EVANS SCHOOL OF PUBLIC POLICY & GOVERNANCE
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Evans School Policy Analysis and Research (EPAR)

Land Tenure Technologies
Summary of Selected Technologies

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EPAR Technical Report #357a

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Introduction

For EPAR Technical Report #357, we collected information on 38 land tenure technologies. This information includes details about who produced the technology, features of each technology, who the users of the technology are, implementation methodology, the scale of implementation and outcomes, and any financial information. From the list of 38 technologies, we chose ten to summarize in more detail. These technologies cover a range of technology platforms, activity types (Type I – enabling activities, Type II – data collection activities, Type III – titling activities), target geographies, and clients served.

Contents

EPAR uses an innovative student-faculty team model to provide rigorous, applied research and analysis to international development stakeholders. Established in 2008, the EPAR model has since been emulated by other UW schools and programs to further enrich the international development community and enhance student learning.

Please direct comments or questions about this research to Principal Investigators Leigh Anderson and Travis Reynolds at eparinfo@uw.edu.

Aumentem

EPAR Land Tenure Technology Profile: Aumentum OpenTitle (Types II, III)	
Aumentum OpenTitle is a desktop technology that integrates land documentation and land mapping capabilities. Designed for rural communities, OpenTitle streamlines the land mapping process through the use of data from built-in GPS, aerial imagery, and paper records. Ultimately, OpenTitle aims to deliver documentary evidence of de-facto land tenure quickly and accurately in order to systematically issue and record land rights.	
Produced By	• Thomson Reuters
Technology/Project Features	• Desktop software database for data storage (requires internet access) • Version control • Uses ESRI ArcGIS technology • Scanning capabilities • Administrative access/permission control • Report generating and editing capabilities • Based on the Social Tenure Domain Model for securing land tenure
Used By	• Governments and partners in implementing communities (i.e., NGOs) • Targets rural, low-income communities

Implementation Methodology	• Via the desktop software, implementers collect and aggregate information on property, boundaries, landholders, and land activities
	  ○ Data sources are existing paper documentation, GIS spatial data, and satellite and aerial photography
	  ○ Paper documentation can be scanned and uploaded to database for archiving/indexing/documenting
	• The software includes GIS technology that allows users to make and create maps of their property overlaid on the collected spatial data
	• Users control all of their own data and determine their own security and sharing settings
	• Customer support center available for set-up, support, and training

Scale of Implementation and Outcomes	• Implemented in Afghanistan, Liberia, Ghana, Sierra Leone • In Sierra Leone, 19 communities independently surveyed and mapped nearly 325 hectares of land receiving documents with maps and pictures outlining their land rights and boundaries • Since 2012, Liberian government has used OpenTitle to digitize and index close to 6,000 deeds Replicability: OpenTitle is a stand-alone technology that is customizable for each region
Financial Information	• User must purchase the product, but the price is not specified
Links to Relevant Documentation	• https://tax.thomsonreuters.com/wp-content/pdf/aumentum/1004045_Aumentum%20Corporate%20INT_(web).pdf • opentitle.thomsonreuters.com/ghana

Blockchain

EPAR Land Tenure Technology Profile: Blockchain (Type III)	
The Blockchain technology has been applied to land registry projects with cited examples of pilot/trial projects taking place in Brazil, Ghana, Honduras, Republic of Georgia, and Sweden. Applied to land registry systems, the technology allows users to interlink real estate transactions with previous and subsequent ones requiring a digital trace for changes thereof. Through its enhanced security technologies (e.g., digital signature, time stamping) the Blockchain technology aims to create an immutable registration of land titles securing rights for landholders in geographies served.	
Produced By	• Bitland (Ghanain-based; BitFury (Texas-based BitCoin company); Factcom (Texas-based); Ubitquity (Delaware-based) • Partner Organizations: Epigraph (Texas-based land title software firm); National Governments
Technology/Project Features	• Internet accessible Blockchain database • Non-repudiation: changes require digital signature and timestamping

