LandSense

A Citizen Observatory and Innovation Marketplace for Land Use and Land Cover Monitoring

Deliverable 2.2

Engagement action plans and campaign strategies for LandSense demonstration cases - I

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Short Description:				
This deliverable describes the initial action plans and engagement strategies for the LandSense demonstration pilots (November, 2017 – September, 2018). This deliverable will be updated in March, 2019 to reflect modifications needed to ensure the successful implementation of the pilots during the second iteration (February, 2019 – December, 2019).				
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Executive Summary

The LandSense Citizen Observatory (https://landsense.eu/) connects the domains of citizen science and Earth Observation to address critical issues in the field of Land use and Land Cover (LULC). As part of the observatory, several technologies are being developed and deployed across various themes and communities to illustrate the potential of citizen observatories to tackle environmental monitoring issues. A key success factor to the LandSense Citizen Observatory is to aggregate key end-users including research organizations, NGOs, SMEs, data providers, public bodies, and citizens to directly address local and regional LULC topics. The direct involvement of user communities in the LULC data collection process will generate relevant information and promote demand-driven policy responses that will hopefully rise horizontal 'modes of governance' (Wehn et al., 2015). As such, LandSense conducted an assessment of user requirements and barriers (D2.1) and this deliverable continues along this trajectory to further elaborate action plans, strategies and campaigns for citizen engagement across the demonstration pilots. Specifically, the deliverable summarizes activities undertaken within Task 2.2 and it organized based on each pilot.

Theme	Pilot
Urban landscape dynamics	➔ City of Heidelberg ➔ City of Toulouse and surrounding areas ➔ City of Vienna ➔ City of Amsterdam
Agricultural land use	➔ Serbia
Forest and habitat monitoring	➔ Spain ➔ Indonesia

1 Methodology

During the three-day LandSense Year 1 Workshop that took place at the International Institute for Applied System Analysis (IIASA) in Laxenburg, Austria on October 3-5, several breakout sessions (Figure 1) were dedicated to Task 2.2 to formulate this deliverable. Breakout groups focused on designing the action plans for the implementation of the first phase of the pilots (November, 2017 – September, 2018).

Figure 1: LandSense meeting year 1, Laxenburg, Austria

Taking into consideration the different themes and approaches used by the pilot cases, the following harmonized structure was proposed to define action and engagement plans.

Element	Task/Objectives
Storyline	Write a storyline (i.e. 4 to 5 sentences) for your pilot that contains the following elements (without the use of scientific jargon and aimed at a 15-year-old audience): • What environmental challenge are you addressing? • How does the pilot address this challenge? • Why should a common citizen care about your pilot and what are the benefits for them?
Target Groups	Identify the key target groups • Indicate who your primary, secondary and tertiary target groups are • Identify why this target groups will participate in the campaign (i.e. why do they care?)
Engagement Strategies	Create an engagement strategy for your 2018 campaign that addresses each of the questions below: • How do you plan to create awareness of the campaign? • How do you plan to get volunteers/users on-board? • How do you plan to sustain engagement of the users? • How do you plan to give feedback to the users? • Which partner will lead the engagement for the campaign?

Timeline & KPIs	Think about the timeline for your first campaign in 2018. Answer the following questions: • What is the launch date of the campaign in 2018? • Can the launch be linked to an ongoing event/community? • How long do you plan to run the campaign for in 2018? • Define 5 quantifiable Key Performance Indicators (KPIs) and your targets for these KPIs, e.g. number of expected participants, and then think about ways to help you reach these targets.
User Profiles	This activity involves outlining each of the steps that your typical user will take when they engage with the technology, whether it's a mobile app or an online application. • Start by identifying a target user and write one sentence describing them. • Then choose the technology that is being developed as part of LandSense, with which the user will engage. • Write a detailed, step-by-step procedure that describes the flow of events that a user will experience • Repeat this step for other users/technologies as appropriate to the campaign running in the summer of 2018
Prototyping	If a prototype for your pilot already exists, then test and refine it. Document any modifications that are needed to improve the prototype. If a prototype does not exist and is still to be developed over the next 3 to 6 months, then follow these steps: • Identify the essential features that are needed in the app, using the user profiles to guide this step • Identify what are desirable features that are needed in the app • Sketch wireframes of the app
Data control & Privacy	• Specifically, what data will you be collecting during the campaign? • What data sources are additionally needed to run the campaign? Are these sources openly/freely available? • Where will the data be stored? Who gets access to the data? • Start outlining the terms and conditions associated with joining the campaign • Do you intend to collect personal data?
Quality Assurance	• Identify the types of quality assurance processes that would like to see implemented as part of your campaign • Determine when the QA should be implemented (i.e. real-time/near-real time/post-campaign)
Business opportunities	• What are potential business opportunities that could result from your pilot? • For whom do you plan to create value and who are the most important customers? • Which one of your customer's problems are you helping to solve? • How can the LandSense Engagement Platform serve as a channel to reach your customer segments? • For what value are your customers really willing to pay? For what do they currently pay?

