Horizon 2020
European Union funding
for Research & Innovation

ITS 4 LAND
innovations for land tenure

Deliverable 8.1
Design of Business Model and Set-up of Business Plan

May 2019
Version 1.6

Abstract:
Business model and business plan of the its4land toolbox

Project Number: 687828
Work Package: 8
Lead: Hansa Luftbild AG
Type: Report
Dissemination: Public
Delivery Date: May 31, 2019
Actual Delivery Date: May 31, 2019

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1 Executive Summary

This is the first deliverable (D8.1) under the project 'its4land', Work Package 8 (WP8), which aims at developing a sustainable business model for the dissemination and commercialization of the land tenure recording technology suite which is the outcome of the project. Using the results from the project Work Packages 2 to 7 (WP2 - WP7) key exploitable results (KER) were produced which can be offered to the land administration sector in East Africa and other developing countries. The results are categorized as consultancy services (C) or as software tools (S) and consist of the following:

- (C) Needs Assessment - consultancy services for needs assessment (WP2).
- (S) Smart Sketchmap (Smart SkeMa) - data collection tool smart sketchmap is a tool to record aspects of people to land relationships where the spatial component is captured using hand drawn sketch maps and described in a qualitative way (not surveyed) and then automatically transformed for further usage in a GIS (WP3).
- (C) UAV-based Data Acquisition - consultancy services for UAV-based data acquisition for land tenure recording (WP4).
- (S) Semi-automatic Visible Boundaries Delineator - a tool that facilitates image-based cadastral mapping by extracting visible boundaries automatically and by supporting the delineation procedure (WP5).
- (S) Publish and Share – a system platform with integrated tools to publish and share land information (WP6).
- (C) Governance and Capacity Building - consultancy services to apply the governance and capacity development models for the use of the its4land geospatial tools (WP7).

The its4land land administration toolbox concept has been chosen to bundle the KERs together. Software tools or consultancy services can be offered separately or jointly, depending on requirements and needs.

The its4land toolbox is the joint effort of different project partners, academic and private enterprises. Hence marketing and commercialising the toolbox is best undertaken with a new legal entity which needs to be established.

On the basis of this marketing and commercialisation approach the Lean Business Model is chosen because it is well suited to start-ups which are not responding to the mass product market. This business model will bring the project results, which would have reached Technology Readiness Level 7 (TLR 7 - prototyping), on the market prior to investing in further development of the software tools in order to reach the Technology Readiness Level 9 (TRL 9 - the complete operationalization of the actual system).

The its4land software tools were developed using open source technologies which are viable, workable, and respond to the needs identified in Work Package 2 (WP2) of the

its4land project. They can be initially released on the market at TLR 7, because being open source they are highly adaptable – and hence responsive.

The business plan which has been developed for the its4land toolbox puts emphasis on the implementers and integrators of the land administration projects which are considered as the major potential customers of the toolbox. It underlines however too, that since land administration is not a mass market, it will not suffice to focus on implementers only: other customer segments will need to be observed and targeted too.

Two major events will be used to launch the its4land toolbox, one is the Geospatial Week at the University of Twente in Enschede, the Netherlands, in June 2019; and the other is the Africa GIS in Rwanda in November 2019.

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Annex 1

BDP Seminar Report for Geospatial technology innovations for land tenure security in East Africa - *« its4land »*

2 Introduction

its4land is a European Commission Horizon 2020 project funded under its Industrial Leadership program, specifically the 'Leadership in enabling and industrial technologies – Information and Communication Technologies ICT (H2020-EU.2.1.1.)', under the call H2020-ICT-2015 – and the specific topic – 'International partnership building in low and middle income countries' ICT-39-2015.

its4land aims to deliver an innovative suite of land tenure recording tools that respond to Sub-Saharan Africa's immense challenge to rapidly and cheaply map millions of unrecognized land rights in the region. ICT innovation is intended to play a key role. Many existing ICT-based approaches to land tenure recording in the region have not been highly successful: disputes abound, investment is impeded, and the community's poorest lose out. its4land seeks to reinforce strategic collaboration between the EU and East Africa via a scalable and transferrable ICT solution. Established local, national, and international partnerships seek to drive the project results beyond research and design (R&D) into the commercial realm. its4land combines an innovation process with emerging geospatial technologies, including smart sketchmaps, UAVs, automated feature extraction, and geocloud services, to deliver land recording services that are end-user responsive, market driven, and fit-for-purpose. The transdisciplinary work also develops supportive models for governance, capacity development, and business capitalization. Gender sensitive analysis and design is also incorporated. Set in the East African development hotbeds of Rwanda, Kenya, and Ethiopia, its4land falls within TRL 5-7: 3 major phases host 8 work packages (excluding Work Package 9 on ethics) that enable contextualization, design, and eventual land sector transformation. In line with Living Labs thinking, localized pilots and demonstrations are embedded in the design process. The experienced consortium is multi-sectorial, multi-national, and multidisciplinary. It includes SMEs and researchers from 3 EU countries and 3 East African countries: the necessary complementary skills and expertise is delivered. Responses to the range of barriers are prepared: strong networks across East Africa are key in mitigation. The tailored project management plan ensures clear milestones and deliverables, and supports result dissemination and exploitation: specific work packages and roles focus on the latter.

WP8 of this project focuses on capitalizing on the its4land results as stated in the project proposal and draws on activities and outcomes from Work Packages 2 to 7. This document, D8.1, is the first deliverable of WP8 and describes the business model and plan proposed for exploiting the

its4land tools. Core to this is the introduction of the **its4land toolbox concept**: a suite of configurable services and software solutions to facilitate land sector transformation.

The toolbox contains the key exploitable results (KER) from the its4land project. These KERs were defined and discussed by the project partners using consultancy services offered by the European Commission through its Common Exploitation Booster Programme.

D8.1 will first outline the objectives of the its4land project and discuss the technology readiness levels (TRL) which the project falls under. It will then describe the KERs identified and the business model that fits the exploitable results. Subsequently the business plan will be elaborated in detail.

This report will also be hosted in an abridged form on the its4land.com website under Output/Tools/Capitalize.

3 its4land Approach and Technology Readiness Levels (TRL)

The overarching objective of its4land is to develop an innovative suite of land tenure recording tools inspired by geo-information technologies, which responds to end-user needs and market opportunities in Sub-Saharan Africa, reinforcing an existing strategic collaboration between the EU and East Africa.

The project specific objectives are to:

1. capture the specific needs, market opportunities, and readiness of end-users in the domain of land tenure information recording;
2. co-design, adapt, integrate, demonstrate, and validate a land tenure recording suite based on small unmanned aerial vehicles (UAVs), smart sketchmaps, automated feature extraction, and geocloud services; and
3. develop and valorise a governance model that realizes the innovation process by aligning end users conditions, technological opportunity, business models, and capacity building requirements.

The project is driven by two major conceptual approaches: 1) *fit-for-purpose land administration;* and 2) *innovation theory*. Fit-for-purpose land administration is part of the broader development approach that argues that societal prosperity requires secure land tenures, provided by a complete and up-to-date land administration system. Land administration systems are the actors, processes, and technologies that record and maintain information about people, land, and rights. Information about people and land is usually recorded textually, whilst, land information takes the form of parcel sketch plan and/or maps (digital or otherwise). Despite the simplicity of the idea, only 30-50 countries maintain land administration systems: institution and technical issues are the major reason for deficiencies in other countries. In response, the fit-for-purpose land administration suggests technologies should be adapted, selected, and applied to match the capacity and cost constraints of a specific context. Meanwhile, innovation theory posits that inventions can be implemented at scale by integrating the processes and competencies of business, academia, government, investors, and beneficiaries: technology-push aligns with market-pull via undertaking needs assessment, design, pre-scaling and dissemination, supported scaling, and finally full dissemination (see Figure 1).

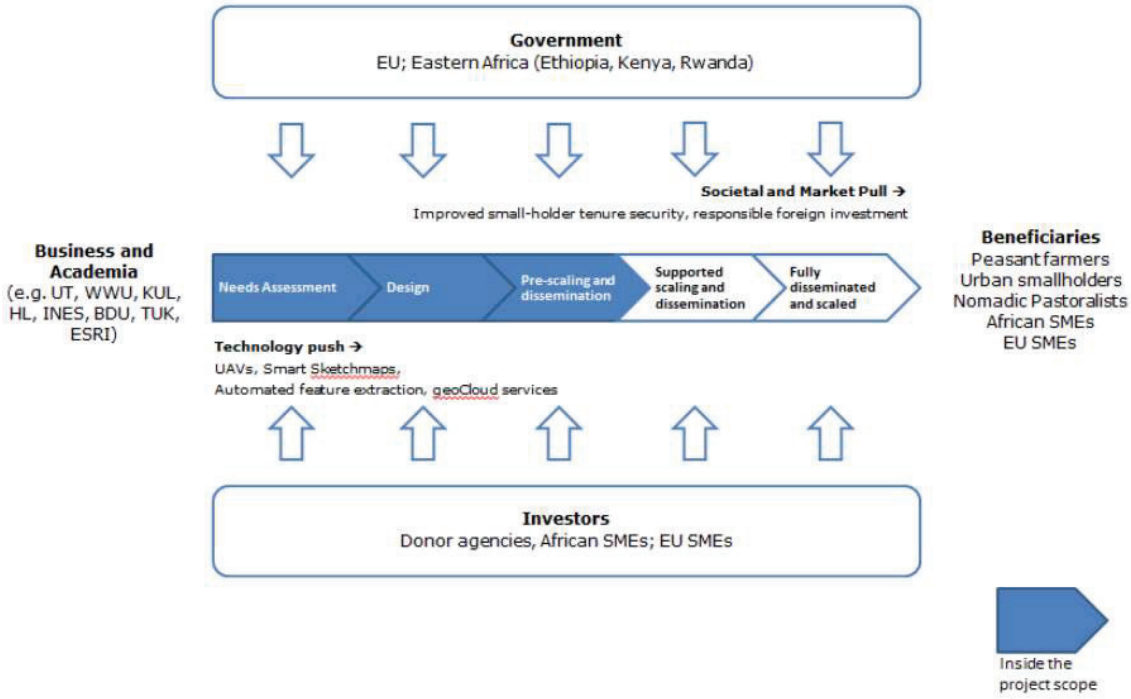

Figure 1: its4land overarching approach: placing the research within an innovation process

Regarding the *Technology Readiness Levels* (TRL) as per Figure 1, the project mainly spans TRL 5 to 7 – i.e. integration and validation (TRL 5), demonstration (TRL 6), and prototyping (TRL 7), in the context of land administration workflows in Ethiopia, Kenya, and Rwanda. **Complete system qualification (TRL 8) and complete operationalization of an actual system (TRL 9) are outside the scope of the project.** However, the its4land software tools were developed using open source technologies which are viable, workable, and responds to the needs. Even though they are not at TRL 9, the product can be put on the market because it is highly adaptable – and hence responsive.

4 its4land Key Exploitable Results (KERs)

The Work Packages 2 to 7 of the its4land project will bring different key results which can be exploited and offered to the land administration community. The project partners made use of the European Commission's Common Exploitation Booster Programme (CEB) and drew on the services of an external business development consultant to help in the definition of the key exploitable results (KER) and the ensuing discussions about the business model and the business plan which are best suitable in the exploitation process.

The KERs were defined by the project partners, who are leading their work packages, on the basis of the research work undertaken. The initial definition of the KERs was under the guidance of the external business development consultant between October 2016 and March 2017. The project partners identified those outcomes which have potential to be exploited by the land administration community in developing countries (with a focus on the sub-Saharan African market). In addition, the project partners prepared two potential business model templates, one for the Lean Business Model and the other for the Platform Business Model.

In March 2017 a seminar / workshop was held at the University of Twente – ITC in Enschede. The seminar was organised by the Work Package 8 leader, Hansa Luftbild, and was under the supervision of the external business development consultant who was provided through the European Commission's Common Exploitation Booster Programme (CEB). The seminar was the platform to discuss the KERs and the business models which are most suitable to exploit the results. The discussions also included the business plan development and how to commercialise the KERs. It was clear that the KERs can be marketed and commercialised once they have achieved the prototype level being developed with open source software. Since the its4land project is the collaboration of different partners, academic and private enterprises, it was recommended to establish a legal entity which would see that the its4land toolbox is marketed and commercialised. The reasoning for this recommendation lies in the fact that managing the work of the different partners will be costly and time consuming and requiring stringent coordination. Thus marketing and commercialising under a newly to be established legal entity will save on necessary financial and human resources. The reader is referred to Chapters 5 and 6 of this document for detailed information about establishing a future legal entity. For detailed information about the CEB seminar the reader is referred to Annex 1 of this document.

The KERs were revised and finalized after discussions during and after the European Commission (EC) review of the second period of the project in October 2018.

After the CEB seminar / workshop the project partners continued discussing how to best capitalize on the project results. This issue was also discussed during the Advisory Board meetings.

On the basis of the project internal discussions and the discussions with the Advisory Board the toolbox concept was considered to be the best approach to follow. Packaging the KERs in a toolbox will provide a flexible offering for coherent exploitation of the multiple outcomes of the its4land project. The toolbox concept also responded to the varying levels of needs and readiness maturity (as identified through WP2, e.g. see D2.5) [1] of potential market segments across sub-Saharan Africa. Such an approach also aligns with the Fit-For-Purpose (FFP) [2] approach.

Therefore, it was decided that the KERs resulting from the its4land project be bundled in the **its4land land administration toolbox –** in short **its4land toolbox-** , which offers services and software tools which can be ordered separately or combined by the interested customers. While this toolbox is still at TRL 7 it can be marketed and commercialised and is incorporated in a business model which fits its product type and nature.

The following table shows the key exploitable results (KERs) of each work package and their type, being a consultancy service or a software product:

Work Package	KER Type	KER Name	KER Brief Description
2	Consultancy	Needs Assessment	Consultancy services for needs assessment
3	Software	Smart Sketchmap (Smart SkeMa) Data Collection Tool	Smart Sketchmap is a tool to record aspects of people to land relationships where the spatial component is captured using hand drawn sketch maps and described in a qualitative way (not surveyed) and then automatically transformed for further usage in a GIS
4	Consultancy	UAV-based Data Acquisition	Consultancy services for UAV-based data acquisition for land tenure recording
5	Software	Semi-automatic Visible Boundaries Delineator	A tool that facilitates image-based cadastral mapping by extracting visible boundaries automatically and by supporting the delineation procedure.
6	Software	Publish and Share	Platform with integrated tools to publish and share land information.

Work Package	KER Type	KER Name	KER Brief Description
7	Consultancy	Governance and Capacity Building	Consultancy services to apply the governance and capacity development models for the use of the its4land geospatial tools

Table 1: Key exploitable results (KERs) of the its4land project with their defined type

The following paragraphs describe in detail the KERs of the its4land project.

4.1 Description of KERs

4.1.1 Consultancy Services for Needs Assessment

There is currently very limited literature (both grey and academic) published on stakeholder needs assessment for land administration projects. In fact, some have criticised land administration projects for not explicitly including such an assessment in the past. Where such assessments do take place (even anecdotally), feedback has highlighted the difficulty in quantifying these needs into a substantive basis that can inform project or policy decision-making. One of the methodological approaches applied in WP2, the Nominal Group Technique, has proven to be a simple and straightforward method that responds to these gaps by both elucidating qualitative needs and translating these as quantitative outcomes. Thus needs assessments can be offered within a consultancy service to organisations (public / private or NGO) which are embarking on establishing a land administration framework.

4.1.2 Smart Sketchmap (SmartSkeMa) - Data Collection Software Tool with Interactive Digital Output

Smart Sketchmaps (SmartSkeMa) is a set of linked sub-tools which can be applied to two workflows, one workflow covers the alignment of sketched qualitative information to base map data, while the other workflow concerns the alignment of sketched information to existing ortho-imagery. The workflows outline and sequence the activities which a data collector needs to follow in order to best use the sub-tools provided. Figure 2 and Figure 3 show the two workflows.

For example, before using the SmartSkeMa system to extract objects represented by symbols from any map, the user must first train the system to recognize these symbols. Therefore, there is a procedure that describes how to train the system to recognize symbols. The set of SmartSkeMa sub-tools consists of:

1. a specialized domain model and an associated visual language for sketching;
2. a system for automated recognition and extraction of objects in sketchmaps;
3. a system which integrates sketched information into existing geo-referenced datasets using qualitative representations;
4. two supporting tools:
    A. one for training the symbol detection algorithm for objects that a group of users would want the system to recognise; and
    B. another for visualizing and interacting with the sketchmap information in the context of the existing data.

SmartSkeMa sub-tools target NGOs, private organizations, research institutions, and government agencies using sketching as part of their work in the land/natural resources sectors. its4land implemented the sketch based geospatial data recording tool, SmartSkeMa, to capture land tenure data from a local perspective. The implementation of the tool consisted of (i) developing a domain model of concepts used in the description of land resources and tenures within localized contexts (e.g. at community level or within cultural groups); (ii) developing spatial models for representing sketchmaps as records of land tenure information; and (iii) developing methods for recognition of land tenure sketchmaps and for embedding the sketchmaps within existing spatial data sets. The implementation was tested on data collected in the field in Ethiopia and Kenya.