Used By	• National governments
	  ○ Evidence for use in land rights from pilot/trial projects in Brazil, Ghana, Honduras, Republic of Georgia, and Sweden
	  ○ ***Brazil:*** Blockchain technology startup ***Ubitquity*** has been awarded a contract with the Brazilian land administration agency *Cartorio de Registro de Imoveis* to pilot the technology in the municipalities of Pelotas and Morrow Redondo
	  ○ ***Ghana:*** Pilot project testing the technology in Kumasi, Ghana with plans to expand across the African continent and then globally
	  ○ ***Honduras:*** regional pilot began in early 2015 in La Ceiba with plans to be completed by end of year [no evidence of completion found]; Factcom hoped to scale nationally thereafter
	  ○ ***Republic of Georgia:*** pilot begun in April 2016; Memorandum of Understanding signed between BitFury and National Agency of Public Registry thereafter to scale nationally
	  ○ ***Sweden:*** Proof of Concept began in Summer 2016; technology estimated to be operational by 2019 [scale not specified]
	• Historically used by financial firms as a secure ledger and by manufacturing firms to track goods

Implementation Methodology	• Land tenure data from national registries is uploaded onto a secured public Blockchain where it is recorded and stored as a digital asset • Real estate transactions are interlinked with previous and subsequent transactions on the Blockchain • Public registries can make real-time audits

Scale of Implementation and Outcomes	• Evidence of pilots/trials in Georgia, Honduras, and Sweden
	  ○ Blockchain land registries at national level
	  ○ BitFury registered over 100,000 land titles within approximately two months of implementation in Georgia on their Blockchain
	  ○ Challenges digitizing centuries old paper and establishing validity of digital signatures in Sweden
	• BitFury plans to create an app that will allow users to register their properties through their smart phone

	• Implementation in Sweden is estimated to save over $100 million annually due to less paperwork, faster transaction, and less fraud
Financial Information	• Elements of the registration process [e.g., transaction notary] will fall from $50-$200 to $0.05-$0.10
Links to Relevant Documentation	• http://bitfury.com/ • https://www.forbes.com/sites/laurashin/2017/02/07/the-first-government-to-secure-land-titles-on-the-bitcoin-blockchain-expands-project/#137bb2c04dcd • http://nordic.businessinsider.com/sweden-is-pioneering-a-blockchain-run-land-registry---which-could-save-taxpayers-$100-million-2017-4 • http://bitfury.com/content/5-white-papers-research/bitfury_white_paper_on_blockchain_auditability.pdf • http://in.reuters.com/article/usa-honduras-technology-idINKBN0O01V720150515 • https://www.coindesk.com/debate-factom-land-title-honduras/ • http://conexaofintech.com.br/en/blockchain-land-registry-tech-gets-test-in-brazil/ • http://www.bitland.world/overview/

Cadasta

EPAR Land Tenure Technology Profile: Cadasta Platform (Type II)	
The Cadasta Platform, designed by the not-for-profit organization Cadasta, provides an internet-based platform to facilitate the digitization of land records using simple, affordable tools. This platform can be used to help partners efficiently document, analyze, store, and share critical land and resource rights information. Cadasta includes an optional plugin to connect with Quantum GIS (QGIS), and also employs Open Data Kit (ODK) and Geographic ODK (GeoODK) for off-line mapping and data collection. Information from ODK and GeoODK can be imported directly into the Cadasta platform either in real-time or, with offline data collection, at a later time when internet is available.	
Produced By	• The Cadasta Platform was developed by Cadasta in 2014. • The Cadasta Platform is funded by United Kingdom Aid (UK Aid) and Omidyar Network.
Technology/Project Features	• The Cadasta Platform is a computer internet platform holds and organizes land and property information for clients. The program relies on three other open-source software programs – ODK, GeoODK, and QGIS – that can be downloaded and used offline to collect data. • No internet connection is required to collect data. The client can upload data from a smartphone or tablet to the cloud-based platform whenever an internet connection is available. • Data uploaded to the platform are either originally collected by the client, or uploaded from an existing database. In either situation, the data uploaded to Cadasta Platform remain proprietary, controlled by the client, and not shared with other users on the Cadasta Platform without the appropriate permissions from the client.
Used By	• The Cadasta Platform generally targets populations that are in need of increased security for land and resource rights.
Implementation Methodology	• The client must first create a profile on the Cadasta Platform, either by joining an existing organization account or creating a new profile. Clients then must download the two data collection software programs supported by the Cadasta Platform (ODK and GeoODK) to an Android smart phone or tablet. To input field data into the Cadasta Platform, clients can upload data manually, upload data directly from ODK and GeoODK, or upload information from another database with support from Cadasta. Clients can then download the QGIS plug-in which will allow them to download their data, analyze it, and make maps for web or print. • The speed of implementation and data delivery is not specified and varies based on each client. • Clients have control and ownership over all of the data that they upload to the Cadasta Platform. Cadasta shares a statement on their website that explicitly states their intention to maintain transparency between the organization and client.
Scale of Implementation and Outcomes	• The Cadasta Platform has been implemented in a variety of geographies including but not limited to: the United States, Mexico, Haiti, Guyana, Peru, Brazil, West Africa, Cameroon, Namibia, Zambia, Tanzania, Ethiopia, Italy, Netherlands, Georgia, India, Sri Lanka, Indonesia, Southeast Asia, Thailand, and Canada. Cadasta provides case studies for many of these projects on their website. • While the Cadasta Platform does not specifically target vulnerable populations, they note on their website that their work "promotes