These various elements of the action and engagement plans are intended to be flexible and adaptable throughout the course of the project. In addition, the various demonstration pilots are at different levels of maturity and as a result not all elements can be addressed at this point in time. The following sections describe the initial action plans and engagement strategies for the LandSense demonstration pilots

(November, 2017 – September, 2018). This deliverable will be updated in March, 2019 to reflect modifications needed to ensure the successful implementation of the pilots during the second iteration (February, 2019 – December, 2019).

2 Theme "Urban LandScape Dynamics"

2.1.1 City of Vienna

→ **Storyline**

"Let the city know how you experience its open space while you explore your urban environment and discover its natural treasures. The city is keen to learn more about the urban open space from its citizens. The FREI.RAUM.APP App gives you the chance to share your perceptions and the way you feel about a certain place in Vienna. Based on your input we can visualise and map the attractiveness of the city. Together we can make this a place everyone can enjoy".

The Viennese urban development plan (STEP 2025) defines the Frei.Raum.Netz as a network consisting of the main and prioritised green and open space corridors. It includes parks, alleys, big green spaces as well as smaller but ecologically and also socially important areas. Additionally, these corridors constitute routes for pedestrians and cyclists and are used for leisure, recreation and sport.

For the future development of the Frei.Raum.Netz the city has to consider the specific needs of different target groups. For this task, the City Planning Department of the City of Vienna (MA 18 -Stadtentwicklung und Stadtplanung) needs additional data and information on land cover as well as how people perceive and use open spaces.

The mobile app created within the LandSense project will support the City of Vienna by:
  a) Collecting photos from land cover of the green and open space network in different seasons
  b) Receiving a rating of green and open urban spaces by inhabitants of Vienna

Additionally, the app will stimulate citizens to discover new aspects of the city and to express their perceptions on the urban green and open spaces as well as to contribute to an emotional map of their city.

→ **Target groups**

Table 1: Target groups: Vienna

Target group	Reasons why this target group will participate in the campaign
1. Target groups for test version and extended version "urban development"	
5th semester architecture students of Vienna University of Technology (primary)	Obligatory participation within course unit 'Introduction to Landscape Architecture'

2. Target groups for public version "your green and open city"	
Citizens of Vienna (+ tourists) (primary)	Finding green pathways through the city; express their perceptions about green and open spaces; see how others perceive the city
Environmental Organisations (primary)	Reduce additional urban/peri-urban areas from being sealed (i.e. soil sealing), create safe spaces for urban wildlife and people
City administration (secondary)	Use the app to refine and complement planning instruments by gaining more relevant data and georeferenced photos. The app also supports the documentation of progress of STEP 2025 and the monitoring of the Frei.Raum.Netz. The promotion of the Frei.Raum.Netz and the app as a tool for the participation of the public (as required for all city planning processes) is also seen as reason to participate in the campaign.
Professionals City planners and architects, developers (secondary)	The app and its results are a useful tool to plan/build the (elements of) a city of the future with the quality aspect of a network of green corridors that's attractive for nature and humans.

➔ **Engagement strategies?**

How do you plan to create awareness of the campaign?
The engagement strategy consists currently of two steps:

Step 1: Alpha-test run of extended version (35 questions regarding open spaces: light conditions, temperature, well-being, noise, materials, etc) with students of the Vienna University of Technology. The participation is obligatory within the course unit 'Introduction to Landscape Architecture'. The app was presented and launched to the students on 3rd October 2017. The greatest number of contributions is expected between October and November 2018.