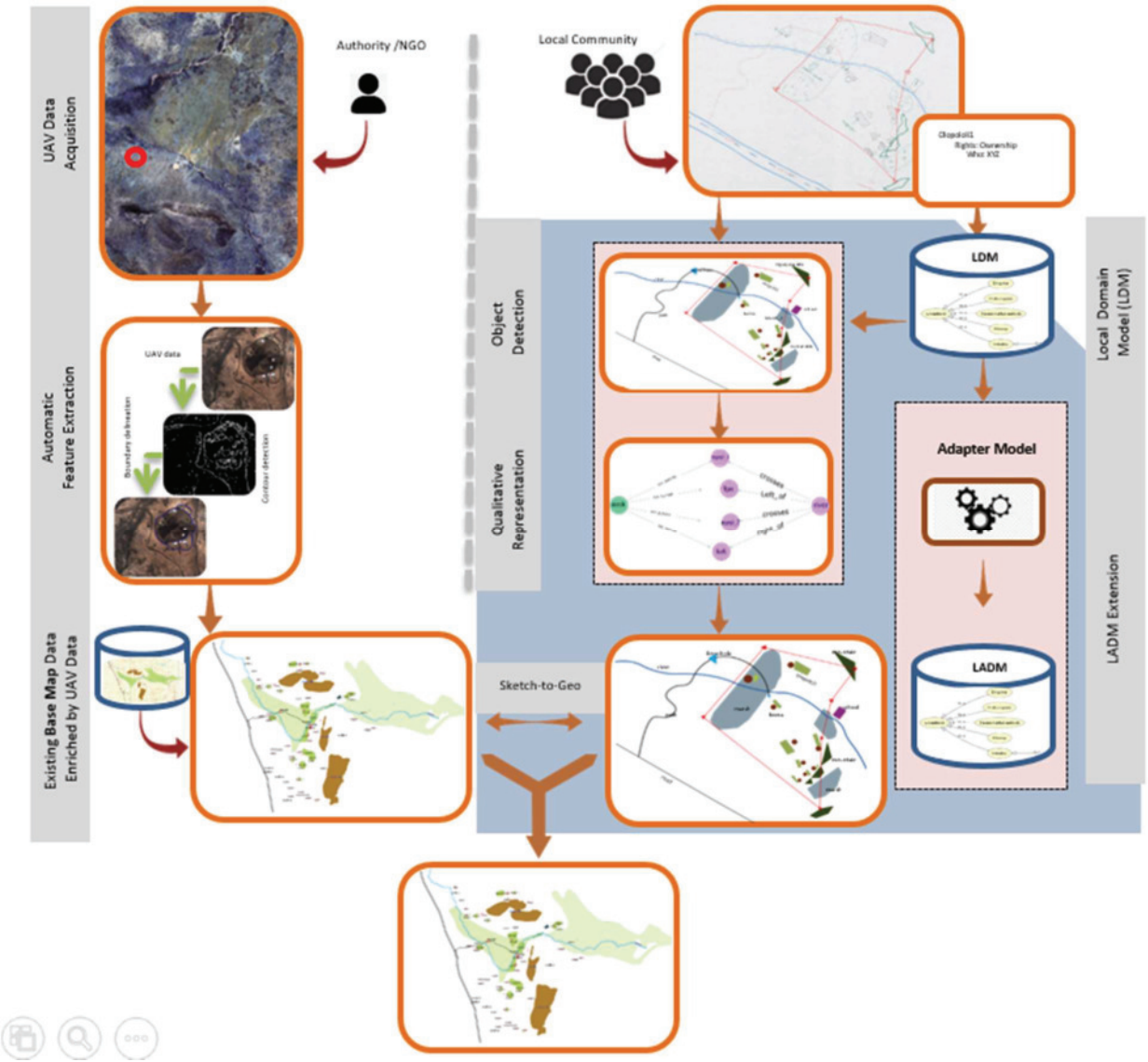

Figure 2: Workflow for aligning sketched information to base map data

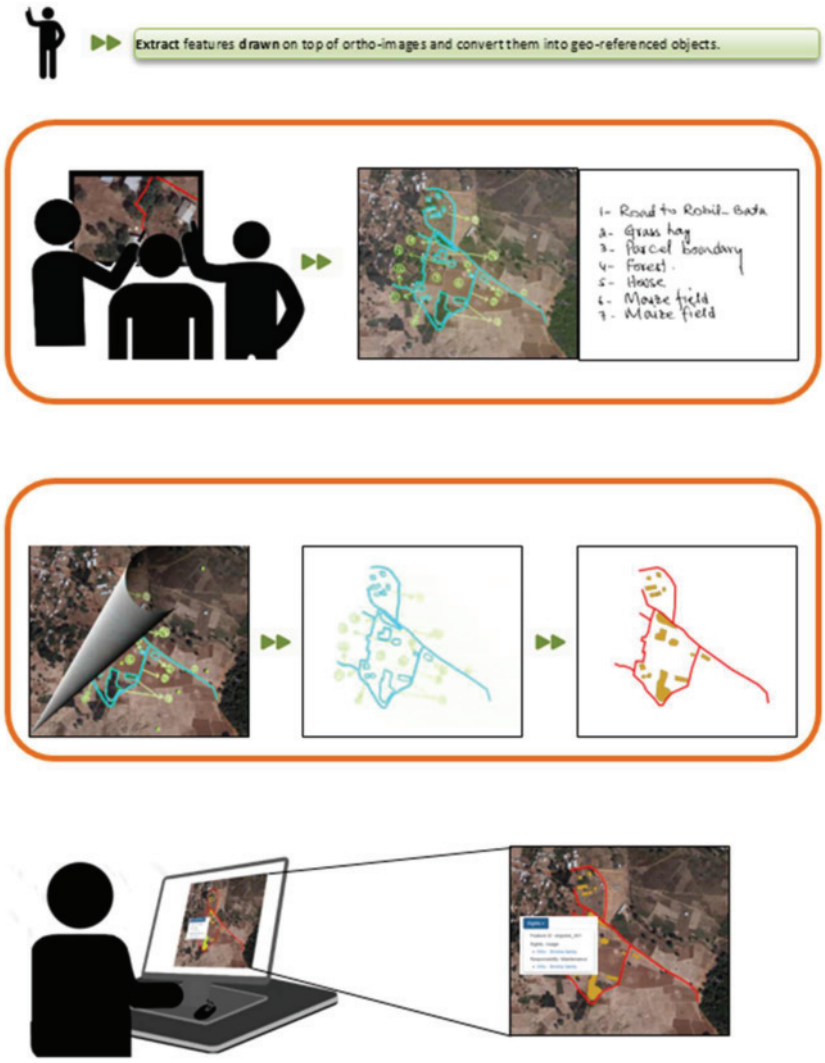

Figure 3: Workflow for aligning sketched information to ortho-imagery

To the end user all these sub-tools will be handled as a single integrated software package. SmartSkeMa is, therefore, marketed either as a software tool for data collection using ortho-imagery or a tool for rapid drafting using sketch maps. Usage of the tool may require initial setup and continuous support which could be offered as a service.

4.1.3 Consultancy Services for UAV-based Data Acquisition for Land Administration

The consultancy services include guidelines and a customizable workflow for UAV-based data acquisition in the context of land administration. Figure 4 shows the generic workflow of UAV-based data acquisition. The workflow is designed following a logical approach which facilitates all steps needed to provide up-to-date and high-resolution ortho-imagery as a geospatial source for land information. The first phase includes the study of policy and legal requirements regarding the successful implementation of UAV

data acquisition workflows within the context of a concerned country. Outcomes of the statutory prerequisites, technical features as well as characteristics of the application and country context provide the necessary framework to design efficient operational workflows which meet the needs of respective users and/or applications. Workflows encompass the entire operational UAV procedure including flight planning and preparation, data acquisition, data processing and quality assessment. The consultancy services will target surveyors, para-surveyors and experts in the land administration sector. However, government organisations, NGOs, local communities as well as grassroots organisations can also use the guidelines and request consultancy services if they want to capture high-resolution aerial imagery with UAVs for purposes other than land administration.

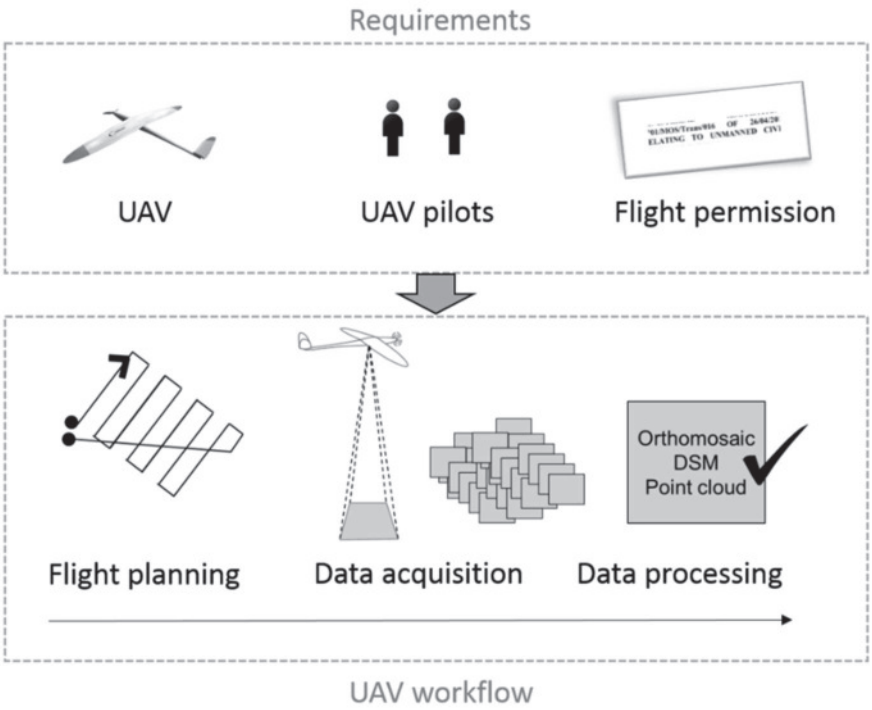

Figure 4: Generic workflow for UAV-based data acquisition

4.1.4 Semi-automatic Delineator of Visible Cadastral Boundaries from Optical High Resolution Sensors

The software tool supports the delineation of boundaries by automatically retrieving information from aerial / satellite imagery and by coupling this information with the subsequent delineation procedure. The tool focuses on improving current indirect surveying approaches in terms of cost, time and accuracy and consists of three parts: (i) image segmentation, (ii) boundary classification

and (iii) interactive delineation. Figure 5 shows the workflow of the semi-automatic visible boundary delineator. The software tool is implemented using open source software and uses the QGIS desktop as a basis to processing and delineation.

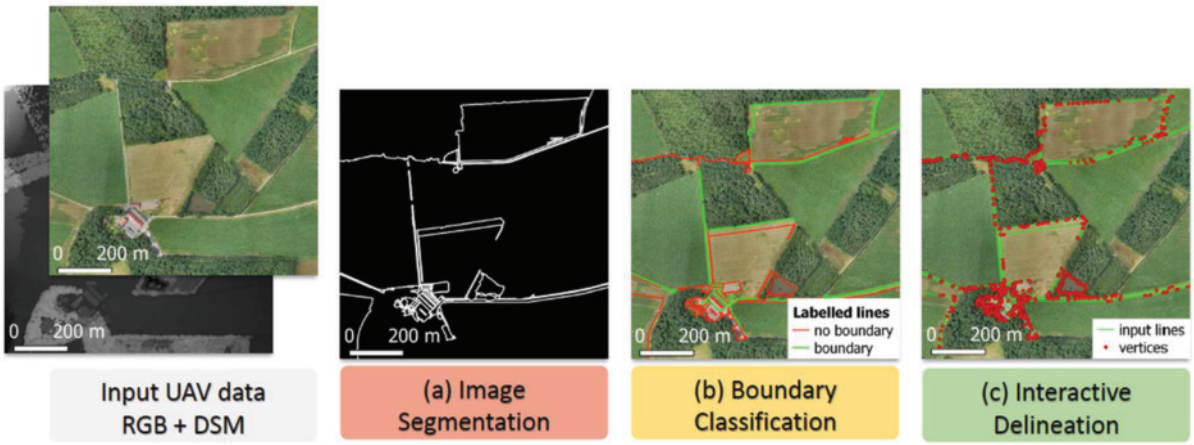

Figure 5: Workflow of the semi-automatic visible boundaries delineator

4.1.5 Publish and Share Land Information Platform

The Publish and Share land information platform is the main, unifying component of the its4land toolbox integrating the three software tools of Work Packages 3, 4 and 5. The main aspect of this platform is the dissemination and sharing of data created by its4land tools to external users or systems. Following the toolbox approach the user can select those its4land tools fitting best to his/her tasks or can integrate his/her own tools. This is achieved by service interfaces based on standards from the Open Geospatial Consortium (OGC) and World Wide Web Consortium (W3C). The modelling of the interfaces follows the concepts introduced by the ISO 19512 Land Administration Domain Model. External systems such as land administration systems (LAS) or land planning systems can use this to integrate data into their own processes, which are based on specific national rules.

The platform was developed using open source technologies. It is primarily intended as a development platform to be used in land administration related projects. Typical users of its4land Publish and Share are independent software vendors (ISV) or integrators which create services / applications for end-users. Publish and Share offers a set of high level geocloud based services for developers of land administration systems to use or to integrate spatial references in land tenure registration. All these services are implemented using the ISO19152 standard (the Land Administration Domain Model (LADM)) concepts. Using the geocloud services allows an

integrator to concentrate on functionalities required by their customer instead of re-implementing common solutions for common problems.

Publish and Share is based on three main concepts and their respective standards:

- LADM (ISO 19512: Land Administration Domain Model) [3]
- Web based API
- Geocloud services platform

How do these three concepts and their respective standards work together?

- LADM provides the conceptual framework of terms. A developer who is familiar with LADM will recognize known concepts such as SpatialUnits, AdminSources, etc. These concepts are available in the Publish and Share API. Their localized meaning depends on the country-specific implementation.
- The web based API is a state of the art REST-API that is independent of programming languages and operating systems.
- The geocloud service platform offers a flexible and scalable structure with high availability. The common data repository and re-use of functionality help to reduce the amount of work in standard administration tasks.

For seamless integration with existing systems, Publish and Share is implemented on standards such as REST, LADM and OGC OWS. It is composed of four technical components:

1. a set of public REST-APIs that allows tools and applications to interact with the Publish and Share platform;
2. a runtime tool environment for Smart Sketchmap, UAV image processing, boundary delineation and other tools;
3. a data repository for alphanumeric, geodata, binary and image data; and
4. OGC services for data dissemination (for publishing and sharing data).

The platform is not primarily intended as an out of the box software for end-users. As a geocloud platform, Publish and Share provides technical services to support land administration projects in implementing their own tools, applications and workflows.

Figure 6 shows the technical components of the Publish and Share software platform.

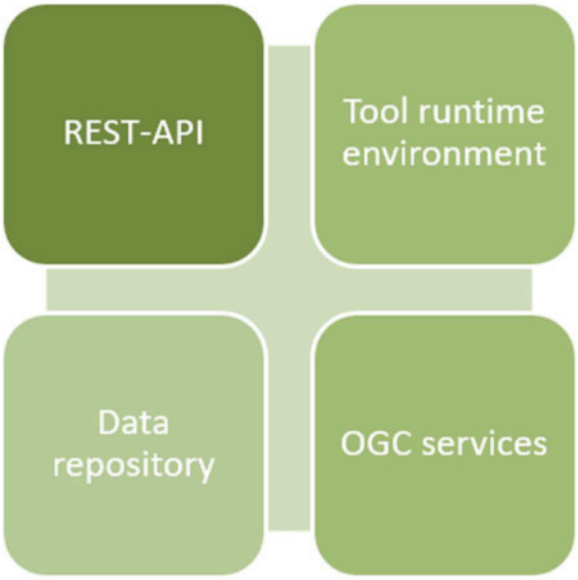

Figure 6: Technical components of the Publish and Share software platform

Figure 7 shows the two current software tools which are integrated in the Publish and Share platform. It also shows that the platform can be integrated in an existing land administration system workflow. For more and detailed information about the implementation of the Publish and Share platform the reader is referred to the deliverable D6.4 of the its4land project.

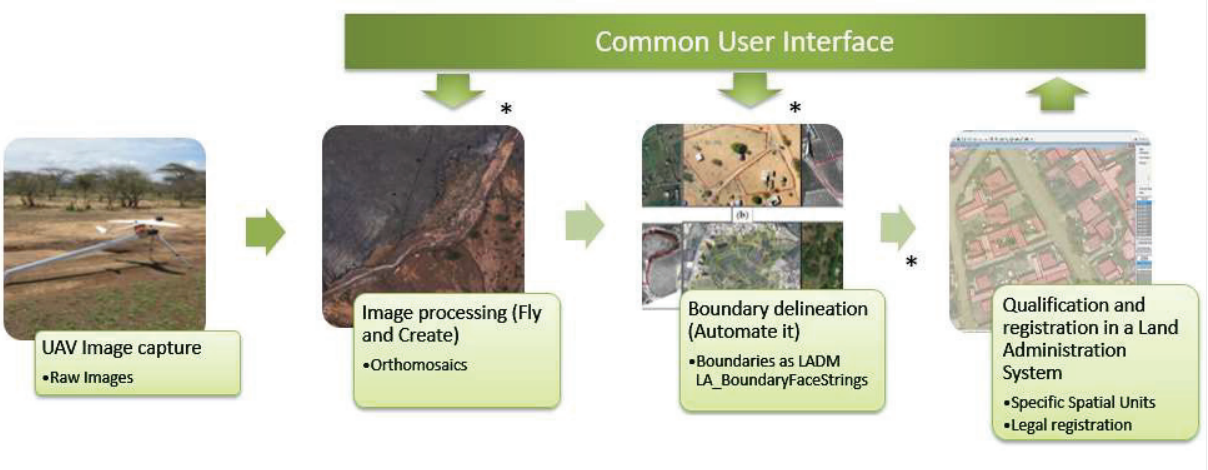

Figure 7: Integrated software tools in the Publish and Share platform and integrating the platform in land administration system workflows

4.1.6 Governance and Capacity Development for Geospatial Tools

The governance model will support the use of the innovative geospatial tools by aligning end-users' conditions, technological opportunities, and capacity building requirements. A good

understanding of the limitations and the successes of current governance strategies can help to deliver insights in the contemporary governance performances in the context of geospatial innovation implementations in East Africa. The three project countries provide insights into common land tenure challenges across Sub-Saharan Africa. These insights might offer transferability of lessons learned to other contexts in Sub-Saharan Africa and beyond. The consultancy services on offer will be provided to organisations (public / private or NGO) which are embarking on the application of the its4land software tools / platforms with tailored governance and capacity building models which best fit their requirements.

4.2 its4land Toolbox Concept

The innovative its4land toolbox concept is in line with the fit for purpose (FFP) land administration approach. While the project case countries of Ethiopia, Kenya and Rwanda have not clearly legislated for the application of this approach in their current land tenure recording processes, the its4land toolbox concept is still applicable, as it may improve workflows at government level, and serve the needs of communities on local and grassroot levels by providing software tools and services which they can use to record and secure their tenure rights. It also follows current trends in donor-funded reform agendas which fully endorse the FFP approach due to its community participatory character.

5 its4land Business Model

The its4land toolbox is the joint effort of different project partners, academic institutions and private enterprises. The project consortium is currently enacted and operationalised through the grant agreement. To ensure the exploitation of the project results after the end of the project the idea of establishing a new legal entity was discussed while preparing for the CEB seminar (see Chapter 4.). This idea was also discussed during this CEB seminar and the consortium concluded:

> Establishing a new legal entity in the form of a start-up is considered to be the best – possibly the only – way forward to sustain the results of the its4land project and exploit them commercially.
>
> This entity – under the working name **its4land Company** – shall sustain, further develop (to higher TLR), market, commercialize and sell the results integrated in the its4land toolbox. It shall be given the rights to do so by the its4land consortium partners, who currently hold all intellectual property rights[1].

As mentioned in Chapter 4 two different business models, the Lean Business Model and tthe Platform Business Model, were discussed and compared during the CEB seminar, due to their relevance to information technology innovations.

The Platform Business Model was not further considered because it is most suitable to businesses facilitating interactions across a large number of participants. An example of the Platform Business Model is the e-commerce company eBay. The eBay platform facilitates consumer-to-consumer and business–to-consumer sales by enabling interactions between millions of buyers and sellers across the globe 24/7 [4]. This Platform Business model is most suitable for businesses requiring large financial resources / capital.

The Lean Business Model, in comparison, is a business strategy that strives to eliminate waste in product and processes while satisfying customer wants [5]. In other words, the Lean Business Model as the name suggests is a concept that saves on unnecessary spending thus leaving more capital to use on developing the business. This model focuses on What Works and puts its

[1] Should no such legal entity be established at the end of the project, the right to market and exploit the project results will remain with the project partners as per the consortium agreement.

emphasis on delivering customer value. With the Lean Business Model resources can be deployed under a controlled situation thus resources are utilised in the most efficient way possible. In addition, with minimal capital investment, lean start-ups are heavily reliant on organic growth. That is, the reinvestment of profits gained from early stage development will enable the new business entity to scale up its operations in a more controlled manner without sacrificing on the levels of quality.