	inclusiveness and participation by all segments society, especially disadvantaged and marginalized groups including women" (http://cadasta.org/our-values/). • Cadasta hopes to incorporate the use of drones in more projects in the future.
Financial Information	• The client must pay for access to the Cadasta Platform, however the price is not specified on their website. Potential clients must contact Cadasta for price information.
Links to Relevant Documentation	• Project website: http://cadasta.org/platform/ • Additional resources: https://www.gitbook.com/book/cadasta/cadasta-docs/details

Landmapp

EPAR Land Tenure Technology Profile: Landmapp (Types I, III)	
The Landmapp Project aims to deliver affordable land rights documentation to smallholder farmers. Using a mobile survey application, Landmapp maps the farm boundaries, interviewing the land claimant, spouse, and neighbors to verify the information for accuracy. After verification, the data are stored in the cloud and used to secure land tenure documentation by the relevant authorities ultimately delivering a signed title or certification to the smallholder farmer.	
Produced By	• Landmapp, established in 2015
Technology/Project Features	• Import government spatial layers and satellite maps via mobile application (requires internet access) • Map land boundaries using mobile device GPSMap land boundaries using GPS on mobile device • Export village maps, land profiles, and full datasets to the cloud (data not shared publicly) • Can be used with other tools such as Emlid Reach RS, QGIS open-source software, and GeoODK technologies for data collection and mapping • Customizable to local language
Used By	• Targets rural smallholder farmers
Implementation Methodology	The Landmapp process follows six steps (the technology is involved in steps 3-5): 1. *Campaign:* Provides information to farmers and community leaders 2. *Sign Up:* Farmers are educated on land tenure and then sign up 3. *Map:* Property boundaries are surveyed and interviews conducted with farmer, spouse, and neighbors 4. *Analyze:* Data is analyzed for errors and anomalies 5. *Validate:* Data is made available to farmer to ensure accuracy and is verified by neighbors 6. *Sign:* Land rights document is signed by relevant authorities and is delivered to the farmer
Scale of Implementation	• Currently being implemented in Western and Eastern Ghana • Over 2,000 land tenure documents delivered to smallholder farmers as of February 2017 • Currently designing program for replicability in other low-middle income countries • Plans to expand to other West African and Southeast Asian countries
Financial Information	• Funders: Omidyar Network; HERi Africa • Fees collected from client/landholders for mapping process [amount not specified]
Links to Relevant Documentation	• https://www.omidyar.com/blog/why-we-invested-landmapp • http://www.impactbeacon.com/thomas-vaassen-unlocking-land-ownership-ghanaian-farmers/

MappingForRights

EPAR Land Tenure Technology Profile: MappingForRights (Types I, II)	
MappingForRights is an interactive community map project for the Congo Basin, which started in November 2011 and is ongoing. By highlighting the presence of otherwise 'invisible' indigenous peoples and forest communities, this project hopes to bridge the gap between remote forest communities and central decision making processes to eradicate marginalization of forest dwellers. MappingForRights uses technologies such as the internet, GPS, and QGIS to collect, manage, and distribute land rights data.	
Produced By	Rainforest Foundation UK