Step 2: General Public – Citizens of Vienna
By early 2018 a communication and engagement plan will be elaborated together with the stakeholders from City of Vienna / MA 18 (City development and city planning) and its communication expert as well as the public relation department of the City of Vienna and GLOBAL2000.
There will be press releases, information via the homepage of the City of Vienna, presentations at public relations campaigns at city events, ad campaigns in local magazines and on info screens in public transport coordinated by GLOBAL2000. Additionally, the app will leverage STEP 2025 PR publications of the MA 18. GLOBAL2000 and UBA will create public awareness by informing and activating their networks.

How do you plan to get volunteers/users on board?

Step 1: Students are required to use the app as part of course within the university curriculum
Step 2: Users of the public version will be engaged potentially by:
- a competition/gamified mode (who can collect the most points)
- users get paid per observation (similar to FotoQuestGo)
- raising interest to contribute to a Map of Emotions/Attractiveness, Emotion/Emoji-map of Vienna
- raising interest to contribute to improve the city and its green spaces / their neighbourhood, ·

- possible cooperation with local businesses (e.g. city bike) to provide further incentives to participants

How do you plan to sustain engagement of the users?

Step 1: if professors like the student's app, there is a potential continuity in next semesters. Compulsory or non-compulsory use of the app is also possible in the context of excursions that the landscape department at Vienna University of Technology offers.
Step 2: there will different communication channels used and multiple waves to broadcast the app initiated. Additionally, competition modes (e.g. who can collect the most points?) and incentives will be set.
The activity is linked to a strategic campaign of the city government (chance to leverage the MA18 PR campaigns). Additionally, if user uptake is high, some money could be generated via advertisement

How do you plan to give feedback to the users?

The data on how people perceive the green and open spaces will result in a Map of Emotions/Attractiveness or Emotionmap/Emojimap. Participants will find their ratings as well as the ratings of others in an anonymized form. Additionally, information about urban green spaces created based on data from the map can be used for feedback.

Which partner will lead the engagement for the campaign?

UBA will lead all engagement activities and will cooperate closely with the following partners:

Partners in Step 1: Professors and assistant professors of Vienna University of Technology/landscape architecture department: definition of questions within the app, definition of points, feedback session.

Partners of Step 2: City of Vienna / MA 18 (City development and city planning) and GLOBAL2000 (general public) - coordinated with PR offices of the city of Vienna/MA18

Due to the fact that communication with the broad public concerns the interests of partners, the City of Vienna and GLOBAL2000 will collaborate and agree on media and public relation activities. All information activities will be carried out in German.

→ **Timeline & KPIs**

What is the launch date of the campaigns?

2017
For step 1: October 3rd, 2017: Vienna University of Technology

2018:
For step 2: Early Summer 2018: launch of version for the general public, so that the users can use the app during the summer.

Can the launch be linked to an ongoing event/community?

Step 1: student versions are linked with teaching units of the Vienna University of Technology and another university.

Step 2: Linked with STEP 2025 promotion and other suitable city events (public events, technology events, social media events …).

How long do you plan to run the campaign for in 2018?

The campaign for the app for the general public is foreseen from May to autumn with maybe a second run of campaigns in the following spring 2019.

Table 2: Key Performance Indicators: Vienna

KPI	Target for the 2017 and 2018 campaign	Ways to help reach the target
Number of Users	500+	A minimum of 500 students were targeted to use the student version of the app Broad advertisement campaign for the public version by the City of Vienna, GLOBAL2000 and UBA
Number of Observations	Enough to generate a Map of Attractiveness / Emotion-map	Students are obliged to use the app, the public (inhabitants of Vienna) will be motivated by the campaign
App Downloads	500+	Students and inhabitants of Vienna
Points covered by users	> 5 per User	To provide enough points
Media Mentions	15+	Joint efforts of City of Vienna, GLOBAL2000 and UBA
Social Media Numbers	TBD	Use Landsense Social Media and create an app-dedicated Social Media presence; Coordinate efforts with City Council, GLOBAL2000, EAA

➔ **User Profiles**

User 1: University Student
Corinna is a student of architecture at the Vienna University of Technology. She is in her fifth semester and one of her lectures is 'Introduction to Landscape Architecture' where she is required to work in teams of 3 and to inspect a pre-specified area (500x500m quadrant) of Vienna. The students are asked to use the FREI.RAUM.NETZ App to evaluate open urban spaces within their area. Corinna downloads the app, which is available for Android and iOS, and makes sure that her mobile phone has enabled geolocation. Cheating and staying in a warm Viennese café while using the app is not an option - the app only works in-situ. During the field trip she can choose one of the points of interest that are marked on the map in the app. The app will guide her and her group to the point. When they have reached their destination they are asked to take pictures of the area and answer several questions about their surroundings. Corinna's team has to complete this process for 3 points to make sure they passed this part of the task. Corinna and her teammates are

pleased with the usability of the app, and this task has been one of the most enjoyable tasks set. Their team receives high marks for their work and are keen looking forward to using the general public version of the app.