For marketing and commercializing the itsl4and toolbox the Lean Business Model is more suitable due to the niche market which the toolbox will appeal to. In addition, the funding and financial resources needed for the its4land start-up can be kept reasonably low thus ensuring that funding will be easier to obtain.

Prior to the final decision for applying the Lean Business Model for the its4land start-up the project partners discussed this model with the Advisory Board during its meeting in September 2018.

The Lean Business Model canvas, which has been created by Ash Maurya as an adaption of the Business Model Canvas of Alexander Osterwalder [6] was applied on the its4land toolbox. Figure 8 shows the its4land lean business canvas featuring the nine basic blocks that describe the problem, the solution, the key metrics, the unique value proposition, the unfair advantage, the channels, the customer segments, the cost structure and revenue streams. The compilation of this canvas is the joint collaboration of the leaders of the Work Packages 2 to 7.

This business model is usually utilized to validate concepts. In the case of the its4land toolbox which will stop at the technology readiness levels 5 to 7 the software tools can be brought further to the technology readiness levels 8 and 9. Even though the software tools are not at TRL 8 and 9, the product can still be placed on the market because it is highly adaptable, viable and workable.

The following paragraphs describe the nine blocks which the lean business model canvas of the its4land toolbox can offer to the land administration community.

5.1 Problem Addressed and Current Alternative Solutions

- Most developing countries have not formalised the land rights and tenure of its rural / communal / pastoral communities.

- Lack of rigorous qualitative and quantitative needs assessment method in land administration.

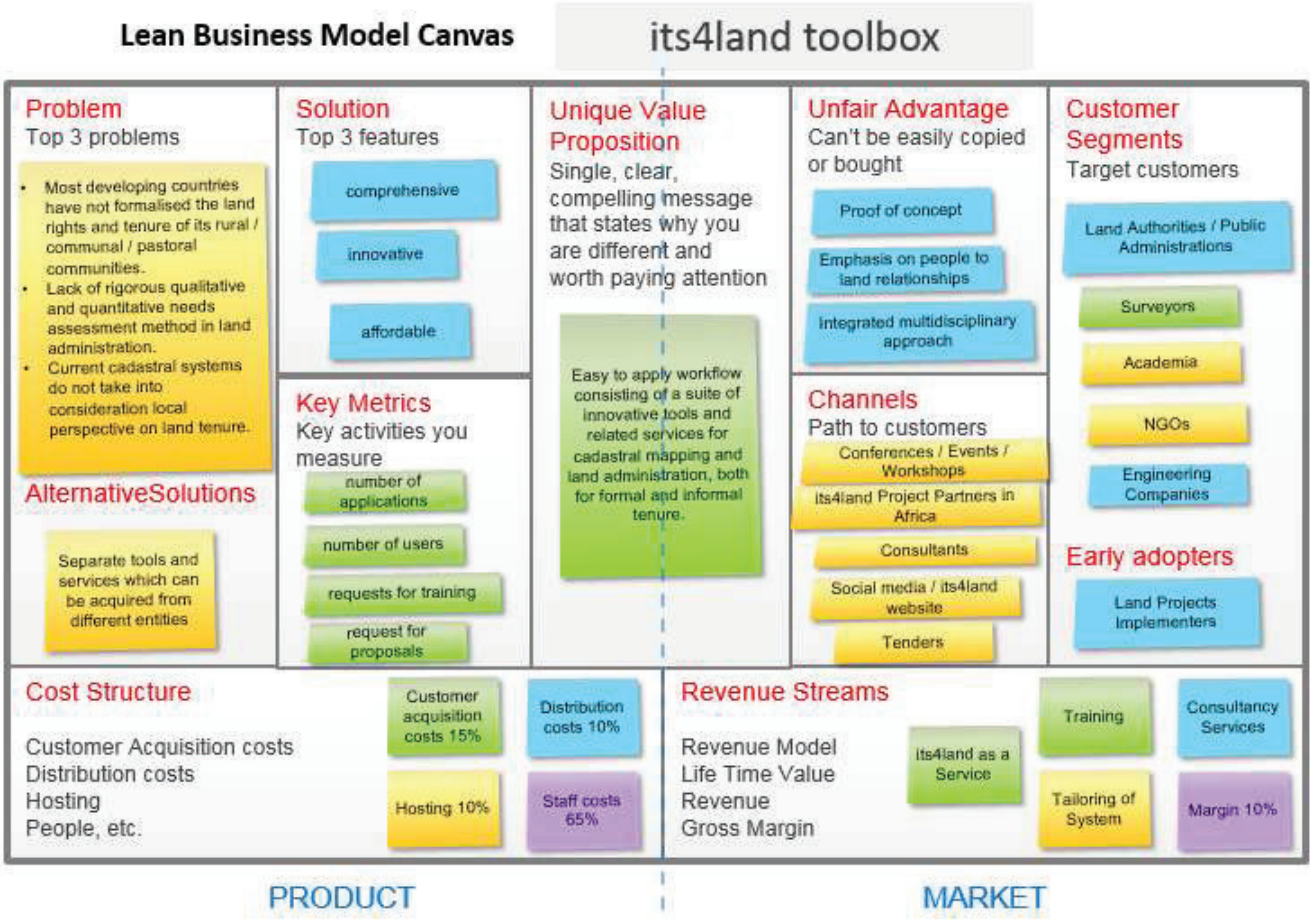

Figure 8: its4land lean business model canvas

- Current cadastral systems do not take into consideration the local perspective on land tenure.

Currently alternative solutions on offer are separate tools and services which can be acquired from different entities, i.e. not a one stop shop. That is, the customer has to request the tools and services separately which will require substantial resources from the procurement and management procedures implemented by the customer's organisation.

5.2 Proposed Solution and its Key Metrics

The main value proposition of the solution (its4land toolbox) is a "one-stop shop" offering that is comprehensive, innovative and affordable with the following key features, which allow the measurement of its popularity and monitoring its performance:

1. number of applications (clients applying one or several of the offered tools and services);
2. number of users (how many are using the tools);

3. requests for training (how many requests are made for training in using the tools or conducting needs assessments or applying governance models); and
4. requests for proposals (how many customers will request proposals for services or software tools)

5.3 Unique Value of its4land Toolbox

The unique value proposition which the its4land toolbox promises to deliver is its easiness. It consists of a suite of innovative tools and related services for cadastral mapping and land administration, both for formal and informal tenure.

The its4land toolbox has an advantage in that it is a proven concept which can be shown through the success of the 4 year its4land project. In addition, it emphasizes the people to land relationships and offers an integrated multidisciplinary approach. It also aligns with and valorises the prevailing innovation paradigm in land administration, which is the FFP approach. With regard to the likely competitors of its4land toolbox business the reader is referred to Chapter 6.2.5 of the business plan.

5.4 its4land Business Channels

As for its channels, i.e. the path to the customers, this could be through land administration related conferences, trade fairs or workshops, or through the its4land project partners in East Africa, through land administration consultants who advocate for innovative land tenure recording solutions, or through social media. Also public tenders that call for land tenure recording tools could be a path to reach the customers.

5.5 its4land Toolbox Customer Segments and Early Adopters

For a detailed description of the its4land toolbox customer segments, the reader is referred to the deliverable D2.2 of the its4land project. Early adopters of new technologies across all stakeholders identified in D2.2, and especially implementers of land recording projects are the most likely initial customers introducing and establishing the toolbox in the (land) administration community. The its4land toolbox is tend to reach the other stakeholders as listed in D2.2 and the members of the buying center described in the business plan (see chapter 6.2.3)

5.6 its4land Start-up Operational Costs

On the basis of Esri Rwanda's previous business experience the operational costs for taking the its4land toolbox to the market are estimated below and will be detailed in the business plan. Currently the cost structure has identified four main elements, which are

1. staff costs: estimated initially at an average of 65% of the entire operational costs

2. customer acquisition costs, estimated at ~15% of the cost structure;
3. partner network – estimated at ~10%; the business will need to establish a network of partners or affiliates to bring the its4land toolbox nearer to the customers;
4. hosting costs: estimated at ~10% of the operational costs – Publish and Share being a geocloud service will create system and data hosting costs which have to be covered by the business.

5.7 Revenue Streams

The revenue streams derived from the its4land project results are expected to come from different sources e.g. hosting/geocloud services, training, software / system customization and tailoring, support and consultancy services.

Table 1 on page 7 showed the two types of KERs which will generate revenues: Software and Consultancy. Needs Assessment, UAV-based Data Acquisition, Governance and Capacity Building fall under consultancy services; while the Smart Sketchmap (Smart SkeMa) Data Collection Tool, Semi-automatic Visible Boundaries Delineator, and the Publish and Share Platform fall under software and consist of hosting services (i.e. geocloud services), training, and software / system customization respectively tailoring.

KER of the **type consultancy** can be charged for as time & material, i.e. on a per day basis, or on a lump sum basis for the provided services. Travel costs and per diem are charged extra. The intellectual property rights for such services will need to be defined in separate contract agreements under which these services will be rendered.

For the **KER** of the **type software**, the selection of an appropriate licensing model will be driven by the fact that the software tools have been developed using open source ICT, etc. which means that the Massachusetts Institute of Technology (MIT) licensing model [7] can be considered.

The MIT License is a free and open source software similar to the Berkeley Software Distribution (BSD) License [8]. It grants the software end user rights such as copying, modifying, merging, distributing, etc. It is notable for what it does not contain, such as clauses for advertising and prohibition of the use of the copyright owner's name for promotional uses. The MIT and BSD licenses are considered to be much more flexible than even the General Public License (GPL). For instance, users have broad copying and distribution rights. Thus, because the MIT License is not copyrighted, in contrast to the GPL, other developers are free to modify the software to suit their own requirements. The MIT license more explicitly states the rights given to users, including ". . . without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense,

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While the MIT (open source) licensing model does not permit to sell software licenses of the developed its4land tools, revenues may be generated in several other ways, each having advantages as well as disadvantages:

- Geocloud Services: During the needs assessment (Work Package 2) most stakeholders expressed their interest in geocloud services. The usual business model for (geo)-cloud services is a model where a customer pays for the use of a technical service. When referring to open source based systems one has to keep in mind that the operation of such a system infrastructure also costs money. When using open source systems one saves on the cost of the licence fee but the cost of operating the infrastructure remains. Thus it is often less costly to pay for the service provider for using his operating infrastructure rather than operating and maintaining the own one.

- Consultancy Services: (larger) organizations which prefer to set up and run their own infrastructure with cloud services, the revenue model for Publish and Share would be to provide consultancy services on how to set up the system, operate and maintain it.

- Provision of General Services: (smaller) organizations, may prefer to buy services rather than operating their own system infrastructure. Land projects of NGOs are time-bound, and therefore it is more beneficial if project money is spent on collecting and recording land tenure information instead of spending it on expensive hardware which they might not need after the project is completed. As for small businesses it is far less expensive to buy services than setting up their own operating infrastructure. Though, NGO's and small businesses might require a tailored specific user interface (GUI) which can be implemented by the service provider as part of its customization services. The backbone, however, is left to the service provider to operate the infrastructure against a set fee.

- Offering a software distribution for the its4land tools: With a distribution, the software is still open source, but the users pay for help and support services to the provider of the distribution. This is the model common e.g. for Linux operating systems (Canonical – Ubuntu, or Redhat) and other software with large user communities, but considered to be less suited for specialized software systems such as the its4land toolbox because of its small user communities. This model will thus not be pursued further.

Based on the previous arguments about the revenue model the following revenue streams are envisioned:

1 Cloud services: selling access to the Publish and Share Platform in the Amazon Cloud / or some other cloud to customers wanting to use the its4land toolbox in a safe and working environment.
2 Implementation services: Some customers might want to download specific its4land tools such as Smart Sketchmap or Semi-automatic Visible Boundaries Delineator or even the Publish and Share Platform from the cloud to install and run on their own infrastructure. Here customization and configuration of the its4land tools for a specific project, paid by the customer who wants to use them either on his/her own operating infrastructure or on the service provider's infrastructure.
3 Integration services: Integration of additional – generic or client specific – tools into the Publish and Share Platform. When paying for the integration of their tools, customers benefit directly from the superior computing power of the platform and the ease of exchanging data with the tools already available in the platform, and at the same time they help to make the platform more encompassing and attractive for yet additional customers.

4 Support services: Various forms of paid support services can be envisaged, from a telephone hotline to regular support- or co-working-sessions with the customers' staff.
5 General consulting services in land projects relevant to Needs Assessment, UAV-based Data Acquisition or Governance and Capacity building.

Thus a good revenue stream for the its4land toolbox will be generated by selling consulting and implementation services, including support and integration, as well as geocloud services. The new legal entity should offer the geocloud services as a service provider. Since the legal entity can operate and run more than one user platform in one cloud environment, effects of scale are attainable and margins are potentially higher. Users subscribing to the geocloud services can be charged a flat rate (monthly, annual, quarterly etc.) and probably a premium for the usage of large amounts of cloud space.

Pricing for both the tools and services will obviously need to be competitive in the market, e.g. respect the rate structure of large donors for comparable services and the prices of competitors in the market. It will be the obligation of the new legal entity, to define a pricing striking the fine balance between the "possible" and what is needed to bring the company forward on the way to profitability as outlined in the its4land business plan.

6 its4land Business Plan

6.1 Business Description

its4land has developed new software tools and related services to make land rights mapping and management faster, cheaper, easier, and more responsible – for **creators** of land administration data and maps as well as for **users** of such data and maps –both of which may be found across the entire spectrum of stakeholders as identified in WP 2 (see D2.2).

The software tools developed during the its4land project were integrated into the Publish and Share platform and are now offered together with the consultancy services developed during the Work Packages 2, 4 and 7 under the name of **its4land land administration toolbox** (or in short: its4land toolbox).

As agreed by the its4land consortium partners during the CEB seminar (see leading section of chapter 5), the **its4land land administration toolbox** shall be offered in different Sub-Saharan land administration markets by a new company to be established at the end of the its4land project, the **its4land Company**.

The **its4land Company** will **exploit** the results of the its4land project, and it will **sustain** the results, by maintaining the software, further develop the tools to reach higher technical readiness levels, and offer consultancy services to meet customer needs.

Whether a client is interested in one of the its4land tools, a service or the entire its4land toolbox, he/she will always be likely to integrate them into her or his organization's workflows and customize it to best fit the IT-environment in operation. The "sale" of the its4land toolbox thus becomes a sale of a configurable software solution (sale or delivery of a solution) and accompanying services. It should not be equated to or confused with a simple product sale (the sale of a software box)[2].

The **its4land Company** shall execute the business plan as outlined in this document, adapting it as necessary. The company shall pursue with diligence and determination the opportunities in a market estimated to invest over time more than 200 Mio USD in software tools in Sub-Saharan Africa, to achieve positive results, which in turn will permit the company to further grow and sustain the its4land toolbox and the its4land project results in the long run.

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[2] This distinction between solution delivery and box/product sale will be made throughout the business plan, especially in chapter 6.2.3 in which the buying center, i.e. the potential customers of the its4land toolbox are identified. Also, one has to be careful with the term "end-user" of the its4land toolbox.

6.2 Market Analysis

6.2.1 Land Administration Market in Sub-Saharan Africa

its4land developed new tools and integrated these into one platform to make land rights mapping and management faster, cheaper, easier, and more responsible – both for

i. **Creators** of cadastral data and maps

and for…

ii. **Users** of cadastral data and maps

Note: The classification of clients in Creators and Users is a concept introduced in order to arrive at an estimate of the market in which the results of its4land shall be commercialized, and to guide respective sales efforts. Both Creators and Users may be found across the entire spectrum of stakeholders as identified in WP2 (see D2.2). To prioritize sales, differentiating between Creators (potentially larger, technology driven projects) and Users (on average smaller projects), seems more relevant than differentiating between different classes of stakeholders.

The **creator** of cadastral data and maps, and thus the first and foremost stakeholder in any country's land administration, tends to be government with its unique responsibility to document and map land rights and issue the respective land certificates/titles[3].

Also often within the government, but not exclusively so, are the potential **users** of cadastral data, who are considered potential clients for the its4land toolbox too. They include, but are not limited to revenue authorities responsible to enforce the collection of land-related taxes (tax-mapping), city councils / administrations for urban development and planning, ministries promoting land to investors for industrial parks, for agriculture or forestry, and as cadastral data becomes more available, the private sector, e.g. for targeted supply chain management of inputs to agriculture or home-deliveries of goods (even by drones – with the land title providing the target-coordinates).

Having shown, that the dominant stakeholder in land rights mapping and land administration still is the government, one needs to establish how government finances the implementation of land tenure projects or the development of land administration information systems (LAS, LAIS); and which role development partners are playing in such projects.

Below are **two example** projects from **Rwanda**, representing the Creator and the User of cadastral data and maps are presented.

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[3] Cognizant of the fact, that the creation and management of the cadastre can be and has been outsourced to private companies, one has not yet seen enough evidence of this happening in Sub-Saharan Africa to dwell further on this possibility in the present business plan. Should more land administration be outsourced to private companies, these companies would assume the roles governments are playing today, and thus become potential buyers for the its4land toolbox, similar to the system implementers which will initially be targeted (see 6.2.3)

Note: The authors debated the validity of extrapolating from two examples from just one country to the entire continent, especially given that the chosen country is enjoying a rather unique position in Africa when it comes to applying IT and in what is often coined "good governance". In addition, in this country the entire land parcels have been mapped and registered and thus the market of Creators and Users is well covered.

1. *The authors wish to point out, how difficult is to get reliable figures on such projects, and that by having been involved to a certain degree in both projects, the authors have been able to overcome this difficulty.*
2. *The risk stemming from extrapolating from just two Rwandan examples is mitigated in the calculations by a slow adoption rate, i.e. a low number of countries are estimated to be doing a similar project as Rwanda in 2020 (estimation 2), in 2021 (3) and in 2022 (5). i.e. the basis of the predictions of only 10 such projects being tendered in the next 3 years (see chapter 6.6, line 32), and furthermore, not the entire software part in these projects is expected to be won, but only up to 5% (see Chapter 6.6, line 36) - which will be sufficient to sustain and grow the its4land company business.*
3. *The authors felt vindicated when during the Bahir Dar Land Conference 24.-25. May 2019, they were able to access more information on the Land Investment for Transformation Project (LIFT) implemented by DAI in Ethiopia. From 2013-2020, DAI "will have issued land certificates for 14 million parcels of land in Ethiopia's Amhara, Oromia, Southern Nations Nationalities and Peoples, and Tigray… The average cost per certificate issued to date is UK£ 5.12, but this figure will continue to fall as the programme progresses and achieves greater economies of scale. This compares to typical average costs of USD$ 7.56 in Rwanda and USD$ 33 in Mozambique*." [9] .
   The mid-term review of the LIFT project by UK Aid lists a project value from UK£ 45 – 67.5 Mio GBP [10] → *i.e. not only are the costs per parcel very comparable between the chosen Rwanda LTR project and LIFT, but the total project budget too.*

Having discussed this, it is from these **two Rwandan examples**, a conservative and prudent extrapolation will be made to arrive at the size of the potential market for the its4land toolbox in the following chapter (6.2.2).