Technology/Project Features	• Online platform with the following features:
	  ○ Interactive mapping database that serves as a repository for participatory maps
	  ○ "Forest Zone" section that provides news, views, and analysis on the latest policy developments Congo Basin and elsewhere
	  ○ Resource Portal, a repository of technical, legal, and training resources
	• Participatory mapping program with innovative mapping methodologies to support mapping by non-literate people, collect data on social development needs, and expand coverage and improve data flows

Used By	• Indigenous community members, especially leaders and decision-makers • Non-governmental organizations (NGOs)
Implementation Methodology	Stage 1: Identification and information • Identify and locate targeted villages • Collect basic information on communities such as population, presence of extractive concessions, protected areas, and more • Provide community with all the information needed to enable their free, prior, and informed consent (FPIC) to participate in the project Stage 2: Scoping • Gain FPIC of communities • Collect information about community and its situation in relation to access and use of forest lands and resources • Identify criteria for selection of community mappers • Ensure the community defines the purpose and strategy for using the participatory map Stage 3: Training community mappers • Train community representatives to map their traditional lands and resource use through a training of a minimum of three days Stage 4: Data collection • Collect field data using GPS points to enable the production of a community map Stage 5: Data transfer and verification • Transfer all geo-referenced data covering the entire community lands onto a computer Stage 6: Production of a full draft community map • Verified data transferred onto official baseline maps and treated with QGIS software Stage 7: Validation • Ensure map that fully reflects the vision of land and resources by the entire community

	• Identify and resolve any issues between neighboring communities Stage 8: Supporting communities in the use of their maps • Develop and implement a plan to support community use of maps using community action plans, advocacy statements, reports and documentation of issues and problems discussed, and multi-stakeholder workshops addressing specific issues raised by communities

Scale of Implementation and Outcomes	• By 2017, an estimated 700 communities in the Congo Basin have mapped their lands through the MappingForRights program, representing up to six million hectares of forest community land mapped and uploaded to the central database
	• As of the end of the 2015-2016 fiscal year:
	  ○ More than 5,700 community mappers trained
	  ○ Nine mobile mapping teams fully functional in DRC and Cameroon
	  ○ 590 registered members of the MappingForRights platform
	  ○ Six community-based lawyers mentored and placed
	  ○ 90 paralegals trained
	• Awarded the UNFCCC *Momentum for Change Award* for work done in Africa's Congo Basin and the Peruvian Amazon regions

Financial Information	• Funded by UKAID/Department for International Development (DFID)
Links to Relevant Documentation	• http://www.rainforestfoundationuk.org/what-we-do/projects/mapping-for-rights • http://www.mappingforrights.org/About_us • http://www.rainforestfoundationuk.org/rfuks-ground-breaking-mapping-project-wins-prestigious-un-award • http://www.rainforestfoundationuk.org/media.ashx/2909565-englow-res.pdf • http://www.rainforestfoundationuk.org/media.ashx/rfuk-annual-report-2015-16.pdf

MAST

EPAR Land Tenure Technology Profile: Mobile Application to Secure Tenure (MAST) (Types II, III)	
The Mobile Application to Secure Tenure (MAST) is a project developed by USAID to crowd-source land rights information using mobile technology. MAST is an open-source smartphone application that aims to strengthen land tenure in underdeveloped rural areas by mapping property boundaries and documenting ownership status. In addition to general training for the technology, the project provided focused trainings on women's land rights during pilot implementation in Tanzania.	
Produced By	U.S. Agency for International Development (USAID)

Technology/Project Features	• Mobile Data Capture Application
	  ○ Android-based application that can be used to capture spatial, alphanumeric, and multimedia land rights information
	  ○ Data can be collected off-line and synced onto the server once the user has internet access
	• Land Rights Data Infrastructure Web Application
	  ○ MAST Administration Tool: Manage users and roles; configure survey projects; import and configure data layers/layer groups
	  ○ MAST Configuration Tool: Configure the attribute fields that are required for a specific project on a data form template
	  ○ Data Management Tool: Import and validate data that is transferred from a mobile device to the data management web application; validates data according to predefined rules, facilitates the visualization and editing of data, allows for the configuration and generation of formal land rights documentation