User 2: Outdoor enthusiast
Niklas has been living in Vienna for about 20 years. He uses his bike to get to work and enjoys working out (inline-skating, football) and meeting friends in the greener parts of the city. At the moment it takes him about 30 minutes to get to the nearest suitable park and some sections of his bike journey are quite adventurous to say the least. Ideally he would like more attractive green spaces in his neighbourhood and a more relaxed way to get to work. He downloaded the Frei.Raum.Netz App after he read about it in VOR Magazine when he saw on the tram a few days earlier. The article said that the app will collect perceptions on the green and open spaces. Ultimately it will help the city government to improve and create open urban spaces and improve the connection between established structures. On his way home Niklas checks which points of interest are close to his route and stops to evaluate them. He takes pictures and answers the questions, as a result he finds his perceptions in the emotional map of Vienna. Niklas continues to use the app, and is currently in 3rd place in the high score lists.

➔ **Prototyping**

Step 1: Alpha prototype of the student version is finished and currently tested:
The areas to be visited by the students are based on the Frei.Raum.Netz Vienna and quadrants defined by the professors of the course unit 'Introduction to Landscape Architecture'. These 24 quadrants have been selected for their particular urban design and open space planning characteristics and because they are located within areas of current interest from the point of view of urban development and renewal.
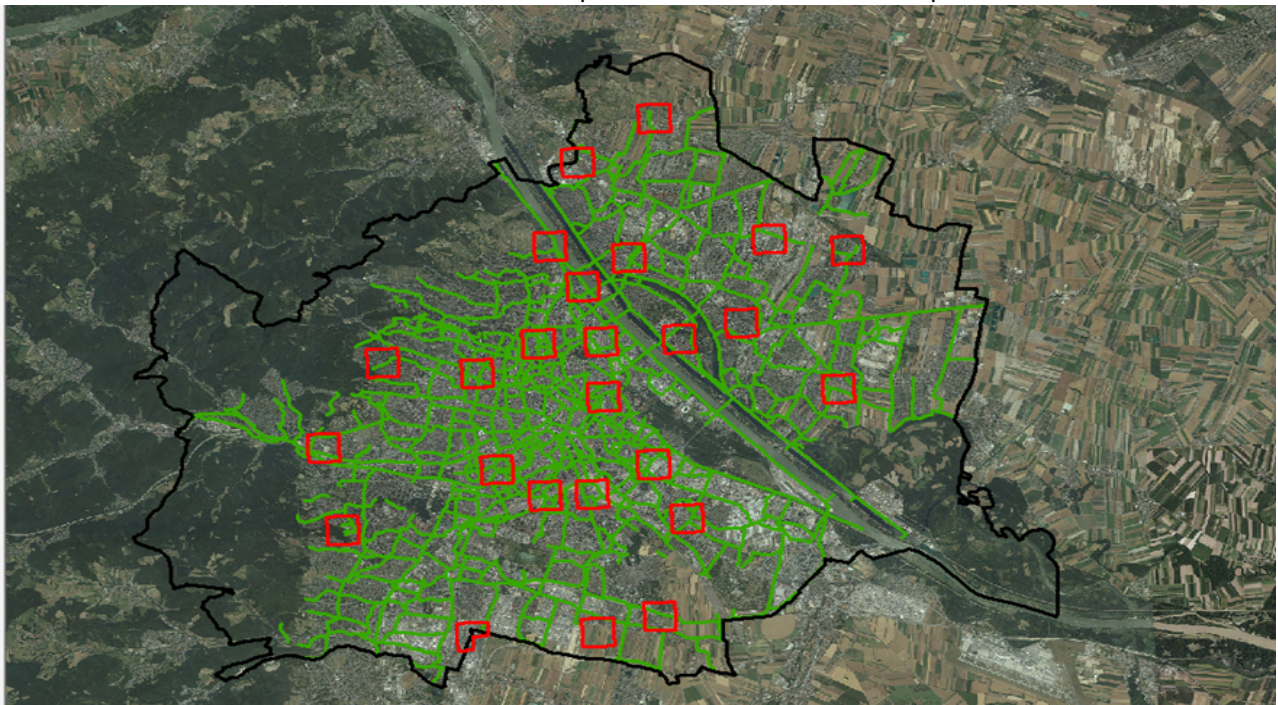
Figure 2: Frei.Raum.Netz (green) and quadrants (red)