Creator: Land Tenure Reform (LTR) Programme, Rwanda
Between 2009 and 2013, the Rwandan Authorities have "swiftly and cheaply created enforceable legal titles to every plot of land in the country" [11] under a Programme now widely known as the Rwandan Land Tenure Reform (LTR) Programme.

The aim of LTR was according to the original project document "to issue registered title to every landholder in Rwanda … through a one-off, low-cost community-based process of Land Tenure Regularisation (LTR) over … 5 years." (cited in [12]). It is stated, that LTR should never need repeating and sustainability was to be assured through the Government of Rwanda taking responsibility for the recurrent costs of land administration to keep the register up to date, wholly or partially funded from land transactions [12].

While the project had to be extended until March 2019, additional funds were needed, and some challenges in maintaining the achieved aim, the results are unique in Sub-Saharan Africa: Rwanda has registered efficiently all plots in the country (~11.4 Mio) and is managing them in their Land Administration Information System (LAIS).

Rwanda's well documented LTR [13] is the exemplary case of the economies and financials at play for stakeholders of the type **creator** in the land administration market:

Four donors and the Government of Rwanda invested from 2009/2010 to July 2013 some 42.2 Mio £ (65 Mio USD at 2013 average exchange rate) [12] – with the Government of Rwanda contributing some 9.3% and the UK the lion's share of the funding, and DFID managing the basket fund – to create swiftly and cheaply enforceable legal land titles for every plot of land in the country (Rwanda).

User: Investor App for Private Sector Driven Agricultural Growth Project, Rwanda

"The Private Sector Driven Agricultural Growth (PSDAG) project is a five-year effort funded by USAID/Rwanda as part of the U.S. Government's Feed the Future initiative.

PSDAG works to improve the effectiveness of Rwanda's agriculture sector by helping the Government of Rwanda (GOR) to attract and increase private investment while upgrading agricultural value chains to stimulate private sector growth" [14]

The PSDAG project is implemented by RTI International, an independent, nonprofit research institute based in the USA. The project runs from 2014 – 2019 with an original budget of 25 Mio USD from USAID [15, p. last paragraph].

PSDAG has two main objectives: "1) Assist the GOR to Increase Private Sector Investment; and 2) Facilitate Increased Private Sector Investment in Upgrading Agricultural Value Chains" [16].

Aligned with the first of these objectives, RTI released in 2016 a relatively small tender[4] for a GIS based "Agriculture Land Information System (ALIS) with an Investor App", to enable potential investors to identify lands available for agricultural investment.

In the five years PSDAG invested in and supported many projects to drive private sector growth in agriculture. While PSDAG was really interested in IT, explored the usage of drones, looked into climate data and had apps developed, it was only through one of their projects, that PSDAG became a stakeholder in Land Administration (the ALIS tender document explicitly mentioned, that the Investor App must make use of the "land titles registered through the LTR under the Ministry of Agriculture's name").

[4] Esri Rwanda Ltd. won the respective tender, which was valued – including two phases – at less than 1% of PSDAG's total project budget: During the implementation, Esri Rwanda invested almost 90% on services for preparing and uploading the agriculture data and training the Ministry's staff, and (only) 10% (~15'000-20'000 USD) on necessary ArcGIS Desktop software and ArcGIS Online.

PSDAG will be used here as an example and case in point of the economies and financials at play for stakeholders of the type **user** in the land administration market.

6.2.2 Estimation of the Sub-Saharan African Market Size for Land Administration Technology and closely related Services

Extrapolating from the two Rwandan projects, one for **creators** of cadastral data and one for **users** of cadastral data as shown above, to the 46 countries which UNDP lists as Sub-Saharan African Countries [17] [18], the total land administration market is estimated at 3 Billion USD in investments (Capital Expenditures, CAPEX) for "Creator" and "User" projects.

Description	Quantity	CAPEX (USD)	OPEX (USD annual)	assumed (%)	Comments
Exemplary Cases, Rwanda					
Rwanda LTR, total up to 2013	1	65'000'000	n/a		funded DFID and other Donor
Creator: Rwanda LTR, software/tools	1	4'875'000	n/a	7.50%	Percentage of total project value used purchase and/or development of tools, incl. installation and some inital trainings
PSDAG, total 2014-2019	1	25'000'000	n/a		funded by USAID
User: PSDAG, total "Land Administration Part"	1	150'000	n/a	0.60%	approximative percentage of total PSDAG project invested in ALIS 1 + 2
User: PSDAG, software/tools	1	25'000	n/a	0.10%	Percentage of total project value used for purchases and/or development of tools, incl. installation and some inital training
Total Land Administration Market Size Sub-Saharan Africa, both Creators and Users					
***Creator:** Total Sub-Saharan LTR projects*	*46*	*2'990'000'000*	*n/a*		*1 project(s) for each country, including Rwanda*
***User:** Sub-Saharan Africa, Land Administration User Projects*	*230*	*34'500'000*	*n/a*		*5 projects for each country, including Rwanda*
Total USD		*3'024'500'000*			
Market size Sub-Saharan Africa, software/tools for creators and users					
Creator: Sub-Saharan LTR, software/tools	46	224'250'000	22'425'000	10.00%	1 project(s) for each country, including Rwanda; OPEX assumed at 10.00% per annum
User: Sub-Saharan Africa, software tools	230	5'750'000	575'000	10.00%	5 projects for each country, including Rwanda; OPEX assumed at 10.00% per annum
Total USD		**230'000'000**	**23'000'000**		
Futher Assumptions / Factors					
Number of Sub-Sahran Countries	46				as per UNDP Definition
Number of User Projects per country	5				1 project each for a Revenue Autority, Urban Planning, Infrastructure, Agriculture, and Forestry

Though this figure is impressive, relevant for the its4land toolbox is not the total size of the Land Administration Market for Sub-Saharan Africa, but the part thereof spent for software, tools and some closely related services, such as system installation and initial training, and consultancy services such as those developed in the Work Packages 2, 4 and 7 of the its4land project.

The software/tools part of the Sub-Saharan Land Administration Market alone[5] is estimated at **230 Mio USD** in CAPEX and **23 Mio USD** per annum in operational expenditures (CAPEX).

With all the limitations the above extrapolation may be having, with the competitors (chapter 6.2.5) and challenges (chapter 6.2.6) facing the its4land toolbox business, it is in this large potential market where the success of the its4land toolbox is sought. How it shall succeed and thrive is described in chapter 6.6 Financial Projections.

Note: As already discussed earlier, the authors are aware, that that not each and every Sub-Saharan Country will perform in the next few years an LTR as Rwanda did and that the 230 Mio USD for tools and software, and that the additional budgets available for goods and services are not automatically available for its4land tools and services. This however is taken into consideration in the chapter Financial Projections (6.6)

6.2.3 Buying Center: Roles and Functions of the Stakeholders

As highlighted in the opening sentences of the business plan (see page 24), the sale of the its4land toolbox is not considered as the sale of a ready-to-use product (sale of a software box), but as the sale of a configurable software solution including various related services (sale or delivery of a solution).

Selling a solution is more complex and usually takes much longer than the sale of a product. Furthermore, in land administration market solutions are almost always[6] procured through an (international) competitive tendering process.

Selling into such a market is thus never straight forward and requires a good understanding of the buying center [19] – i.e. of the individuals making decisions about a purchase. The following stakeholders and their respective roles are identified as typically represented in the Buying Centers for land administration projects:

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5 Based on the knowledge the authors have on the Rwandan LTR project, we estimated that 7.5% of the total project budget were spent for software/tools, and closely related services, such as software development, installation and initial trainings. We further assume, that on average, these 7.5% are applicable for Creator projects in other countries too.

6 Large donors such as the World Bank, the EU, GIZ and others, publish their tenders in their own online platforms. Furthermore there is a multitude of commercial tendering platforms (e.g. DEVEX, Tendersinfo, etc.) who are collecting and making accessible requests for proposals from various sources. Common to all of these platforms is, that they are built to facilitate a transparent, competitive procurement process and prevent corruption. While sometimes tedious to follow, such tender processes are also quite good guarantees for the supplier, that a project is "real", has a budget, is honestly trying to find the best solution etc. The authors of this business plan would personally be very cautious to go for projects, which are not procured through such a tendering process: The risks are just too high.

Government organizations in the country of implementation: are the beneficiaries of the projects, e.g. the ministry responsible for lands in projects creating and managing cadastral data or other ministries when it comes to using cadastral data. These ministries tend to be owners of the developed systems and often it is them who issue and evaluate the tenders

Land professionals in government organizations: are – in creator scenarios – the **end-users** of the **its4land tools** in the sense of "the person who uses the software or hardware **after it has been fully developed**, implemented and installed. It is also the person who keeps calling the "IT guy" with questions about why the product isn't working correctly" [20][7]

Professional or casual users of land data and maps: are – in user scenarios – the end-users of the its4land tools in the sense of "the person who uses the software" [20] or parts thereof as exposed through an interface or app.[8]

Donors and development partners: are (still) playing a very important, if not the key-role in financing land tenure projects or projects making use of digital land data and maps in Sub-Saharan Africa. This is clearly shown by the two Rwandan projects presented earlier, and underlined by the World Bank "working on land tenure as well as land and geospatial infrastructure and systems in dozens of countries across the world, with an investment of approximately 1.5 billion USD in commitments" [21]

Summarizing for Sub-Saharan Africa: One would hardly dare to speak of a market for the its4land toolbox, were it not for the huge investments made by donors and development partners.

While some development partners do get involved in the implementation (and respective technical decisions) of land projects, many development partners and donors take a less paternalistic stance, understanding their role as administrative and financing agencies[9], interfering only, if their no-objection procedures are not adhered to.[10]

Philanthropists and foundations: are playing a similar role as donors and development partners, but act more independently (from governments), following rules and implementing

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7 Usage of bold font by the authors to highlight, that we do not expect land professionals to use the entire its4land toolbox, but only certain tools as configured and fully developed for the workflows of their organization.

8 In the case of the PSDAG project (see page 20) , the end-user of the implemented app is the potential investor searching for land in Rwanda suitable to grow certain cash-crops

9 "Along with the Nordic countries DFID has generally avoided setting up its own programmes as that can create unnecessary bureaucracy. To achieve this DFID distributes most of its money to governments and other international organisations that have already developed suitable programmes and lets them distribute the money as efficiently as possible" and from 1997 onwards, „reduced the amount of aid tied to purchasing British goods and services which often led to aid being spent ineffectually" [31]

10 While the non-objection procedures vary from donor to donor and depend on the "client's capacity, the market situation, and corruption risks" [36], they generally leave technical decisions and the evaluation of proposals to the tendering agency, i.e. the beneficiary of the project.

projects in line with the preferences of their founders or boards. The best known of such foundations, the Bill and Melinda Gates Foundation, is considered a potential client and is included on the list in the following Chapter 6.2.4.

Consultants: are working with and for government organizations, donors, development partners and/or implementers to asses user needs, define projects and write the respective terms of reference (TOR). Sometimes consultants are conducting preliminary pilot projects (to better assess the needs or test the respective technology) or they are involved in the quality assurance / acceptance of projects delivered by implementers / system integrators.

Consultants called upon in the land administration sector have mostly many years of professional experience and tend to be expatriates (coming from Europe or the Americas).

Intergovernmental organizations, universities, a few large NGOs: are (politically) well connected and influential, the large NGOs are also resourceful. They are consulted for advocacy and expert advice by their member states (members), but sometimes they can also be seen implementing (pilot) projects (a good case in point is RCMRD, Nairobi). Members of the its4land consortium has experience in seeing them acting in the market somewhere between being consultants and implementers. A few of these organizations are considered to be potential clients and are included in the list in the following Chapter 6.2.4.

Implementers / system integrators: are typically large, internationally positioned engineering companies with a large pool of staff (often 100s or 1000s), broad expertise, financial means and clout to go for the large (often multi-million USD) land administration projects which are being tendered.

After a long[11] and often very competitive bidding process, one of the participating companies is chosen and invited for contract negotiations. During these negotiations, the winner has to present and defend their proposal, and may be asked to lower the price to meet the available budget. The winner will try to have the client accept a lean, economical implementation and the client typically is very cautious to deviate much from the original TOR – worried that it might be interpreted as a corrupt practice.

After successful negotiations, the implementation of the project starts. The winning contractor chooses and procures components (e.g. the its4land toolbox) or services they do not have or can't execute themselves. Often the winning company procures these goods and services again through a competitive bidding process.

[11] Two staged procurement cycles starting with an Expression of Interest and continuing with a Request for Proposals may take 1 to 2 years.

Last but not least, one needs to mention separately one group of stakeholders, whom one may encounter in any of the roles mentioned above:

Staff, students and alumni of the university partners in the its4land project: The University of Twente (UT), KU Leuven (KUL) and the Westfaelische Wilhelms-Universitaet Muenster (WWU), all have a long history of hosting students from African countries, and the Institut d'Enseignement Supérieur de Ruhengeri (INES) in Rwanda, the Bahir Dar University (BDU) in Ethiopia and the Technical University of Kenya (TUK) in Nairobi provide higher education for future land administrators and (tailored) made training courses for other professionals locally in Africa. Many of the graduates will find employment with one or the other organization mentioned above.

All presented stakeholders come in at different, sometimes overlapping times in the life-cycle of a project, with usually a combination of consultants, donors and government agencies defining projects in the very important initial phases.

The two Rwandan projects presented above (page 26) are strong cases in pointing out large engineering companies implementing development assistance projects funded by a foreign donor: The LTR project was implemented largely by HTSPE with funding from DFID[12], and RTI implementing PSDAG with funding from USAID.

These two projects and the its4land consortium's experience with many similar constellations throughout Sub-Saharan Africa, support the decision to present the implementers / system integrators as the first important group of customers of the its4land toolbox and to prioritize the respective business plan accordingly.

Note: "Prioritizing" is to be understood in the narrow sense of prioritizing pro-active measures on the market, e.g. actively approaching potential customers at conferences. In a market however, which is – as outlined above – largely depending on public procurement processes, companies will not attain success by pro-active measures alone, they must react to all tenders for which their solution is suited in a wider sense – regardless if the potential customer is from a prioritized group or not: While the its4land Company will prioritize it's pro-active sales measures on implementers / system integrators, it cannot afford to be picky: Tenders from any potential customer and / or stakeholder will be analyzed carefully and answered by submitting a proposal – if the its4land toolbox stands at least some chances to be selected as the winning solution.

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12 "The LTR process in Rwanda can be divided into two phases. In both cases, DFID was the main donor, and the implementing agency (through competitive tender) HTSPE Limited (UK) in consortium with Matrix (Kenya) and PCG (Rwanda)" [32].In December 2013, HTSPE joined forces with DAI (Europe) and in Summer 2014 DAI retired the brand-name HTSPE

6.2.4 Implementers - High Potential Customers for the its4land Toolbox

The tools developed in the Work Packages 3, 4 and 5 of the its4land project were integrated in the result of Work Package 6 - the Publish and Share platform. This platform will be offered to potential clients as the **its4land land administration toolbox**. The tools integrated in the platform and the services developed in the Work Packages 2 and 7 are also offered independently and separately.

The its4land toolbox should not be confused with a software box that can be procured, opened, installed and directly helps end-users perform their work (such as e.g. MS Word, or the best known desktop GIS: QGIS or ArcGIS).

The real strength of the Publish and Share Platform and the its4land toolbox lies in the integration of the tools developed and its capability to easily integrate other tools in one open source platform. Implementers and system integrators who are able to unleash this unique strength by integrating the its4land toolbox into their projects and adapting them to the (often complex) land administration workflows, will derive most value from the offered platform – more value than individual end-users[13].

Some implementers will be interested in the entire Publish and Share Platform and all the integrated tools: these are the clients the **its4land Company** will target, since they represent potentially the largest business market for the its4land toolbox.

With much having been written about the value of the integrated Publish and Share Platform, the its4land Company will also pay attention to implementers and other potential clients, who may be interested in using just some of the tools or part of the platform in their projects. Whilst most likely smaller in size, there is a larger number of such opportunities and their sales cycles tend to be shorter: The its4land company cannot afford to neglect such business.

Global development is not just about "Doing good", in 2016 it was "a 200 Billion USD Industry" according to Raj Kumar, CEO of Devex [22], making in rank well in the top 20 of all industries in the USA.

Some of the implementers identified as the high potential customers of the its4land toolbox, are big players in this development industry, appearing on the list of Top USAID Contractor in 2015

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[13] its4land tools may also be very useful for individual land professionals e.g. when using the Semi-automatic Visible Boundaries Delineator (KER of WP 5) in QGIS and/or for uploading drone images to the Publish and Share platform.
The reason such end-users are not considered in the business plan are scale and the open-source licensing model – which encourages such end users to download the tools free of charge. This is true for implementers as well, who are expected to also have a budget to procure services (cloud-, implementation-, integration-, support or general consulting services, see page 15) from the its4land company

[23], e.g. DAI (the successor of HTSPE who implemented the Rwanda LTR) ranked 5th with some 272 Mio USD contract funding through USAID and RTI ranked 8th with some 106 Mio USD funding.

The following list – an initial version of the marketing tool of the its4land Company – links potential clients identified (implementers / system integrators and a few others) with the fields and sectors they are engaged in, and with the donors who are likely to fund projects won by them. The relationship between donors and implementers is important to understand, because some donors still tie a part of their aid to consultants and materials originating from the country the aid is coming from[14].

[14] While the percentage of tied aid may not be quite as high anymore as it was in 2005 (70% for US aid, 92% for aid from Italy [33, p. 117]), the OECD still maintains a web-page [34] with updated recommendations for untying aid: It seems that some points made in the much cited 2005 and 2006 Real Aid reports from ActionAid International [26] [27] may still be valid today when engaging with donors and their implementers.