Used By	• Country government (piloted in Tanzania) • Villagers and landholders
Implementation Methodology	• Activity 1: Present project to Village Council to gage interest and build support • Activity 2: Establish and build capacity of local government and institutions • Activity 3: Execute public awareness campaign related to land laws and women's land rights • Activity 4: Provide training and select trusted intermediaries for field mapping/adjudication • Activity 5: Conduct field mapping/adjudication • Activity 6: Verify/validate data collection, identify and resolve any conflicts • Activity 7: Facilitate Village Assembly workshop and publically resent results • Activity 8: Issue Adjudication Forms for village leadership to review and sign • Activity 9: Issue Certificates of Customary Rights of Occupancy (CCRO) to villagers

Scale of Implementation and Outcomes	• Pilot implementation in 3 villages in Tanzania's Iringa Region
	• Ilalasimba village:
	  ○ 910 parcels over three weeks for a total mapped area of 1,205 hectares
	  ○ 910 Certificates of Customary Rights of Occupancy (CCRO) issued
	• Itagutwa village:
	  ○ 1,139 parcels over five weeks for a total mapped area of 1,786 hectares
	  ○ 1,126 CCROs issued
	• Kitayawa village

	○ 1,878 parcels over four weeks for a total mapped area of 2,793 hectares ○ CCRO data not available at time of report • USAID reported that MAST had a significant impact on women's land rights in the villages in which it worked ○ In all three villages, men were originally opposed to the idea of women owning land and receiving CCROs; however, through education, training, and outreach, the project achieved parity between land registrations for women and men • Other findings: ○ Putting youth engagement at the center of technology training yielded benefits – this opportunity allowed youth to build practical skills and capacity ○ Relying on citizens in the implementation process facilitated the resolution of some land disputes ○ Affordability of internet services is a major barrier ○ Geospatial resources and tools are expensive, but easily adopted by beneficiaries ○ Using and transitioning to a cloud-based land information system presents opportunities and challenges – cloud-based systems and mobile technologies can be deployed and used in rural areas with limited internet access, but expensive (hosting service chosen for MAST costs approximately $500/month)
Financial Information	• Funded by USAID
Links to Relevant Documentation	• https://www.land-links.org/project/mobile-application-to-secure-tenure-tanzania/ • https://www.land-links.org/document/mast-final-project-report/ • https://www.land-links.org/wp-content/uploads/2017/01/USAID_Land_Tenure_MAST_Final_Report_Nov_2016.pdf • https://www.land-links.org/wp-content/uploads/2016/09/USAID_Land_Tenure_MAST_Lessons_Learned_Report.pdf

One Map Initiative

EPAR Land Tenure Technology Profile: One Map Initiative (Type II)	
The One Map Initiative is an Indonesian database developed by USAID and US Forest Service International Programs, and maintained by the Government of Indonesia. The database brings together land tenure, land use, and other spatial data to reconcile discrepancies and aggregate relevant data in one location. One Map also includes a participatory mapping aspect that allows users to create layers of interest, which are later verified and incorporated into national datasets that can be accessed by others.	
Produced By	• Badan Informasi Geospasial (BIG), the National Mapping Agency of Indonesia, collaborated with the Spatial Informatics Group to develop the geospatial database and create the participatory mapping portal. • USAID, US Forest Service, and the Government of Japan provided funding. • World Resources Institute (WRI) assists with implementation, data collection, and dispute mediation. • Japanese IT firm NTT Data is also assisting with implementation
Technology/Project Features	• BIG uses ArcGIS for Server and ESRI Geoportal Server to collect and aggregate data into map layers. An internet server is used to exchange data and upload to the map database. Satellite imagery is used to make updates and changes to the base map. • Users have access to the database through a participatory mapping feature, allowing them to create custom maps using layers of interest.
Used By	• Indonesian and global agencies, companies, and individuals interested in land tenure and land use in Indonesia.
Implementation Methodology	• BIG works with indigenous communities to perform community mapping and collect land administration data. Other relevant data is aggregated from government ministries, including the Forestry department and Mineral Resources, who are responsible for creating thematic maps for their ministry's relevant data, or for their specific geographic region. This data is compiled, verified, and checked for conflicting information. Information is then made available through the online database as map layers. • Users can then access the database information by creating maps through the participatory mapping portal. They create maps with various layers of interest, and can also add their own original information. Any information added by users is verified by BIG before being made public on the database. • One Map has faced difficulties standardizing maps made by different ministries due to frequent disagreements on boundaries and land data, which are often complicated by power imbalances and corruption amongst interested parties, including parties who benefit from illicit land grabs made possible by the lack of a standardized national land registration system. Additionally, ministries contribute data at different rates - some layers/information are complete while others are not, and different regional maps are available at different scales and detail. Finally, interest in and support for One Map waned after its initial implementation, following the 2014 election and subsequent presidential turnover (The new