Approximately 500 5th semester students will be working in teams of three within over 20 groups in order to study and develop ideas for one of a series of 1 km x 1 km quadrants within the City of Vienna. For every

quadrant points of interest (yellow) and main points of interest (yellow with black centre) were selected, all in all there are 430 density points and 266 main points.

Figure 3: Example of quadrant with points of interest

The students have to activate their GPS mode on the mobile phones and register. The app works with Android and iOS. Within the students version, points can only be visited and recorded by the app once.
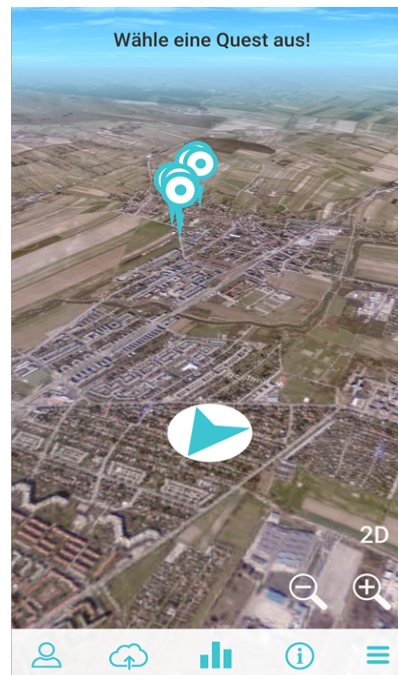
Figure 4: Frei.Raum.Netz Wien app – the first steps

The app is visualized by 2D and 3D interactive maps and indicates how to make photos from the point in 4 directions (landscape format).

Figure 5: The app guides the user to the right position to take a picture

Before loading the pictures, the students are requested to delete (pixelate) all elements that can identify a person or will otherwise violate privacy rights. Additionally, the students have to answer approximately 35 questions by using check boxes, radio buttons or scale buttons ranging from 1 to 5. The content of the questions includes subjective impressions and emotions, observations on human activities and use of space, ecology and climate, as well as infrastructure. Additional factors such as wellbeing, security, noise, sounds and smell are also addressed within the questionnaire.

Also, users are asked to record the number of people that can be observed, the types of user groups, their activities, handicapped users, infrastructure and bicycle lanes. The bundle of questions related to ecology and climate comprises of the existence of shadow and the reasons for shadow, feelings of temperature (hot/cold), if its windy, if soil is sealed, vegetation and observation of animals (mammals, birds and insects). The course unit will run during the winter semester from October 2017 to January 2018. The student app was initiated on 3rd October. Until 17th December 2017 the students contributed 730 photos doing 146 quests. Further contributions are to be expected.

Next steps in prototyping:

Concerning Step 2: The experience and feedback from the student version of Step 1, as well as recommendations from the stakeholder City of Vienna and project partner GLOBAL2000 will be used to adapt the app for the general public. Modifications to the app will be made early in 2018 and tested again with relevant stakeholders.

Initial suggestions for improvement that are to be discussed are already available:

● For the public version: it should be possible for multiple users to visit one point
● It should be possible for users to mark their favourite spot in the area
● Maybe the map can be connected with the EmotionMap Project of the Vienna University of Technology
● More points of interest should be added
● Fewer questions for the public version: ideally questions should be linked to the desired end product (Attractivness-Map/Emoji-Map) or to stakeholders/partners interests
● Notification instead of questions or pop-up questions during the tracking (phone *bings*)

Before the rollout, a focus group will test this version and give feedback on the functionality and usability from the public's point view.

➔ Data control & privacy

The data that is collected within the app consists of land cover observations, pictures, information about the area (questionnaire: noise, animals, vegetation, general feeling, infrastructure, connection to other existing structures e.g. bicycle tracks). The points of interests are already connected with data from the Frei.Raum.Netz Vienna. Some other need for open environmental data might emerge during the project lifetime depending on the interest of stakeholders and the further development of the application.

