Central Europe, Africa, Middle-East and the Far-East. His recent research focuses on the innovative use of crowdsourcing to support citizens in directly capturing their land rights.

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