Implementer / System Integrator	Fields / Sectors of Engagement	Source(s) of Funding	Comments
Chemonics, International Inc., Arlington, VA, USA	works across a wiide range of sectors, from agriculture to conflict and crisis, gender and inclusion, to energy and sustainability	USA	Chemonics implemented Land Project in Rwanda (9.4 Mio USD, 4-years) as one of their "Sustainabiliy/Inclusion" activities. As part of the project, they commissioned the National Land Use Planning Portal
DAI, Bethesda, MA, USA	economic development, environment and sustainability, governance, ICT, global health, stability and business development	USA, UK	Implementer of LTR in Rwanda, active in other countries in Land Administration
AECOM, Los Angeles, CA, USA	infrastructure development, agriculture and economic development, democracy, human rights and governance, social development, and disaster and crisis management	USA	Involved in Energy Projects in East Africa
Parsons, Houston, TX, USA	defense, intelligence, critical infrastructure	USA	Implemeter of a rural feeder road project in Rwanda, which used GIS
RTI International, Research Triangle Park, USA	(agriculture), global health, education, governance, and workforce and economic development	USA	Implementer of PSDAG in Rwanta
Mott MacDonald, Crydon, UK	international engineering, management, and development consultancies	UK, NL	Implemeter of Water for Growth in Rwanda with a strong GIS component. Mott employs some 16'000 staff working in 150 countries)
GIZ IS (International Services), Eschborn, Germany		DE, EU	this is the indepent Services arm of the german GIZ. Implemented in Burundi a pilot Land Tenure project for Government owned land funded and single sourced to GIZ IS by the EU
SWECO, Franfurt Germany, Sweden	architecture, engineering, urban planning	DE (SE, EU)	Sweco implements the Kigali Green City Masterplan with a small GIS component
GFA Consulting Group,Hamburg, Germany	implementation of complex studies and projects with experience in 130 countries	DE	Important implementer of GIZ projects
GOPA Consultants, Bad Homburg, Germany	specialists in developing and transition economies	DE	Important implementer of GIZ projects
GAF AG Munich, Germany	Remote Sensing, Geo-spatial services	?	
IGN FI, Paris	Land Administration, National Mapping / Base Maps / NSDI	FR	Independent services and consulting arm of the French National Mapping Agency IGN
Kadaster International,Apeldoorn, NL	Land Administration	(NL)	Developed the land title database for the LTR Rwanda Project
Ordnance Survey International, South Hampton	Mapping	UK	Independent services and consulting arm of the UK National Mapping Agency
Landmateriet, Gävle, Sweden	Mapping, Land Use Planning, NSDI, GIS	SE	National Mapping Agrency of Sweden. Is currently involved in capacity building in Rwanda.
Surbana Jurong Group	Transportation, Urban Planning,	(SG)	Implemented and updates the Kigali Masterplan

Intergovernmental Organization, University, NGO, Philanthropist, Foundations	Fields / Sectors of Engagement	Source(s) of Funding	Comments
RCMRD, Nairobi, Kenya	GIS and Cartography, Photogrammetry, Remote Sensing, Land Management, Surveying	USA, Member States, ?	www.rcmrd.org
OSFAC, Kinshasa, DRC	Forest Observation, Carbon Compensation, REDD ++		https://www.osfac.net/
Bill and Melinda Gates Foundation, Seattle, USA		Foundation	
Clinton Foundation	Health, Education, ...	Fund raising	
IUCN/WRI	Foresty, Nature Conservation	?	
World Vision	Humanitarian, Education, Water	Fund raising	

This list is work in progress and not complete yet. It will be updated and maintained by the new **its4land Company**.

As it is true in any complex sales process, focusing – at least initially –on one main customer segment – large implementers and system integrators as in the its4land business case – does not mean paying no attention to other potential members of the buying center, who must be enabled to develop a good understanding of the its4land toolbox offer and its comparative advantages:

Staff, students and alumni of the university partners in the its4land project: must become ambassadors and volunteer sales representatives of the its4land toolbox. Having access to and keeping these large number of well qualified professionals involved might become the strongest Unique Selling Point.

Government organizations implementing the land registration projects: if government agencies in Sub-Saharan African countries have already heard about or even seen the its4land toolbox in a productive environment, they are more likely to evaluate it well, or even express their wish for the its4land toolbox to be used when discussing with a donor.

Land professionals in government organizations: opportunities are to be created for land professionals to see and test the its4land tools, get enthusiastic about them and promote them (bottom-up) within their government agency.

Donors and development partners: as with government agencies, it helps tremendously if a donor or a development partner has already heard of the its4land toolbox (e.g. at the World Bank Land and Poverty Conference). The donor commits considerable sums of money for a land administration project, money the donor is accountable for to his taxpayers at home. It is nothing but natural if a donor is hesitant to spend his funds with a "nobody".

With as many possible members of the buying center being informed about the its4land toolbox, with its possibilities and advantages, the terrain for a sale to an implementer is prepared to the extent possible, as the chances for the its4land Company increase to encounter good terms of reference, knowledgeable members of tender evaluation committees and even influential ambassadors of the its4land toolbox.

A land administration project creates a system or records, forms the backbone of any national (spatial) data infrastructure and is an investment for generations to come. Selling some tools to a few free-lance developers and hoping they will evolve it into a sustainable land administration system, is not a serious business: offering a solid basis such as the its4land toolbox to reputable implementers or professional system integrators is the right approach to follow and doing business responsibly in this market is so important for development.

6.2.5 Competition

As mentioned in Chapter 5 (page 16), the competition for the very innovative its4land toolbox is expected "to be minimal" because:

> The its4land toolbox is highly specialized: a single platform (Publish and Share) with integrated software tools offered under an open source license, and adapted consultancy services related to needs assessment, managing and planning of UAV missions and governance/capacity building development: From a purely technical point of view, one truly can't see a competitor offering exactly the same!

Competition will come however from a quite different angle. In highly competitive tendering processes for land administration projects (for both creators and users), it is far from a given, that the technically best solution will win, even when competitively priced.

Competition will come from other offered solutions, which may be considered less innovative, but still good enough to get a sufficient technical ranking in the evaluation of the respective proposal.

While the its4land toolbox does not have to "fear" to be beaten on technical grounds, one still has to watch out and beware of other solutions which are offered by other players in the market, some of them are:

Esri Inc.: is the world leader in commercial GIS software, offering the Desktop GIS with probably the most functionalities (ArcGIS Desktop, ArcGIS Pro). For a few years already, Esri offers with ArcGIS Online a competitively priced[15] geocloud solution, which may also be purchased for installation on-premises, i.e. on an in-country server or cloud.

While already technically a strong competitor, Esri's biggest strength is probably their network of local offices (distributors in Esri-speak) in Kenya, South Africa, Rwanda, Egypt, Tunisia, Morocco and Senegal. In some other 20 countries, Esri is represented by official resellers or partners.

Sourcepole Switzerland: Sourcepole has built an offering very similar to Esri's ArcGIS Online with and around QGIS. Like Esri with ArcGIS Online, Sourcepole offers a free account

[15] Esri does not disclose the price publicly on their website, and the prices do vary slightly depending on the country one buys from. The successes Esri is having in public tenders, their special pricings available for NGOs, Conservation and Higher Education Institutions as well as their new Africa GeoPortal – "the best location for geospatial tools data and training, free for users working on Africa geospatial challenges" [35]– should serve as cautious warning to its4land, not to believe that being open-source is automatically cheaper than proprietary software.

with some limitations, and a paid QGIS Cloud Pro for 65 Euro/month for 500 MB cloud-space, plus 20 Euro/month more for each additional 1 GB cloud space [24].

Cloud Hosting of Open Source Solutions
Very likely, Sourcepole is not the only company in the world offering an open source GIS solution in the cloud. It is mentioned here as a case in point for: • Transparent pricing • With a cloud solution, it does not matter much commercially anymore, if the solution in the cloud is built on open source or proprietary software: There are costs related to the hosting, which have to be charged to clients, independently on which basis the solution is built • Because of the economies of scale, cloud platforms with many clients / subscribers can typically offer comparable services cheaper than platforms with fewer clients (ArcGIS Online from Esri is comparatively less expensive than the QGIS based solution of SourcePole). • Most cloud providers offer free accounts with limited functionality or storage space (e.g. Dropbox, WeTransfer, Google….), and then offer paid premium subscriptions. This is a model the its4land company needs to consider too.

*Implementers / System Integrators: The same implementers / system integrators which will be targeted by the its4land Company marketing as its4land toolbox clients (see list on page 35), are also free to implement solutions using other platforms.

Implementers are (must be) opportunistic
Implementers who have built and delivered a solution already, will most likely want to utilize the same technology again and continue building on it, rather than switching to a new platform (e.g. IGN FI (https://www.ignfi.fr/en/) who has delivered a "land administration and registration system for the Republic of Uganda" based on "Open source / Web based /LADM / Web portal" after initially working with a proprietary system provider Thompson Reuters [25].) Implementers also have a natural interest to keep as much as possible of a project's budget "in-house", rather than spending it on third parties. With software developers at hand, implementers may prefer to build from scratch the entire software stack required in a project rather than buying a solution from a third party. Larger implementers are technically capable of using various technologies in their project and may leave the final choice to their client, the concerned government agency or the donor. All of this makes selling to implementers not an easy task. In order not to have implementers as competitors, the its4land company needs to convince them that executing their projects using the its4land toolbox, is beneficial for them, i.e. is saving them money and reducing their risks.

*Development partners, foundations and philanthropists: When entities who traditionally provide funding engage in implementations, they are likely do so with a company from where they originate from (see Real Aid Reports by Action Aid International [26] [27]) and – even unintentionally – jeopardize business opportunities which could be pursued for the its4land toolbox; e.g. when JICA (Japan International Cooperation Agency) enters a collaboration with the Government of Rwanda to launch Rwanda's first satellite, the University of Tokyo who trains 5 Rwandan technicians [28], may well be offering some cloud-based geo-processing of images solution too….)

Especially the *last two examples show that in the land administration market there is no clear-cut line between client and competitor for the its4land toolbox: One needs to be aware that a partner in one project may well be a competitor in another project.

6.2.6 Trends, Perspectives and Challenges

The its4land toolbox responds software-wise well to Sub-Saharan Africa's immense challenge to rapidly and cheaply map millions of unrecognized land rights in the region.

With only a few of the 46 African countries in Sub-Saharan Africa having comprehensively addressed this challenge and having made real progress in establishing and maintaining a country-wide land administration system, there is undoubtedly a market for innovative tools such as the its4land toolbox.

With more countries having established (created) their land administration system, the market for users of cadastral data and maps will grow too, as it is happening in Rwanda (see Chapter 6.2.1). The growing market of **users**, will help sustain the business of the its4land Company, at the point in time (several years from now), when the creators of cadastral data will switch from investing (capital expenditures) to maintaining (operational expenditures).

These positive trends and good perspectives depend however on a large extent on **good governance** and to a lesser extent on a growing awareness that initial investments in IT-systems need to be sustained, i.e. that African governments becoming able to shoulder operational expenditures of the systems they put in place with the help of donor funding:

Note: Work package 7 of the its4land project deals with the development of a governance model[16] to support the implementation and evaluation of innovative tools and their use in order to meet stakeholders' needs and the creation and partially implementation of a capacity development model to strengthen the necessary skills and competencies for the innovation process to have

[16] Readers interested in the its4land governance model are referred to the respective deliverables D7.1-D7.3.

*sustainable effects, i.e. with the **after-sale** or **implementation the governance** is important to sustain and grow land administration solutions, this section of the present document deals with "**good governance**" as an enabler, if not prerequisite for tendering good land administration projects meeting stakeholder needs.*

Good governance / political will: There is a broad consensus, that "good governance is fundamental to achieving the benefits of the protection of property rights and the development of efficient and effective land and property markets" ([29] to cite the first hit Google shows) or as Ngoga says – concluding a good summary on the linkage of good governance and land tenure –"the importance of good governance in land tenure and administration cannot be over-emphasised" [11, p. 5]. Ngoga also touches on commitment of high level leadership, the political will the Government of Rwanda is well known for. Without strong political will and leadership, donor agendas still prioritize land tenure projects. Money is still spent and services from the **its4land Company** might be procured, but the projects carried out will hardly yield the desired results.

Political will, good governance and funding given, narrow down the challenges to purely technical ones, which the its4land toolbox is well positioned to address and solve.

Operational expenditures: Roads do not maintain themselves, but Rwanda has a road maintenance fund, tenders for maintenance work, has it carried out and people travel smoothly on these roads. The same cannot yet be said for IT projects[17].

The transition from initial "one-off" [18] donor-funding to ongoing government-maintenance is always expected to happen, but in reality is never easy or straight forward.

Large commercial IT-companies often earn more than half of their revenues from ongoing maintenance contracts, which tremendously reduces their costs of sale. The notion that IT is part of infrastructure and needs to be maintained as such, is slowly growing in Sub-Saharan Africa, but as the **its4land Company** will start, one can't depend on such an ongoing maintenance revenue stream.

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17 We do not understand IT-Maintenance in the narrow sense of having to pay annual license fees to a vendor of a proprietary product. IT can be maintained by training, retaining and increasing a Land Agency's own staff, by having a budget for some limited consulting from externals or by concluding a full-fledged maintenance contract: The importance lies in the need of having a budget to keep (IT-) systems running, not on how to spend it.

18 One original Rwanda LTR project document (cited in [12], highlighting by the Authors of this paper) stated: "The project will enable …. the Ministry of Natural Resources (MINIRENA) to issue registered title to every landholder in Rwanda (some 7.9 million parcels) through a **one-off**, low-cost community-based process of Land Tenure Regularisation (LTR) over the next 5 years." LTR should never need repeating. Sustainability is assured through GoR taking responsibility for the recurrent costs of land administration to keep the register up to date, wholly or partially funded from land transactions".

Apart from the above challenges, one can do little to mitigate, and land regulations are identified as another challenge. Regulations on flying drones which have already been extensively discussed in Work Package 4, are mitigated by the its4land toolbox to work with imagery from drones and other sources (airborne or satellites). Regulations on having to store sensitive data in-country may become a challenge to the geocloud to be offered in a foreign cloud such as the Amazon cloud. Since the its4land toolbox is available both in the geocloud and for installation on-premises, i.e. on local servers or local clouds, such regulations lead only to a shift in what services will be offered, but will not pose a direct loss of potential business.

6.3 Organization and Management

The its4land project united a multidisciplinary consortium of researchers, IT-experts and entrepreneurs from 2 SMEs and 6 Universities: 4 in three EU countries and 4 in three East African countries.

While the complementary skills and expertise of the consortium members were essential for the research carried out, the implementation of the its4land toolbox and the integration into the Publish and Share platform, another unique quality of the consortium will be a key facilitator for the exploitation of the project results; that is:

The unrivalled network of the project partners, consisting of active professors, university staff, students and thousands of alumni from the targeted Sub-Saharan Countries:

- The University of Twente – ITC, (Netherlands) – has been conducting geo-related research since 1950 with a focus on developing countries. (University of Twente: 3000 Staff, 10500 students, 6200 alumni in Sub-Saharan Africa).
- The Public Governance Institute at KU Leuven (Belgium) conducts research into different aspects of public governance from a public administration and political science perspective. (KU Leuven, founded in 1425, is the largest University in Belgium with a staff of 12,000, more than 58,000 students, and some 400 alumni in Sub-Saharan Africa).
- The Spatial intelligence lab at the University of Muenster, one of the largest universities in Germany, founded in 1773, specializes in designing and studying computer systems that support rather than replace human intelligence in the performance everyday tasks in space. (The University of Muenster has some 3,500 staff and more than 60,000 students).
- INES is an Institute of Applied Sciences, based in Musanze, Rwanda. Since its creation in 2003, INES has educated and researched on problems that apply to daily existence in Rwanda, including land. Currently, INES counts some 1,400 students and has a total of "6,778 alumni as on the 10th graduation ceremony of 15th March 2019" on the labor market" [30].
- Bahir Dar University, Ethiopia (BDU) was inaugurated in 2000 by the merging of two former academic institutions. BDU's Institute of Land Administration (ILA) has extensive development cooperation experience, primarily through SIDA (Swedish International Development Cooperation Agency), and is a leader in land administration developments in Ethiopia and East Africa. BDU is one of the largest universities in Ethiopia, counting some 35,000 students.

- The Technical University of Kenya (TUK) was established through the elevation of The Kenya Polytechnic University College (KPUC) to full university status. The technical university is a new type of university in Kenya, whose mandate is to offer higher education and research in technology. TUK maintains hands-on land administration degree programs and is actively engaged with local industry through provision of country-wide leadership in technology and innovation. TUK currently counts some 13,000 Students.
- Hansa Luftbild AG, Germany provides geospatial solutions since 1923. The company's portfolio covers the entire field of geospatial solutions, from aerial photography and data processing to software development for national and international customers in the public and private service sector.
- Esri Rwanda Ltd, Kigali, Rwanda is since 2010 the official representative for the Region of the African Great Lakes for Esri, the innovator and world-leading company for commercial GIS.

Besides offering the expertise from 4 years of research and unique technology, the its4land Company to be founded at the end of the project will be able to **leverage this unique network** and use it as a **differentiator** in the competitive land administration market.

6.4 Exploitation Strategies to End of Project (31 January 2020)

From the very beginning of the project, the consortium has been promoting actively its research and developments through scientific papers and presentations at relevant conferences (e.g. the World Bank Land and Poverty Conference in Washington D.C., FIG Weeks) and during missions in the East African project countries.

The project partners have been attending conferences and using the networking opportunities provided there, to further promote its4land and the toolbox (e.g. just recently, Esri Rwanda attended the Africa CEO Forum and the Transform Africa Summit, both in Kigali). Furthermore, the toolbox was showcased in Ethiopia during the Bahir Dar University Land Conference in May 2019.

Moving from science and research to commercialization, it is planned to launch the its4land toolbox at two major events: the Geospatial Week in June 2019 at ITC and the Africa GIS Conference in November 2019 in Kigali.

The its4land toolbox will also be exhibited and presented in Kenya at the RCMRD International Conference in Nairobi in August 2019 and at INTERGEO 2019 in Stuttgart, Germany, in September 2019.

By presenting the its4land toolbox at these events, covering the countries involved in this research project, the potential market for the **its4land Company** is prepared. So once this company is established and adequately staffed, its operations and the exploitation of the project results can commence earliest in February 2020, immediately after the conclusion of the its4land project.

In addition, an animated video is currently under production which explains the its4land toolbox and its benefits to the land administration communities in developing countries. This video will be hosted on youtube and the its4land.com website.

6.5 Funding Requirements

The **tables on the following pages** identify and justify in the form of a commented profit/loss statement the funding requirements for establishing and operating the **its4land Company** for an initial three years. They to amount to:

1 Mio EUR / 1 Mio USD

to finance the start-up. The first two years of the company will see negative cash-flows - the first year (amounting to USD -523.750) and the second year (amounting to USD -390.825). The third year is expected to break even, and – from then onwards – to slowly increase profits, enabling the company to invest in further growth and to start paying back investors.