IIASA will handle data associated with the Vienna pilot study. The format of data to be provided to the teachers (raw, pre-processed, summary...) and which results to be shared still remains open for discussion. There will be a meeting early in 2018 with IIASA, UBA and MA18 to discuss the data handling and sharing policies and terms of use for the Vienna pilot study. The project team is aware of the fact that the Data Privacy Regulations.

➔ Quality Assurance

Table 3: Quality assurance process: Vienna

Quality assurance process	When will the process be implemented, i.e. real-time/near-real time/post-campaign
Improve user location service (algorithm)	Real-time
Privacy through blurring	Real-time
Expert validation	During and after campaign
Points can be visited and observed multiple times	Real-time

Types of processes include (but are not limited to):
- Processes related to positioning/GPS
- Checking for values outside of an allowable range or not possible
- Review by experts
- Review by the crowd
- Comparison with authoritative data
- Conflation methods when more than observation is recorded at a single location
- Measures of user trust or reliability
- Model-based validation

➔ Sustainability measures

The public app is closely connected to a political long-term planning instrument which should ensure that the tool can be used for many years and PR can be closely connected to the STEP 2025 press releases. The development of the public app is subject to negotiations with the city of Vienna/MA18 With few expected changes in the curriculum in the upcoming years, the student version of the app can be integrated and become a robust part of the modules for architects and potentially also other fields of study.

➔ **Business opportunities**

What are potential business opportunities that could result from your pilot?

To create versions for other universities, cities or towns (maybe at a price). Additionally, the Vienna greenspace monitoring campaign has sparked interest among partners and city administration in Amsterdam. As such, a new LandSense demonstration pilot will be implemented in Amsterdam (see following section).

For whom do you plan to create value and who are the most important customers?

- Universities: A tool to enhance the module unit by being a front runner using modern technologies collecting relevant data. In addition, the data from the app helps grading the students work.
- City of Vienna, MA18 (City development and city planning): gets input for LULC monitoring (photos) and feedback from citizens that can be used for improving the green and open spaces as well as future city planning.
- Experts (e.g. spatial planners, landscape planners, architects): get information that may be used for future planning and building activities.

Which one of your customer's problems are you helping to solve?

The stakeholder MA 18 (city development and city planning) has no regular monitoring system including photos for the Frei.Raum.Netz. It will receive photos taken with the app that can be used to document land use and land change. Additionally, they will get valuable feedback from the users concerning subjective perceptions of green and open spaces that are helpful for their planning activities. The rollout of the app and the publication of the results will support their aim to make stakeholders in other cities more aware of the Frei-Raum.Netz. Additionally, MA18 sees the app as a means to promote the Frei.Raum.Netz among future city planners and architects. Furthermore, it is a quite attractive tool for lecturers to try out new ways of collecting attributes of green and open spaces.

For what value are your customers really willing to pay? For what do they currently pay?

In contrast to some other pilots the Viennese pilot activity has a research centred approach and not a business centred one. Thus far the customers are rather stakeholders and are part of the public sector consisting of members of the administration of the City of Vienna and universities. They are currently non-paying stakeholders that bring in their expertise and knowledge as well as their needs. Even if they appreciate the app and its results it can be assumed that they have rather low funds to pay for an app. This might change if there is political will to adapt such an app for similar applications. Also, citizens will not be willing to pay for the app – quite the contrary: there is a need to include incentives in the promotion of the app to motivate people to contribute. However, the Vienna demonstration pilot can be scaled to other cities, such as Amsterdam as described in the following section.

2.1.2 City of Amsterdam

➔ **Storyline**

"Urban green spaces (UGS) are a vital element of any urban environment. Besides providing an array of ecological benefits, they are also the places where urban dwellers engage in recreational activities and social interaction, as well as retreat from the stresses of everyday life. It has been proven that exposure to greenery positively influences physical health and increases psychological well-being. However, the link between subjective perceptions and objective characteristics of green spaces is not always clear. To ensure the provision of high-quality UGS which will support residents' well-being, it is important to reduce perceived negative properties and incorporate the needs of diverse user groups in urban green planning and design practices. The pilot demonstrates how a dedicated mobile app can be utilized to collect location-based information on the subjective perceptions of green space users, and ultimately help informing planning and design experts".