	president later issued a Presidential Decree renewing support for the initiative).
Scale of Implementation and Outcomes	• Implemented across Indonesia, with a specific focus on rural and indigenous groups. Currently working on reconciling conflicting information and verifying all submitted maps and data. • Information on outcomes and impact is not available.
Financial Information	• The Government of Japan (Japan International Cooperation Agency) provided funding to BIG to develop the database technology (amount not specified). • "A recent major cut in state budgets across ministries has also cast doubt on whether progress will remain on schedule. At this stage, there is uncertainty on how these cuts will impact schedules for further development of One Map" (One Government Partnership, n.d.).
Links to Relevant Documentation	• Project website: https://petakita.ina-sdi.or.id/pempar/ (currently not operational) • Additional resources: https://sig-gis.com/projects/one-map-indonesia/; http://www.esri.com/news/arcnews/spring12articles/indonesia-nsdi-one-map-for-the-nation.html; https://www.opengovpartnership.org/sites/default/files/case-study_Indonesia_One-Map-Policy.pdf

Red Tierras

EPAR Land Tenure Technology Profile: Red Tierras (Types II, III)	
Red Tierras is program led by a not-for-profit organization, Mercy Corps, that uses technology to facilitate and expedite the registration process for formalizing land rights. Red Tierras originally began as a program intended to solve land disputes through mediation in Guatemala and Colombia, and adopted the use of new technologies when the program expanded to Bolivia. Red Tierras employs a customized version of Aumentum OpenTitle software from Thomson Reuters, with assistance from product development and information technology services firm ThourghtWorks, to collect and store land tenure data. To support the software program, Red Tierras uses a variety of other technologies – mobile phone SMS messaging, handheld GPS, and aerial imagery - to facilitate community-based land registration.	
Produced By	• Red Tierras was first created by Mercy Corps in 2009 as a land dispute resolution project, and began using the mobile application in 2012. • Omidyar Network and Fundacion Tierra fund Red Tierras.
Technology/Project Features	• Red Tierras operates an open-source software that stores property and land information. This software uses ThoughtWorks and a modified version of Open Title. • Red Tierras incorporates aerial imagery into the software program, which integrates with GPS information collected on-the-ground to create maps. • Beneficiaries use handheld GPS devices to collect GPS property information, and then use mobile phones to send SMS text messages of the GPS coordinates to Red Tierras. • The GPS coordinates are originally collected data, while the aerial imagery is open source, collected by other organizations.
Used By	• Red Tierras aims to help rural, low-income communities in Colombia, Guatemala, and Bolivia to formalize their land titles and resolve land disputes.
Implementation Methodology	• Clients/landholders use handheld GPS devices to collect coordinates of their property boundaries, and then send an SMS text message of the coordinates to Red Tierra's software system. Staff at Red Tierras upload this information to the open source software and overlay the coordinates onto aerial imagery to create maps. Clients/landholders can then access these maps via the software to create reports or submit applications regarding land titling. • Red Tierras reports that the land titling process currently takes 450 days from start to finish, but that they hope to reduce the process to 202 days. • Red Tierras operates a free hotline for clients/landholders to call into with questions regarding the land titling process. • If conflicts arise or are pre-existing to the land titling process, Red Tierras provides in-person mediation to help resolve land disputes. • In addition to any disputes over property boundaries, Red Tierras notes that it is often difficult to navigate language barriers between indigenous and non-indigenous community members.
Scale of Implementation and Outcomes	• Red Tierras operates in Colombia, Guatemala, and Bolivia. • Red Tierras won the Ashoka Changemakers Award in 2011 for resolving over 350 land disputes to benefit 115,000 indigenous families in Guatemala and Colombia.