6.6 Financial Projections

0	Profit/Loss Statement (USD)	2020	2021	2022	0	Explanations, Comments
1	Revenues	25'000	434'063	1'369'000	1	Revenues grow rapidly; Challenge: retain the necessary staff to deliver the services
2	*Cloud Services*	*0*	*86'813*	*410'700*	2	Cloud 2020: 0% of total Revenues: 2021: 20%; 2022: 30%
3	*Implementation Services*	*10'000*	*130'219*	*273'800*	3	Implementation 2020: 40% of total Revenues: 2021: 30%; 2022: 20%
4	*Integration Services*	*10'000*	*130'219*	*273'800*	4	Integration 2020: 40% of total Revenues: 2021: 30%; 2022: 20%
5	*Support Services*	*0*	*0*	*136'900*	5	Support 2020: 0% of total Revenues: 2021: 0%; 2022: 10%
6	*General Consulting*	*5'000*	*86'813*	*273'800*	6	Gen. Consulting 2020: 20% of total Revenues: 2021: 20%; 2022: 20%
7	Direct Costs	23'750	329'888	910'385	7	Services to be rendered by staff do not scale, because of the relatively high costs involved (and possible challenges to hire/retain the respective staff)
8	*Provision of Services Sold (Consultants as needed, not full-time)*	*23'750*	*329'888*	*910'385*	8	95% of Revenues from Services (except with cloud services, accounted for on line 17) are needed for the remuneration and reimbursables (travel) of non-permanent staff needed to executed these services
9	Gross Margin	1'250	104'175	458'615	9	Gross margin grows with a higher percentage of cloud vs services rendered by staff
10	Gross Margin %	*5.00%*	*24.00%*	*33.50%*	10	
11	Operating Expenses				11	
12	Permanent Staff Costs	190'000	220'000	250'000	12	56% (avg.) of Total Operating Exenditures
13	*Management and Sales*	*150'000*	*170'000*	*190'000*	13	The new its4land Co. must be managed and most of all, our offerings have to be sold, which means a lot reaching out/promotion (educating potential clients) and then proposal writing. Ideally the new Co. has two part-time staff for this position, rather than one full-time
14	*Software Development / Mainteance of its4land Toolbox*	*40'000*	*50'000*	*60'000*	14	We need some developer resources to keep our toolbox up-to-date and functioning; separately budgeted are software development needed to reach required TLR (line 20)
15	Customer Acquisition Costs: Travel, Conferences, Events, ... (Marketing)	50'000	50'000	50'000	15	13% (avg.) of Total Operating Exenditures
16	Partner Network Costs	25'000	25'000	25'000	16	6% (avg.) of Total Operating Exenditures
17	Hosting Costs	10'000	20'000	30'000	17	5% (avg.) of Total Operating Exenditures, slowly growing with increasing number of customers on Platform
18	Other Costs	150'000	80'000	0	18	35% of first year Total Operating Exenditures; 0 in 2021 and 2022
19	*Establiing and registering its4land Company*	*50'000*	*0*	*0*	19	
20	*Finalizing initial developments to required TLR*	*100'000*	*80'000*	*0*	20	A total of USD 180'000 is budget to raise initial developments to a higher TLR.
21	Total Operating Expenses	425'000	395'000	355'000	21	
22	Gross Estimated Profit (EBIT)	-423'750	-290'825	103'615	22	
23	Interest	100'000	100'000	100'000	23	Interest on working capital of 1 Mio USD, at a rate between typical European and the 18% East African rates
24	Taxes	0	0	1'000	24	
25	Net Profit	-523'750	-390'825	2'615	25	Break-even expected in year 2022 (year 3), profits (to pay back investments and grow its4land Co.) in years 2023 onwards

Parameters/assumptions on which this 3 year profit/loss statement is based, see next page ./.

	Parameter applied	2020	2021	2022		Explanations, Comments
28	Creator: Total Market Sub-Saharan Africa, Software/Tools (CAPEX)		224'250'000		28	The total Market size is estimated for an indefinite period of time (i.e. each country has to do a creator project - at least - once, hence 46 creator projects). This total is broken down into actual projects tendered per year in line 32
29	User: Total Market Sub-Saharan Africa, Software/Tools (CAPEX)		5'750'000		29	The total Market size is estimated for an indefinite period of time (i.e. each country is expected to do - at least - 5 user projects). This total is broken down into actual projects tendered per year in line 33
30	Creator: Total Market Sub-Saharan Africa, Software/Tools (OPEX)		22'425'000		30	Maintenance of Software Tools, i.e. OPEX is estimated at 10%, much lower than the 20-35% usually charged for propietary software
31	User: Total Market Sub-Saharan Africa, Software/Tools (OPEX)		575'000		31	Maintenance of Software Tools, i.e. OPEX is estimated at 10%, much lower than the 20-35% usually charged for propietary software
32	Number Creator Projects (Countries) tendered in Sub-Saharan Africa	2	3	5	32	Perspective: A growing number of Sub-Sahara African Countries are doing large scale LTR Projects.
33	Number of User Projects tendered in Sub-Saharan Africa	10	15	20	33	Perspective: With more cadastral data becoming available, there will be more possibilities for projects too
34	Number of Creator Projects (Countries) with Maintenance Contract (paying OPEX)	0	1	2	34	Currently, there is hardly any OPEX spending for IT in (East) Africa. We are expecting this to change slowly, especially for the critical Creator (data infrastructure) projects
35	Number of User Projects with Mainteance Contract (paying OPEX)	0	0	3	35	Currently, there is hardly any OPEX spending for IT in (East) Africa. We are expecting this to change, but slower than for the Creator (data infrastructure) projects
36	% Probabliliy its4land Company wins tools part for tendered Creator Projects (CAPEX=OPEX)	0.00%	2.50%	5.00%	36	Given the large size of LTR (creator) projects, the low % stated here mean, that its4land Company would not "win" the entire tools part of the project, but only some components. Given the high complexity of such projects, this is realistic
37	% Probabilty its4land Company wins tools part for tendered User Projects (CAPEX=OPEX)	10.00%	15.00%	20.00%	37	Winning smaller projects is more likely than winning the entire software part of the large creator projects, but doing so comes with larger sales efforts, i.e. with submittting proposals for all projects/tenders listed under 33
39	Total its4land Co.: Creator (CAPEX)	0	365'625	1'218'750	39	
40	Total its4land Co.: User (CAPEX)	25'000	56'250	100'000	40	
41	Total its4land Co.: Creator (OPEX)	0	12'188	48'750	41	
42	Total its4land Co.: User (OPEX)	0	0	1'500	42	
43	Total Sales its4land Co.	25'000	434'063	1'369'000	43	
44					44	

(The market size figures in lines 28-31 are carried over from Chapter 6.2.2. Estimation of the Sub-Saharan African Market Size for Land Administration Technology and closely related Services)

7 Conclusion

The its4land project is a European Commission Horizon 2020 project funded under its Industrial Leadership program. The results of the research in this project can be exploited commercially. These results are software tools and consultancy services which will be bundled in the its4land land administration toolbox. Software tools or consultancy services can be offered separately or jointly, depending on requirements and needs. The its4land toolbox is the joint effort of different project partners, academic and private enterprises. Hence marketing and commercialising the toolbox is best undertaken with a new legal entity which needs to be established. On the basis of this commercialisation approach the Lean Business Model is chosen because it is best suited to start-ups. The business plan which has been developed for the its4land toolbox puts emphasis on the implementers and the integrators of land administration projects as being the main customers of the toolbox. However, other customers segments will also be targeted. Two major events will be used to launch the its4land toolbox, one in Europe and the other in East Africa.

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Annex 1

BDP Seminar Report for Geospatial technology innovations for land tenure security in East Africa - *« its4land »*

BDP Seminar Report
For

Geospatial technology innovations for land tenure security in East Africa

« its4land »

Number: 687828
Starting date: 01.02.2016
Ending Project date: 31.01.2020

DATE
07/03/2018

PLACE
ITC Faculty, Department of Urban and Regional Planning and Geo-Information Management (PGM) – University of Twente, Enschede, Netherlands

Provided by:
TUNDE KALLAI

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1 Agenda

its4land CEB Workshop – 07/03/2018

Place: ITC Faculty, Department of Urban and Regional Planning and Geo-Information Management (PGM) – University of Twente, Enschede, Netherlands

TITLE OF THE SESSION	REQUESTED	TYPE OF THE SESSION	LEADER	PURPOSE (describe the need)	PROPOSED DURATION min
Ice breaking and PUDF	-				
a) Welcoming the participants	YES		(by the Host Organization, by the Expert and by the PO/PTA)		5
b) Introducing participants and agenda	YES		(by the Expert)		15
Achieving project goals					
c) What is "Exploitation" / Valorization & Value of Intellectual Capital	YES	Presentation	(by the Expert)	Get us on the same page, re Intellectual Capital we need to discuss Open Source/Creative Commons vs. commercializable IP	20
d) Presenting the state of the art of main exploitable results (by each WP Leader of the Project)	YES	Presentation	(by the Project)		30
e) Characterizing Key Exploitable Results (introduction)	YES		(by the Expert and project)	Get us on the same page	30
COFFEE BREAK					
Towards an effective Exploitation Strategy					
Characterizing Key Exploitable Results (conceptional note)	YES	Group work	(with the Project, in preprepared subgroups,		50

TITLE OF THE SESSION	REQUESTED	TYPE OF THE SESSION	LEADER	PURPOSE (describe the need)	PROPOSED DURATION min
			prepared		
Discussing the Priority map	NO	Group work	(with the Project)		
LUNCH					
Towards an effective Exploitation Strategy (Part II)					
Characterizing Key Exploitable Results (Form 2)	YES	Group work	(with the Project)		30
Completing and discussing Lean and Platform Business Canvas	YES	Group work	(with the Project)		30
How to determine your target market ?	YES	Group work	(with the Project)		20
Discussing the Project Map	No	Group work	(by the Expert)		
Key exploitable results and IP related issues	No	Presentation	All	see above: Open Source vs. IP	
The Capitalization Strategy					
Business Models: a suitable mechanism for exploitation	YES	Presentation	(by the Expert)	We are concerned about scaling (especially when much of the KER are consulting	40
PUDF: introducing PUDF, exploitation plan, structure and contents	YES	Presentation	(with the Project)		20
COFFEE BREAK					
Other topics to be covered					
Further rounds of finance	YES	Presentation	(by the Expert)	learn about funding options, sources, …..	40

TITLE OF THE SESSION	REQUESTED	TYPE OF THE SESSION	LEADER	PURPOSE (describe the need)	PROPOSED DURATION min
Pitching exploitable results	NO	Group work	(by the Project)		
Collecting CEB feedback forms, Wrapping up & Closing Remarks	YES		(by the Expert and Host Organization)		20
Other	No				

CEB seminar on Twitter

List of Participants and their roles in the project

ITS 4 LAND

EC Booster workshop – List of Participants

Project Acronym:	ITLAND-687828
EC Booster workshop:	07-March - 2018
Meeting Venue:	UT (ITC) Enschede, The Netherlands

Surname	First Name	Function	Beneficiary	Signature
Grommelinck	Sophie	WP5	ITC	S. Grommelinck
Koeva	Mila	Project coordinator	ITC	
Staaven	Chiel	Project manager	ITC	
Chipofya	Malumbo	WP3	WWU	
JAN	SAHIR	WP2	WWU	
Timm	Christian	UTG	HL	
KUIJPERS	Kaspar	Managing Director	Esri	
ZEIN	TAREK	WP8	HL	
Bondebrink	Esther	admin support	ITC	
KALLA	THIATE	Expert	META-G	

List of Consortium of its4land project

No.	Partner	Country
1	UNIVERSITEIT TWENTE (Coordinator)	Netherlands
2	WESTFAELISCHE WILHELMS-UNIVERSITAET MUENSTER	Germany
3	KATHOLIEKE UNIVERSITEIT LEUVEN	Belgium
4	HANSA LUFTBILD AG	Germany
5	Institut d'Enseignement Superieur de Ruhengeri	Rwanda
6	BAHIR DAR UNIVERSITY	Ethiopia
7	THE TECHNICAL UNIVERSITY OF KENYA	Kenya
8	ESRI RWANDA	Rwanda

Project Main Data

TITLE: GEOSPATIEL TECHNOLOGY INNOVATIONS FOR LAND TENURE SECURITY IN EAST AFRICA

ACRONYM: its4land

CONTRACT NUMBER: 687828

BUDGET: 3, 933,740 EUR

COORDINATOR: UNIVERSITY OF TWENTE (NL)

STARTING DATE: 01FEBRUARY 2016

DURATION: 48 MONTHS

2 Executive Summary

2.1 Project Abstract

Short description of the Project and its main objectives

The its4land project is *ICT-based*. It instigates a set of collaborative work packages based around emerging ICTs: UAVs, Smart Sketch Maps, automatic feature extraction tools, and geocloud services are co-designed, adapted, integrated, demonstrated and validated for the specific domain of land tenure information recording. It is the creation of third generation land tools which support faster, cheaper, easier, and more responsible land rights mapping. The tools are inspired by the continuum of land rights, fit-for-purpose land administration, and cadastral intelligence. These tools will be developed in 6 work packages. The project is built around an ICT innovation process that incorporates a broad range of stakeholder groups with emergent geospatial technologies, including smart Sketch Maps, UAVs, automated feature extraction, and geocloud services. By coupling the technologies, end-user needs and market forces, are better responded to. Backed by the European Commission, the work consists of a 4 year work plan and 8 consortium partners. The project is working with stakeholders from 4 case study locations in Ethiopia, Kenya, and Rwanda: tool development, prototyping, and demonstration is intended for local, national, regional, and international interest groups. The case locations include a mix of livelihoods and landscapes: urban, peri-urban, rural smallholder, and (former) pastoralist contexts are all included. Seven work packages will produce results which can be exploited.

These are:
Work Package 2 (WP2) – Get Needs: captures the specific needs, market opportunities, and readiness of end-users in the domain of land tenure information recording to support design activities in its4land WPs 3-6 and modelling activities in WPs 7-8
Work Package 3 (WP3) Draw and Make: development of a software tool (the Smart Sketch Maps or Smart SkeMa system) for recording land tenure information within the context of rural and peri-urban communities based on hand-drawn sketch maps. Sketch maps are the technologies and processes that enable hand drawn non-metric spatial representations to be converted into topologically and spatially corrected maps. The tool is composed of several components that are responsible for extracting information from the sketch map and integrating that information with existing topographic and other data.
Work Package 4 (WP4) – Fly and Create: aims at designing, testing, and validating a UAV driven land administration workflow. UAVs are to be understood as uninhabited and reusable motorized aerial vehicles. A systematic investigation will examine various situations including different setups of UAV configurations, multiple tenure systems, different legal and institutional arrangements, different geographical contexts and different national contexts. The workflow will be described as guidelines, which will be based on scientific results. Decision trees will support users from the very beginning of the workflow – e.g. choice of the right type of UAV – to a quality measure of the final results.
Work Package 5 (WP5) – Automate It: development of tools that support the automated interpretation of land tenure information for cadastral mapping on the basis of mainly UAV data. For these tools, a workflow will be developed that takes UAV data and further sources of geospatial data as an input, deploys automatic feature extraction algorithms and delivers cadastral boundary features as an output. In this context, automatic feature extraction refers to algorithms

that enable the identification and vectorization of real-world phenomena of interest, such as cadastral boundaries. UAV data, existing topographic and cadastral maps as well as sketch maps will be investigated in terms of automated boundary delineation.

Work Package 6 (WP6) – Publish and Share: aims at proving a concept for the integration of data, workflows, publishing, and sharing of land tenure information resulting from the other technical work packages (UAV data, Smart Sketch Maps, and automated feature extraction) through geocloud services. The result is intended to be an integrated information platform for publishing and sharing the data obtained from the methodologies developed in the other work packages. An adapted version of the land administration domain model (LADM) forms the basis for organizing and integrating the data and the processes. The system will be developed and implemented on the basis of open source software.

Work Package 7 (WP7) – Govern and Grow: aims to develop a governance model to support the implementation and evaluation of innovative tools and their use in order to meet stakeholders' needs. It will also create and partially implement a capacity development model in order to strengthen the necessary skills and competencies so that the innovation process can have sustainable effects.

Work Package 8 (WP8) – Capitalize: aims at exploiting the results from the previous work packages and the development of a sustainable business model for commercialization of the integrated suite of land tenure recording tools within the end-user markets. In addition, it involves the construction of a business plan, which covers the development of the product descriptions and the advantages of the product when compared to other technologies; the market opportunity; the financial projections; and the funding requirements.

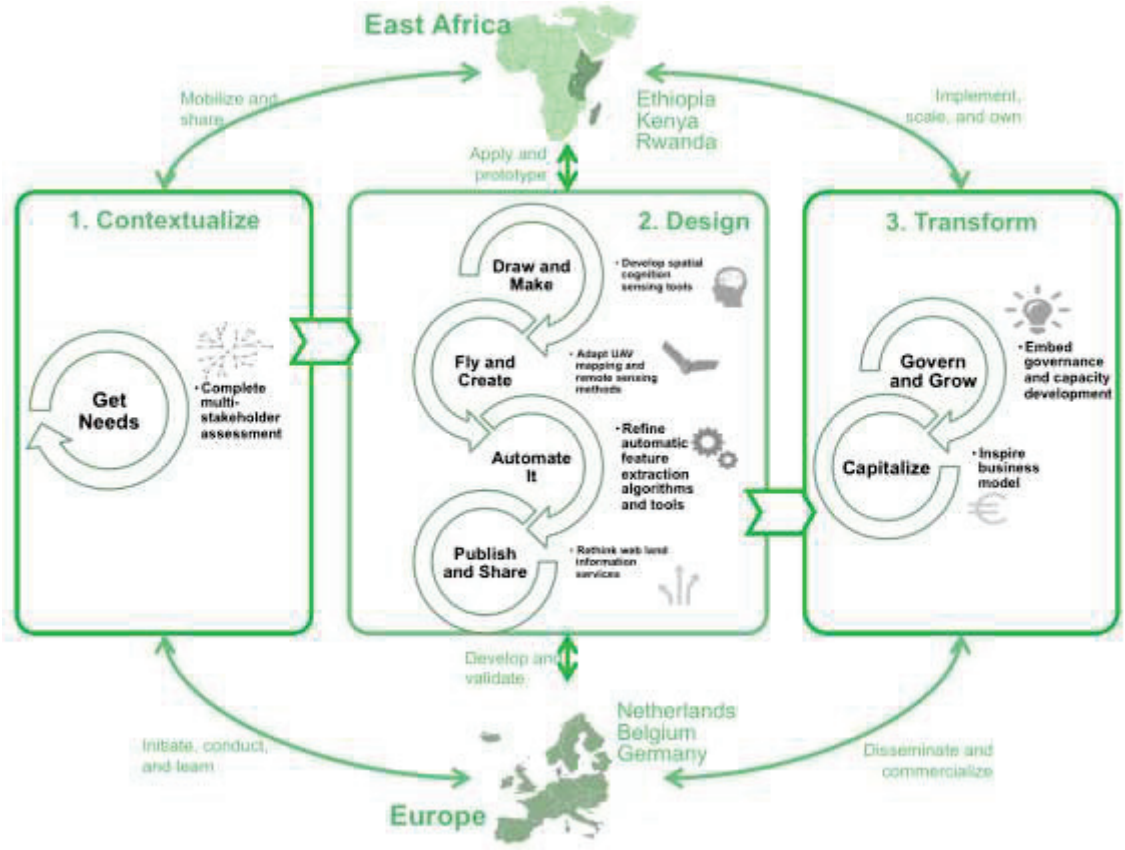


Fig 2. Screen-shot on 13.03.2017

2.2 Project State of the Art

Current state of the project with special reference to any major deviation from initial contract, if any (in regards to exploitation)

The main objective of its4land is to:

Develop an innovative suite of land tenure recording tools inspired by geo-information technologies, that respond to end-user needs and market opportunities in Sub-Saharan Africa, reinforcing an existing strategic collaboration between EU and East Africa.