➔ **Target groups**

Table 4: Target groups: Amsterdam

Target group	Reasons why this target group will participate in the campaign
Department of Planning and Sustainability Municipality of Amsterdam	Expanding the means of data collection to inform policy making Targeting locations of specific interest (e.g. where interventions are being planned or were recently implemented) Monitoring if interventions are well-received
Residents	Opportunity to express opinions on their everyday surroundings and contribute to policy making Exploring the neighbourhood and learning about the city Opportunity to win a reward
Organizations and initiatives with sustainability focus (e.g. Green Office, Sustainable Amsterdam...)	Interested in supporting and showcasing the approaches and initiatives which contribute to sustainability
Students (as a part of the app testing phase)	Part of the curriculum

➔ **Engagement strategies**

Awareness raising

The first phase in engaging the citizens to participate is to create awareness of the LandSense campaign among the wider public. The following channels are proposed for awareness raising activities:

- **Traditional media streams** including local newspapers (e.g. Het Parool, Volkskrant, De Groene Amsterdammer) and radio stations (e.g. StadsFM)
- **Communication streams of the Amsterdam Municipality** including official web-pages and municipal newspapers which are being distributed through mail eight times a year in seven district-specific editions (Table 14)

Table 5: Number of copies shipped per district

District	Number of copies
Centrum	72 000
Nieuw West	75 000
Noord	50 000
Oost	73 000
West	88 500
Zuid	93 000
Zuidoost	45 000

- **Social media campaign** through a pilot-specific social media page (on Facebook and Twitter) and by using the existing LandSense social media streams
- **Identifying and linking to existing initiatives and communities;** examples listed in Table 6
- Call for participation distributed through **institutional mailing lists** (VU students and employees)

Table 6: Initiatives which may be included in awareness raising activities

Initiatives & communities	Description
Green Office	Student-led platform to implement joint initiatives and exchange ideas in the field of sustainability
Green Living Lab	Living lab to inspire and promote healthier urban living through organizing lectures, debates, workshops & events
Sustainable Amsterdam	Stream for showcasing the approaches that contribute to sustainability in Amsterdam
Pocket Parks (Postzegelparken)	Private foundation working with local residents to establish miniature parks on abandoned sites in Amsterdam
City Plot	Community of urban gardeners
…	…

Getting users on-board

To get the volunteers on-board, the benefits arising from active engagement should be clearly communicated through promotional materials, including showcasing the app functionalities. An effective method to initially attract participants is to offer them the opportunity to win a reward. The Municipality already used rewards (i.e. iPod and yearly entrance to Hortus Botanicus) as an incentive to fill in the 2013 *Big Green Survey*, so the possibility to extent that practice to the crowdsourcing campaign will be explored.

Sustaining participation

To sustain the engagement of users, it is important to provide regular feedback on their own progress as well as on the progress of the project. An increasingly common way to sustain user's participation in active crowdsourcing projects is through gamification, in other words applying game thinking to engage the audience. The game elements proposed for this mobile app include leaderboards and badges for achievements. To be able to enter into the competition for rewards, users will be asked to complete the quests in five to ten green space locations. For each successful quest users will receive a certain number of points and be placed on a leaderboard. By visiting at least five locations users will become a candidate for a lower-level reward (e.g. book voucher) and earn a badge of a junior green guardian. By visiting ten locations

users will receive a badge of a senior green guardian and become nominees for higher-level rewards (e.g. free visit to a natural site or yearly entrance to Hortus Botanicus?). Another mechanism to sustain participation would include providing educational elements through awarding every successful quest with a two-to-three-sentence long "fun" fact related to green spaces in the city. The facts would be drawn from a pool of 20 so that each user is presented with a different fact each time.

Examples of educational facts:

The Secret Green of Sloten
The Siegerpark, located on the Sloterweg, was built in 1930s in English Landscape style. Last year the park entered the 80th decade. It used to have a role of a beekeeping park and tasting garden for the Hortus Botanicus, while today it houses a collection of modern sculptures of the Stedelijk Museum Amsterdam.

Humans in parks as subjects of art
In the period from 2003 to 2006, Rienke Dijsktra, Amsterdam-based and world-acclaimed Dutch photographer, created a series of Park Portraits. The series features children and teenagers momentarily interrupting their various activities to gaze into the lens from scenic spots in Amsterdam's Vondelpark, Brooklyn's Prospect Park and Xiamen's Amoy Botanical Garden, among others.