	• Red Tierras hopes to bring down the cost of land titling for a single indigenous farming community in rural Bolivia. The current cost is approximately $58,360 per community, and they hope to reduce this cost by 40 percent to $23,344.
Financial Information	• Omidyar Network and Fundacion Tierra fund Red Tierras and the project has been funded in the past by the European Commission, IrishAid, European Union, and USAID.
Links to Relevant Documentation	Program website: www.redtierras.org (does not work) Additional resources: https://www.mercycorps.org/tags/red-tierras ; https://www.changemakers.com/property-rights/entries/red-tierras-land-rights-network ; https://www.omidyar.com/investees/red-tierras ; https://www.mercycorps.org/articles/colombia/land-conflict-resolution-network-wins-prestigious-prize ; https://www.mercycorps.org/articles/mobile-phones-bring-land-ownership-indigenous-farmers

Social Tenure Domain Model

EPAR Land Tenure Technology Profile: Social Tenure Domain Model (Type II)	
Developed by UN Habitat, the Social Tenure Domain Model (STDM) is a land administration system that aims to strengthen and secure land rights and tenure security for the poor in developing countries. It allows communities to document their land tenure information and store it through open-source database software. The tool was developed to bridge the gap between formally registered and unregistered land.	
Produced By	• Global Land Tool Network of the UN Habitat developed the product and leads implementation efforts, including providing training. The International Foundation of Surveyors (FIG), International Institute for Geo-Information Science and Earth Observation (ITC), and World Bank provided further support. • Espacio Feminista (a gender rights group for land tenure security in Brazil). Swedish International Development Agency (SIDA) and Cities Alliance provide implementation support. • Funded by the governments of Norway and Sweden.
Technology/Project Features	• STDM is a land administration system (LAS), developed by GLTN, FIG, and World Bank as a prototype for an ISO standard for the land administration domain model (LADM). It utilizes open source software in order to strengthen and secure land rights and tenure security for the poor in developing countries. The STDM database allows communities to document their land tenure information by supporting the importation of various forms of land tenure documentation, including textual and spatial data from CSV and shapefile formats. It also facilitates the presentation of this information through reports and charts by generating plots and graphs. The software additionally allows the user to create land transaction forms and documentation of residency. • Software is open source, and can be downloaded directly from the website or from GLTN's open GitHub repository. • Uses several open source software components, including PostgreSQL, PostGIS and QGIS, and SQLAlchemy.
Used By	• Intended for use by land titling agencies in low- and middle-income countries. • Involves targeted communities in data collection of land information. Specifically meant to be inclusive of women and poor peoples in its design and implementation.
Implementation Methodology	• High resolution satellite imagery is collected to establish parcel index maps. Boundaries are drawn on the printed maps with pencils and the finalized versions are taken to local communities for public inspection. The parcel boundary information is then recorded in the STDM software where it can be accessed. • End users access and update stored data on land boundaries through a desktop application, downloaded from the STDM website. • "The data can then be shared within the community and with local and national governments to assist the development of the community, identify priorities, and target interventions more effectively. It can also be used in

	combination with other enumeration and planning tools" (Cities Alliance, 2016) • The software can then be used to generate reports, and print title certificates or other land tenure transaction documentation.
Scale of Implementation and Outcomes	• Currently implemented in Africa (Kenya, Namibia, Uganda, Zambia), Colombia, Philippines, and the Caribbean (St. Lucia, St. Vincent and the Grenadines). • Cities Alliance found: "The pilot phase demonstrated that STDM is technically sound, has multiple usages and is user-friendly. By the end of the first phase, community members were able to use the system and to confidently manage and update the information on an ongoing basis" (Cities Alliance, 2016). • However an unpublished master's thesis (University of Tende, Netherlands) reported that while the Ugandan pilot project in 2011-2012 showed that participating landholders were "confident of possessing their lands in the near future," evidence of actual strengthened tenure was limited (Archer, 2016). • The Social Tenure Domain Model has shown potential for replication internationally. For example, the Ugandan government has invested nine million Ugandan Shillings (USD $3,183) towards projects using STDM technology (Cities Alliance, 2016). Additionally, the Social Tenure Domain Model served as the concept for an application used in the formalization of rural land rights by the Colombian Ministry of Agriculture and Rural Development.
Financial Information	• The initial pilot in Mbale, Uganda received $75,000 in funding for Phase I and $225,000 for Phase II (pilot follow up focusing on scaling up the use of STDM in Uganda). (Cities Alliance, 2016) • There is no cost to users who want to download the software
Links to Relevant Documentation	• Product website: http://stdm.gltn.net/ • Additional Resources: http://www.citiesalliance.org/node/5634; http://www.itc.nl/library/papers_2016/msc/la/archer.pdf; http://www.gltn.net/index.php/land-tools/gltn-land-tools/social-tenure-domain-model-stdm; http://www.sciencedirect.com/science/article/pii/S0264837715000174; https://www.gim-international.com/content/article/light-mobile-collection-tools-for-land-administration