The specific objectives for its4land as per section 1.1 of the DoW are to:
1. capture the specific needs, market opportunities, and readiness of end-users in the domain of land tenure information recording;
2. co-design, adapt, integrate, demonstrate, and validate a land tenure recording suite based on small unmanned aerial vehicles (UAVs), Smart Sketch Maps, automated feature extraction, and geocloud services; and
3. develop and valorise a governance model that realizes the innovation process by aligning end users conditions, technological opportunity, business models, and capacity building requirements;

The following documents were analysed to start the iterations with the its4land's Coordinator Team and the Exploitation Manager and the whole consortium by regular emails exchanges and Skype conference calls starting from February 2017 until March 2018 to discuss the current stage of the project:

- DoW
- EC Report_Period1_V15

The Periodic Report 1 gives a detailed overview about the achieved goals and deviations as well.
In general, at the end of year 1, the needs assessment work (WP2) has been completed with delays on D2.4 (field data collection), due to civil unrest in Ethiopia. The key planned submission date for D2.5 (synthesized needs) was in M18. The partners of WP3, 4, 5, and 6 have contributed through their tasks in order to exploit the WP2 results in those ongoing work packages and tool developments. Following the project dissemination plan, WP2 results were exploited in various formats including academic publications, policy briefs, press and media. With regard to the other work packages 3, 4, and 5 are progressing as planned – with a minor delay for WP3 in terms of finalization of field data collection. However, in each case, tool development, prototyping, and testing is well under way.The tool integration planned within WP6 is being dealt with via regular tech4land meetings. WP1 has completed all setup tasks and deliverables (apart from ongoing periodic reporting). The Management Team (MT), Advisory Board (AB), Valorization Panel (VP), communications channels, exploitation plans, and data management are established and functioning as expected.

Even when the project partners are facing some challenges, such as data collection delays due to an Ethiopian unrest , or collecting UAV data or establishing UAV regulations and institutional uncertainty in East African, the project shows well balanced progress both from EU and Eastern Africa.

In the DoW of its4land, **Work package 8 Capitalize: exploitation and business modelling** is addressed through the exploitation activities/impacts and achievements. The involvement of the project partners and their visions is demonstrated in the next table in connection with the expected TRL levels (5-7) at the project end:

SME/ innovator	Products at the start of its4land (TRL 1,2,3,4)	Envisioned prototype products at the end of the project (TRL 5,6,7)	Transferred to… (for TRL 8, 9).
UT	Theoretical UAV land tenure recording workflows; automatic feature extraction algorithms	Adapted UAV designs and workflows for East African context; Tailored automatic feature extraction software	HL, ESRI, INES, TUK, BDU
WWU	Sketchmapia (EU-specific sketch-to-geo tool)	Smart sketchmaps for East African land tenure recording activities	HL, ESRI, INES, TUK, BDU
KUL	EU spatial-data governance models and actor-network tools	Governance and capacity development models for land tenure recording in East Africa	INES, TUK, BDU
HL	LADM-compliant Ethiopian data model	Extended LADM model for East African land tenure recording	INES, TUK, BDU, ESRI
INES / BDU /TUK	N/A	UAV adaptations, smart sketchmaps, automatic features extraction, geocloud services, governance model, capacity development model, business models	UT, WWU, KUL, HL, ESRI
ESRI	Proprietary geocloud server technologies	geocloud services adapted for East African land tenure recording	INES, TUK, BDU

Table 1. The involvement of the project partners in the exploitation and their visions

2.3 Exploitable Results

Short description of main Exploitable Results and comments on the characterization and on the level of the discussion during the seminar, IPR related issues possibly referring with short comments to individual results.

The key exploitable results will be bundled in the **its4land land administration toolbox** with different items consisting of the following consultancy services and tools:

- Consultancy services for land administration needs assessment
- Smart Sketch Maps (Smart SkeMa) data collection tools with interactive digital output
- Consultancy services for UAV-based land tenure data acquisition
- A tool that facilitates cadastral mapping by automatically extracting visible candidate parcel boundaries from UAV imagery. An extension of this tool will also be developed which integrates the knowledge derived from Sketch Maps (WP3).

- A land administration information platform for publishing and sharing the data obtained from sketchmaps, UAV derived data and automatic data extraction. It combines a parcel-based approach with qualitative descriptive land tenure information to match the tradition and the needs of land right holders.
- Consultancy services to apply the governance and capacity development models for using innovative geospatial tools

its4land Toolbox : brief description of each results

- **Consultancy services for needs assessment**

There is currently very limited literature (both grey and academic) published on stakeholder needs assessment for land administration projects. In fact, some have criticised land administration projects for not explicitly including such an assessment in the past. Where such assessments do take place (even anecdotally), feedback has highlighted the difficulty in quantifying these needs into a substantive basis that can inform project or policy decision-making. One of the methodological approaches in WP2, the Nominal Group Technique, has proven to be a simple and straightforward method that responds to these gaps by both elucidating qualitative needs and translating these as quantitative outcomes.

- **Smart Sketch Maps (Smart SkeMa) data collection tool with interactive digital output**

This is a set of tools linked by a proposed workflow. The workflow outlines and sequences the activities a data collector must do in order to best use the tools provided (e.g. before using the Smart SkeMa system to extract objects represented by a symbol from any map, the user must first train the system to recognize that symbol. Therefore, there will be a procedure that describes how to train the system to recognize symbols. There is also the overall workflow that stipulates that in case a symbol is not yet known to the system, the user must first execute the train symbol procedure before proceeding to the next step) This set of tools consists of:

i. A specialized domain model and an associated visual language for sketching ;
ii. A system for automated recognition and extraction of objects in sketch maps ;
iii. A system which integrates sketched information into existing geo-referenced datasets using qualitative representations.
iv. Two supporting tools :
    - One for creating descriptors of objects that a group of users would want the system to recognise.
    - Another for visualizing the sketch map information in the context of the existing data.

The set of tools will target NGOs, private organizations, research institutions, and government agencies using sketching as part of their work in the land/natural resources sectors. It can be marketed either as tools for data collection or as tools for rapid drafting using sketch maps.

- **Consultancy services for UAV-based land tenure data acquisition**

The consultancy services are guidelines and workflows for UAV-based data land tenure data acquisition with software prototype for UAV data acquisition in the context of cadastral mapping. It is a logical approach which will facilitate UAV based data acquisition. The first phase includes the study of policy and legal developments regarding UAV regulations in general and focus on regulatory frameworks for UAV flights in East Africa in particular. Based on the outcomes of this legal prerequisite for the successful implementation of UAV flights, a phase of prototyping will provide guidelines to design efficient operational workflows which meet the needs of respective users. Data acquisition workflows encompass the whole operational UAV procedure including flight planning and preparation, field work, data processing and quality assessment. The consultancy services will target surveyors, para-surveyors and experts in the land administration sector. However, NGOs, local communities as well as grassroot organizations can also use the guidelines and request consultancy services if they want to capture high resolution aerial imagery with UAVs for purposes other than land administration.

- **Automatic extraction tool of visible candidate parcel boundaries from UAV imagery**

The tool and its extension consist of automated feature extraction for boundary delineation in the context of land tenure recording. This will be conceptualized, implemented and validated based on data from its4land use case scenarios. Business opportunities for this tool are its provision and installation, as well as training and support services related to the tool. The tool will target surveyors, para-surveyors and experts in the land administration sector.

- **Land administration information platform for publishing and sharing**

The land administration information platform for publishing and sharing data integrates the data output obtained from sketch maps, UAV derived aerial imagery and automatic feature extraction into one system. It provides geocloud services, which are particularly unexploited in the land administration domain. The system platform, which will be based on the Land Administration Domain Model (LADM) will be developed using open source software. The development of the platform relies on data and workflows emanating from WP3, WP4 and WP5. The land administration platform integrates the outputs in terms of storage, analysis, editing, and dissemination.

The main components of the platform will be:

1.) Cadastre tool based on LADM with a qualitative extended spatial reference based on the sketch maps

2.) Integration of the processed UAV imagery and parcels extracted with the feature extraction tool

3.) Workflow that integrates the components 1.) and 2.) in the land tenure process.

- **Consultancy services to apply the governance and capacity development models for geospatial tools**

The governance and capacity development models will support the use of the innovative geospatial tools by aligning end-users conditions, technological opportunities, and capacity building requirements. A good understanding of the limitations and the successes of current governance strategies can help to deliver insights in the contemporary governance performances in the context of geospatial innovation implementation in East Africa. The three project countries provide insights into common land tenure challenges across Sub-Saharan Africa. These insights might offer transferability of lessons learned to other contexts in Sub-Saharan Africa and beyond.

Before BDP seminar

A few Skype conference calls (starting from February 2017 until March 2018) and a large volume of email exchanges between the expert and the its4land project coordinator and the exploitation manager were first carried out before the entire consortium was involved in the BDP seminar.

The email from the Exploitation Manager, with the date of 29th of January 2018:
*"We have 6 KERs which make the toolbox. That is WP2 to WP7, 6 work packages and each has a KER. We used the name of the combined KER **its4land Land Administration Toolbox** to denote that it is a box with different tools, in this case the KERs."*

The 6 KER leaders sent their Lean and Platform Business Canvases on 29th of January 2018.

- *KER 1)* **Consultancy services for needs assessment** *(WP2) – Lead KULKER 2)* **Smart Sketch Maps (Smart SkeMa) data collection tool with interactive digital output** *WP3) – Lead WWU*
- *KER 3)* **Consultancy services for UAV-based land tenure data acquisition** *(WP4) – Lead UT*
- *KER 4)* **Automatic extraction tool of visible candidate parcel boundaries from UAV imagery** *(WP5) – Lead UT*
- *KER 5)* **Land administration information platform for publishing and sharing** *(WP6) – Lead HL*
- *KER 6)* Consultancy services to apply the governance model and capacity development models for the use of geospatial tools *(WP7) – Lead KUL*

(All are attached to the Final Report.)

The consolidated Lean Business Model Canvas of WP2, WP3, WP4, WP5, and WP7 and the Platform Business Model Canvas of WP6 under the common title of ***KER its4land Land Administration Toolbox*** has been sent to the expert on 23rd of January 2018.
(all are attached to the Final Report.)

During BDP Seminar
The attendants of the BDP seminar worked only with the Consolidated versions of the Lean Business Model Canvas and Platform Business Model Canvas as the main ***KER its4land Land Administration Toolbox.***

After BDP seminar
By the request of the attendants, the expert sent two documents to the project partners:

- ✓ Introduction to Exploitation Strategy_Living Labs How to determine your target market (ppt slides)
- ✓ Lean_Platform Business Model Canvas_OS Business models (ppt slides)

Synoptic table of Exploitable Results (before & during the BDP Seminar)

	Exploitable Result	**Lead Partner**	**IPR owners of the ER**	**Partners planning to exploit**	**Planned additional partners**
1	KER 1 (WP2) Consultancy services for needs assessment	KUL	UT, KUL, WWU, HL, ESRI	ALL	N/A
2	KER2 (WP3) Smart Sketchmap (Smart SkeMa) data collection tool with interactive digital output	WWU	UT, KUL, HL, ESRI	ALL	N/A
3	KER 3 (WP4) Consultancy services for UAV-based land tenure data acquisition	UT	KUL, WWU, HL, ESRI	ALL	N/A
4	KER 4 (WP5) Automatic extraction tool of visible candidate parcel boundaries from UAV imagery	UT	KUL, WWU, HL, ESRI	ALL	N/A
5	KER 5 (WP6) Land administration information platform for publishing and sharing	HL	UT, WWU, HL, ESRI	ALL	N/A
6	KER 6 (WP7)	KUL	UT, WWU, HL,	ALL	N/A

	Consultancy services to apply the governance model and capacity development models for the use of geospatial tools		ESRI		

Synoptic table of **FINAL Exploitable Results** (after the BDP Seminar)

	Exploitable Result	**Lead Partner**	**IPR owners of the ER**	**Partners planning to exploit**	**Planned additional partners**
1	KER its4land Land Administration Toolbox	HL	UT, KUL, WWU, ESRI	ALL	N/A

3 Recommendations

Support in fine tuning available information and drafting (describe what) and provision of final comments, after the workshops

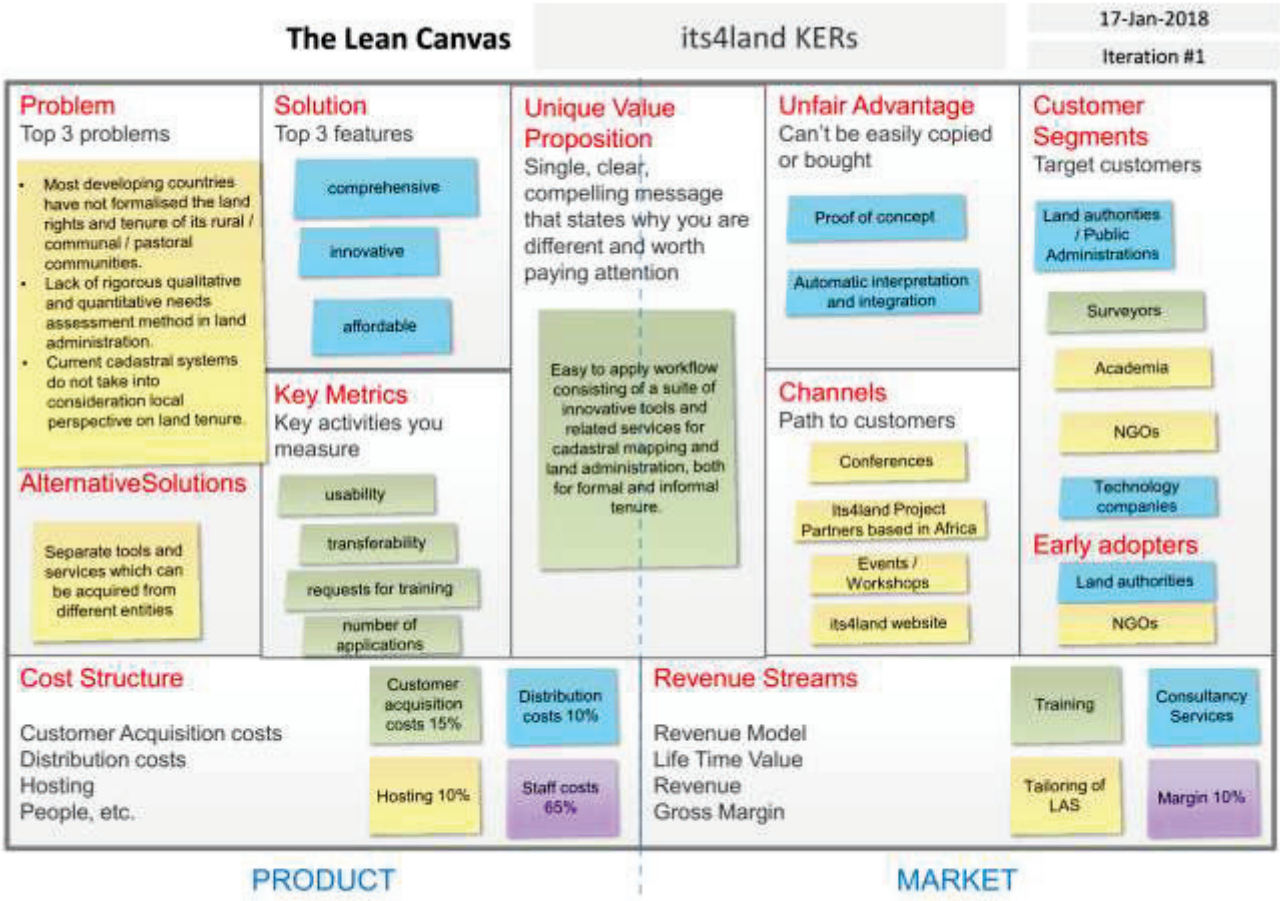
The following elements were highlighted (list elements that you highlighted):

Issues	Recommendations
Characterisation of KERs	The expert has agreed to consolidate each of the 6 KERs into one, in an Open platform which will not be just a software platform. Based on the recommendation No 4. of the project consortium in their Interim EC Expert Report, "Ensuring Capitalisation" is one of the key outcomes of the project. The "revenue" and sustainable aspects should come from selling "value" and "added features" to the core platform: consulting services (including training services) and custom development of the platform, with extensive involvement of stakeholders from the national and international land management organisations and agencies.
Target groups	The early adopters, ie the direct and indirect target users, have to be identified during upcoming project meetings and workshops. Intensive field/onsite work is needed where the its4land land administration toolbox and platform (first version) should be introduced. Some market surveys might be needed to sense the expectations of the stakeholders, though the results of WP2 could be drawn here. This could help the business plan development for WP8 (T8.1 and T8.2), which is led by HL.
UVP vs MVP	The UVP vs MVP have been characterised during the BDP seminar. A simple market study is recommended. Such a study could be prepared by ESRI Rwanda, taking Rwanda* as a case study in order to show the its4land toolbox potential, a SWOT analysis, trends, competitors, market size, time to market, pricing, collaboration with PPPs, access to data repositories of land administration, law and regulations, barriers, early adopters etc. etc. *It still needs to be discussed, if Rwanda is the most suitable country for such a case study, given the fact that Rwanda has a complete Cadastre, while most target countries have not.
Business Model	A business model based on open source is proposed to be used, in respect of SW licences and cloud services, covering on a combined Freemium & Premium licensing model which could be discussed within the consortium at a later stage.
Planning	The project management (WP1) budget is already reached. The project partners might consider to increase the budget of a work package by reallocating a budget from another item (work package or partner) where there is underspending. One of the options that was mentioned is to reallocate some budget from the African partners, since the budget for the time input was overestimated, due to lower average salaries than anticipated. This recommendation is not part of the BDP seminar and the CEB expert consultancy, but neglecting this issue might jeopardize the project coordination and hence the management of the process that

	should lead to the planned results.
Finance/Funds	Further discussions are needed during stakeholder meetings in the target East African countries (Kenya, Ethiopia Rwanda) about the necessity and the size of additional funds / channels needed to find a solution for getting the necessary high resolution imagery. The World Bank could be approached through the Zanzibar Mapping Initiative to obtain funds for using the UAV extensively in other African countries.
Improvement of internal management to monitor/check/ enlarge the planned and potential impacts	In order to achieve the expected goals and impacts to better capitalise on the project results, to be in line with the project proposal 2.1.2 Innovation Capacity, Knowledge Sharing, Global Markets and 2.1.3 Enviro- and Social Impact, it is imperative to continue engaging from top-down and from bottom-up the full spectrum of the PPP actors in the land administration sector in the East African countries. An example could be the recent engagement in the World Bank funded Zanzibar Mapping Initiative which is based on UAV aerial surveys. The success of this engagement could be transferred to the collaborations with the African project partners in Ethiopia and Kenya. The engagement with the World Bank shows that such a cooperation creates the opportunity to collect UAV data for the its4land project and at the same time provides valuable input for the next deliverable about the quality aspects of UAV data. Maybe the its4land project partners could produce a video about their project, to be put also on youtube, which demonstrates the results to be achieved through the its4land. Such a video could support other initiatives, e.g. in-country efforts by the African project partners, to engage with PPP actors.
Actions to be performed in the mid-term	The following common opinion was formulated during the BDP seminar: Talking about Joint Ownership or Third Party involvement in the its4land platform operation (after the project end) is currently still early. As HL and ESRI Rwanda are responsible for the exploitation and capitalisation strategy, the works on a sustainable business model should start now. The results of WP2 could provide the main input in order to decide on the concrete actions in the next phase of the project. The sustainability of the its4land project results depends on the real time services on offer such the real time data collection, or on an open innovation platform for start-ups, or the establishment of a Living Lab in Rwanda as a hub to develop a cross-border channel for the end-users. New marketing tools such as advertisements or additional regional collaboration with the World Bank or other organisations could promote the its4land project and open new contact channels with additional land authorities and land managers.

4 Consolidated LEAN and Platform Business Model Canvases

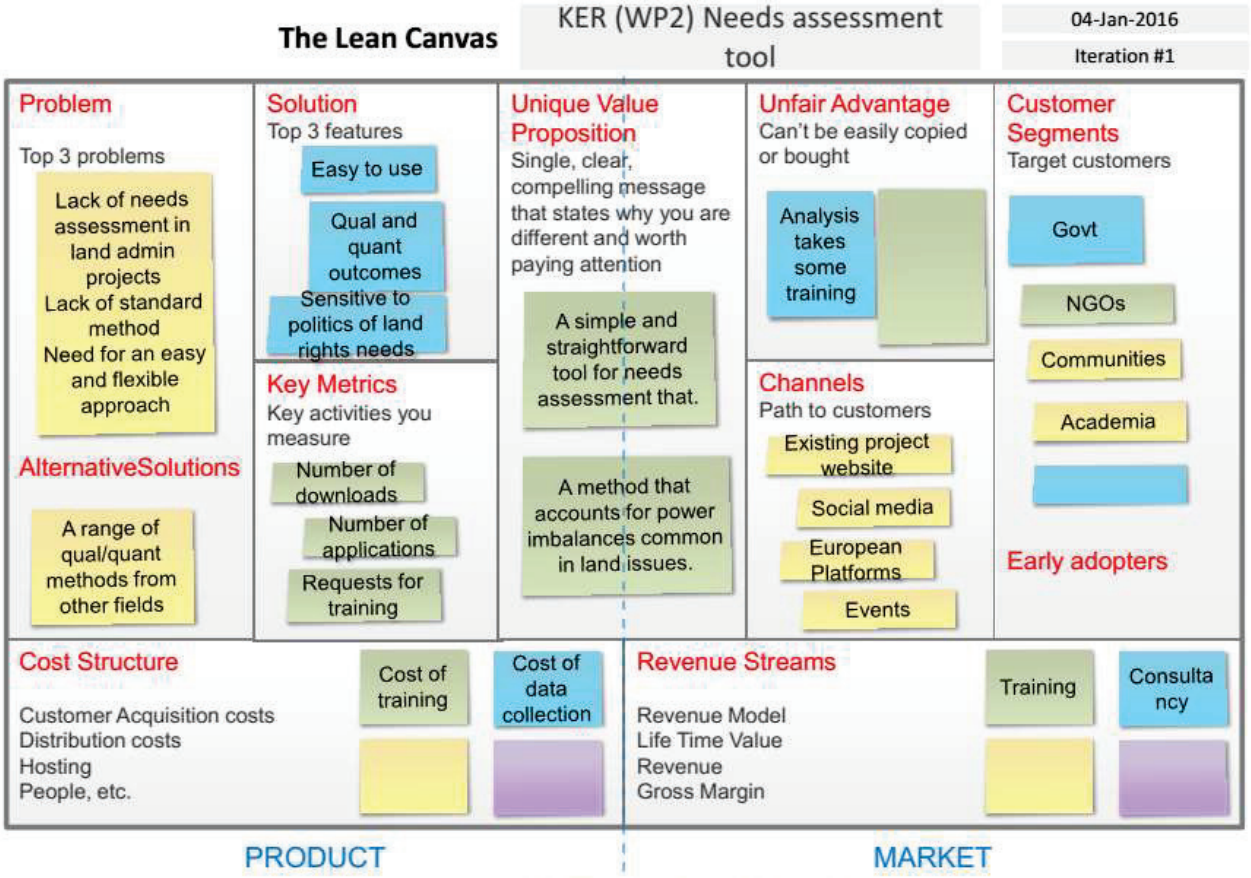
5.1. Lean Business Model Canvas (from WP2-WP3-WP4-WP5-WP6-WP7)



Lean Canvas is adapted from The Business Model Canvas (http://www.businessmodelgeneration.com) and is licensed under the Creative Commons Attribution-Share Alike 3.0 Un-ported License.

5.2 Platform Business Model Canvas (from WP6)

Annex 1 : LEAN Business Model Canvases (by WP2-WP3-WP4-WP5-WP7)



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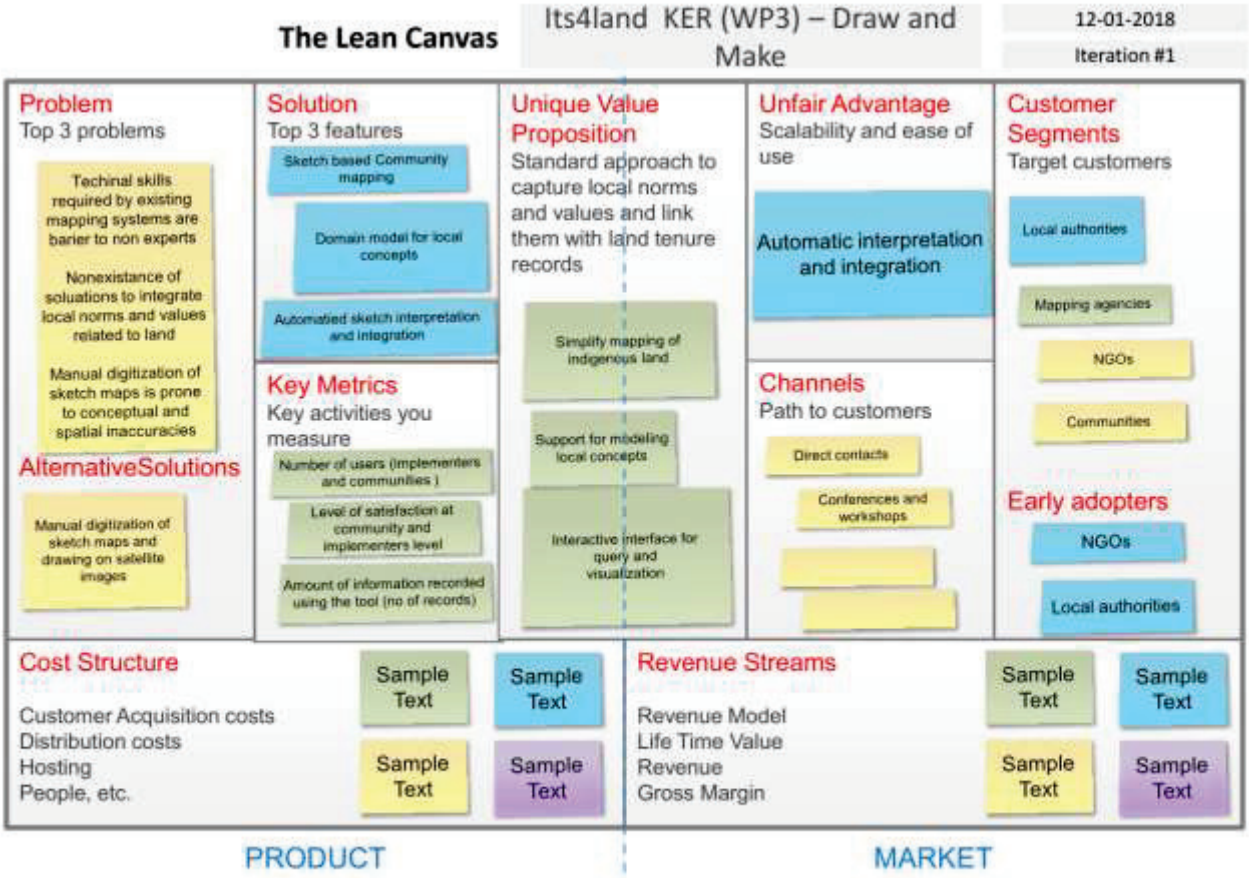

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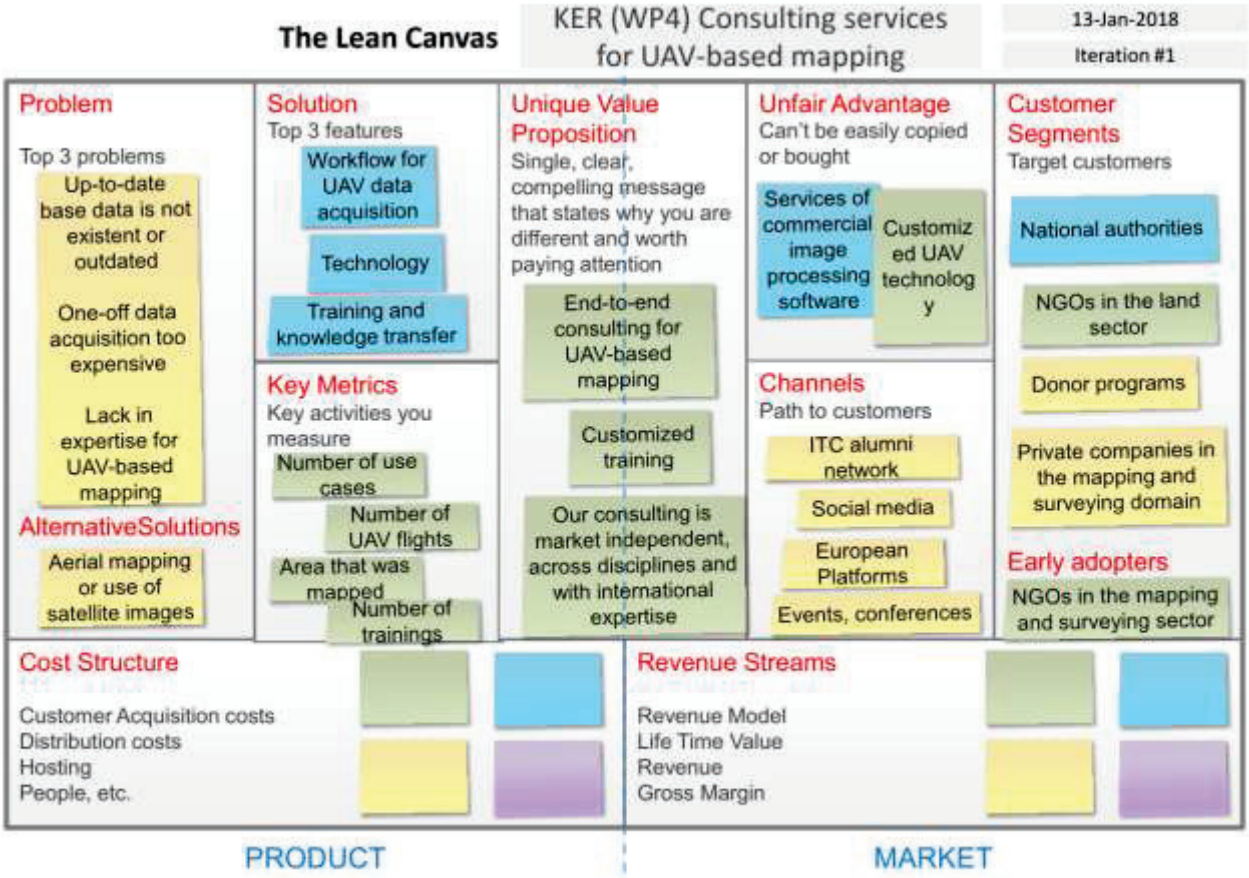

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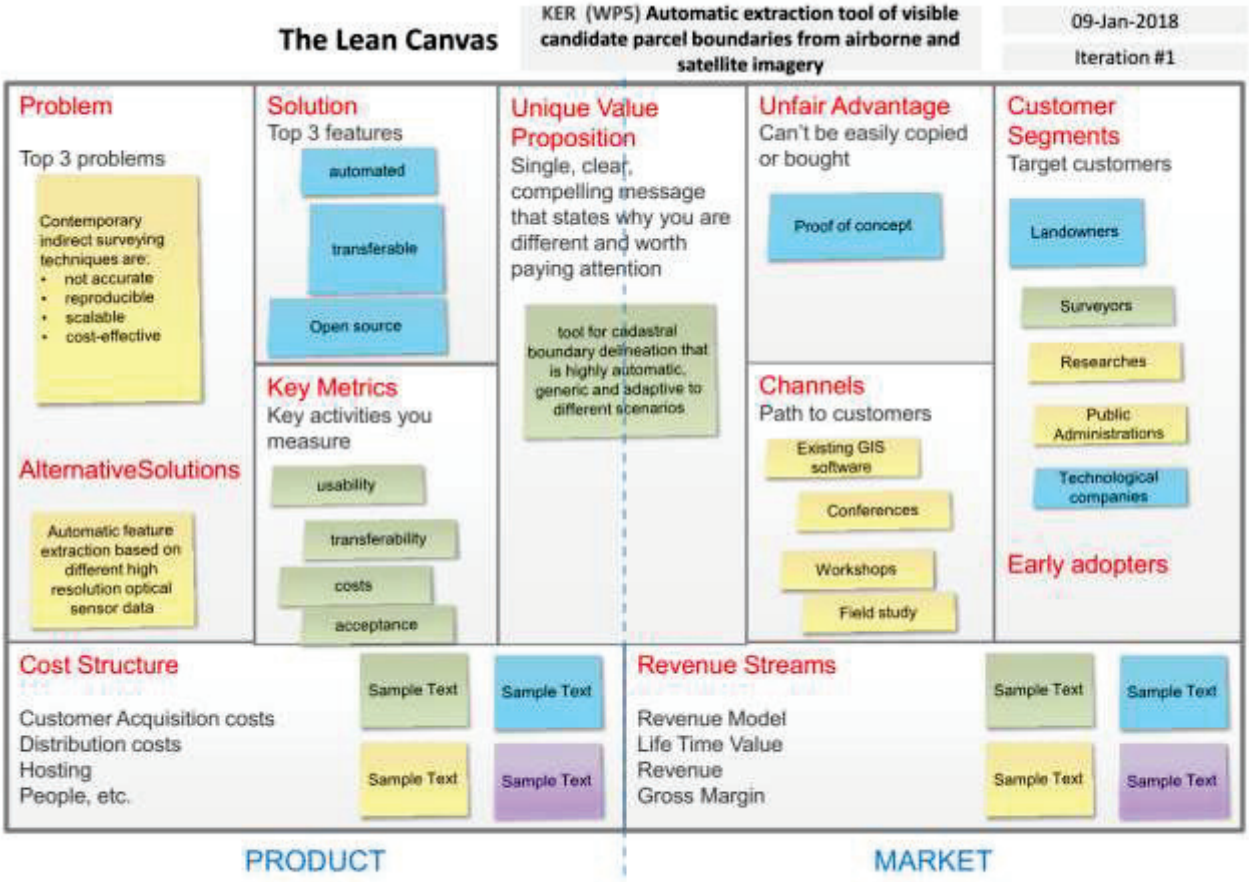

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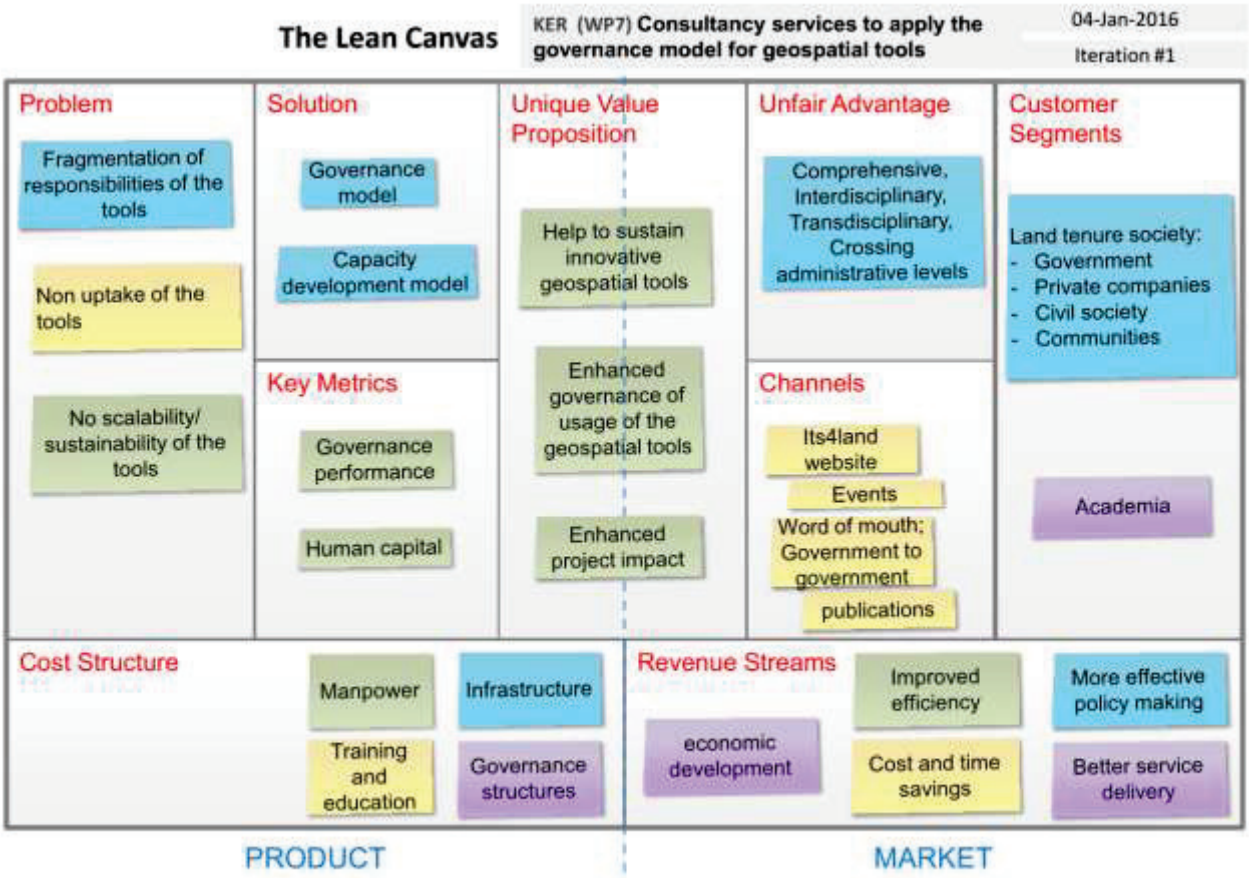

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Annex 2 : Tutorial to Platform Business Model Canvas

About

Platform business models are multi-peer business models. It's very hard to create such a model with the original Business Model Canvas and Lean Canvas. Therefore the Platform Business Model Canvas makes it easier than ever to design a platform from every stakeholder's perspective.

The PBMC is part of the Platform Innovation Kit and works well with other templates like the Value Proposition Design Canvas.

Tutorial

This template has a 'smart tutorial'. Hover over the quotes '' next to titles for more information on how to use the template.

A short tutorial on how to use the template:

1. **Stakeholders** - Identify the main stakeholders of the platform and map them in each corner. Be as precise as possible. Usually, there will be a platform owner, consumers, producers and partners.
2. **Value Propositions** - Formulate the value proposition for each stakeholder. Is the platform a real benefit for everyone?
3. **Value Transactions** - Map the inputs and outputs of each stakeholder - what is the peer giving and what does he wants from the platform?
4. **Platform Components** - At the center, think about necessary technical components needed in order to make the platform work, realize the value transactions and meet the value propositions from each stakeholder.

This should help to start…

Link to download the template:
https://www.creatlr.com/template/um2yxrXADndCd8ftsGgY2/platform-business-model-canvas/

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