Suyo

EPAR Land Tenure Technology Profile: Suyo (Types II, III)	
Suyo is a for-profit startup that combines a mobile application with in-person consultations to collect property data, and facilitate property formalization through land titling and building registration. Suyo currently operates in select cities in Colombia but plans to expand to other areas within Colombia and Latin America in the future. Suyo combines modern technology with a team of property experts to help low-income families unlock the social and economic benefits of their property. Suyo specifically targets low-income families in informal settlements and interacts with families throughout the entirety of the property formalization process, from documenting information through the mobile app to collecting content on the data platform and submitting land formalization applications to the proper authorities.	
Produced By	• While Suyo is the organization that currently manages the mobile application and overarching land formalization process, the idea for Suyo was originally conceived by Mercy Corps in 2012. Suyo and the associated mobile application was the launched as an individual entity in 2015. • Suyo is funded by Omidyar Network and Harvard Innovation Lab. • Additionally, Suyo partners with Habitat for Humanity, Echoing Green, Agora Partnerships, Orrick, CrediOrbe, Fundacion Carvajal, Fundacion Mario Santo Domingo, Fundacion nu3, and Combarraquilla, however specific partner details are not provided.
Technology/Project Features	• Suyo manages land and property information on a mobile application using mobile device (smart phone); and computer-based platforms. • Suyo collects original property data, including photos, ownership history, testimonials from neighbors and friends, and utility and tax receipts through the mobile application.
Used By	• The technology is used by employees at Suyo; clients do not operate the technology.
Implementation Methodology	• Families contact Suyo directly if they are interested in property formalization services. Suyo conducts an initial, free, in-person site visit to the client's property and documents information on the mobile application. Suyo then uses this collected data to apply for land formalization documents through the appropriate government authorities, on the client's behalf. • The length of time between when clients contact Suyo and when they receive land formalization documents is not specified. • Suyo mentions that sometimes during the land titling process, disputes arise regarding conflicting boundary lines. Suyo does not address how these disputes are resolved.
Scale of Implementation and Outcomes	• Suyo targets low-income families living on informal land settlements in Barranquilla, Bogotá, Cali, and Medellin in Colombia. • Suyo intends to expand services to other regions of Colombia, and potentially other regions of Latin America. • Suyo has helped to formalize more than 1,100 properties since it was created in 2012. The organization hopes to reach more than 500,000 by 2021. • Suyo has reduced the cost required to apply for land formalization by 50 percent for certain services. The total process could cost up to $2,500, but Suyo charges as little as $1,440, saving costs through using the mobile app.

Financial Information	• While the specific amount is not specified, after the initial free consultation Suyo charges a fee to clients pursuing land formalization. • Suyo began as a project backed by the Harvard Innovation lab, Mercy Corps, and Habitat for Humanity. From there, the startup operated on angel investments, founder contributions, and support from the Agora Partnerships Accelerator and Echoing Green. Suyo reported in July 2015 that it was hoping to close a full $500,000 investment round soon.
Links to Relevant Documentation	• Product webpage: https://www.suyo.co/ • Additional sources: http://www.socialtech.org.uk/projects/suyo/ ; https://www.omidyar.com/news/omidyar-network-increases-investment-suyo-help-families-latin-america-secure-their-homes-and; http://www.wired.co.uk/article/startups-with-profit-and-purpose; https://www.fastcompany.com/3047993/this-startup-is-making-it-easier-for-people-living-in-slums-to-own-their-land?utm_content=buffer3b8ec&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer&show_rev_content