Vondelpark
Not all of the 10 million visitors who yearly stroll or cycle through its gates know that the famous park carries the name of the Dutch Shakespeare, a poet Joost van den Vondel. Did you know that? How about the fact that in 2009 Vondelpark entered The Guinness Book of Records for the biggest picnic with 433 persons participating? To discover more facts from park biographies, join a new quest!

City wilderness
With 10 000 different animal species living in the city, Amsterdam presents a home to one quarter of the animal species in The Netherlands. The city hosts 300 protected species and the biodiversity has increased over the past 10 years. However, the other side of the coin reveals a pressing environmental issue. The increase of wildlife in the cities is closely linked to a continuous decrease of wildlife in the countryside. Changing the natural landscape through industrial farming and urbanization leaves wild species to either adapt to human lifestyle, or die.

Providing feedback

As registered users provide their e-mail addresses, they will receive feedback two to three times in the course of the campaign through a newsletter sent via e-mail providing a summary of the project's progress. Furthermore, users could be able to access the summary statistics of their own contributions within the app, and possibly the maps with an overview of all the entries. Users should also be able to give feedback on the app and overall project to improve the future campaigns. This could be done through a follow-up online survey by the end of the campaign.

Which partner will lead the engagement for the campaign?

Depending on the different phases, the roles will be distributed among the partners. The VUA will prepare the text for the promotional material to be featured on the LandSense official pages. It will be discussed with the City if there is a possibility to use their graphic designers to adapt the visual identity of the existing app to the Amsterdam context. Furthermore, it will be discussed if the campaign could be advertised in the

municipal newspapers. VUA will reach out to other initiatives (listed in Table 15) to discuss the potential support in the dissemination activities. VUA will create and continuously update the social media pages during the course of the campaign, as well as provide feedback to the participants.

➔ **Timeline & KPIs**

What is the launch date of the campaign in 2018? How long do you plan to run the campaign for in 2018?

The launch of the campaign is proposed for May 2018 (exact date t.b.d.) and the active campaign should last until July 2018. In the coming months, the possibilities for linking the campaign launch with the communities and initiatives listed in Table 15 will be explored. The KPIs for the Amsterdam demonstration pilot are listed below.

Table 7: Key Performance Indicators: Amsterdam

KPI	Target for the 2018	Ways to help reach the target
Number of app downloads	1000	• Advertising on a neighbourhood level • Sending targeted invitations through mail (with the GGO survey) • Building on the existing communities and NGOs • Including the app in the course curriculum
Number of sustained users	500	• Opportunity for winning rewards • Providing regular feedback • Providing educational benefits • On-going social media campaign • Community building through organizing group quests
Number of contributions per user	5 – 10	• Minimum number of visited locations to enter the different levels of prize competition • Game elements: leaderboards and achievements
Frequency of social media mentions	100-150	• Creating and regularly maintaining campaign's social media streams • Using social media streams of multiple communities and existing initiatives
Media mentions	n.a.	• Using the resources of the City's communication department

➔ **User Profiles**

User 1: Rosa is 35-year-old mother of two children aged 4 and 7 who tends to visit the green spaces in her neighbourhood on a daily basis (if the weather allows so).

Rosa heard about the app on the local radio station. Since she enjoys visiting the green spaces with her children, she thought the app could be a fun tool to discover new green spaces which are attractive, quiet, and kids-friendly. Also, as she is a regular visitor of green spaces in her neighbourhood, she started to notice the small details which could be improved. Therefore, she decided to download the app and try it out. After downloading the app, she created a user profile by answering a short set of questions and she was ready to

go explore the nearby green spaces. On the map of points shown in the app, she identified a pocket park close to her home and went there to try it out. Rosa considered the app user-friendly, and decided to also visit the locations she was unfamiliar with.

User 2: Daan is a 20-years-old student who uses the park nearby for jogging during the week, and as a place to meet friends during the weekend.

Daan discovered the app through a social media post shared by his friend. Since he is interested in sustainability, and also uses green spaces on a weekly basis he decided to try it out. He downloaded the app, created a user profile, and after exploring the map with locations decided to visit those in his neighbourhood. The fact he can enter in prize competition encouraged him to dedicate some of his regular jogging time to visit five locations in two city parks he visits the most.

User 3: Ben is 70-year-old pensioner who likes to spend his free time exploring the wildlife in the city parks.

Ben learned about the app through the municipal newspapers he received in the mail. As he likes to visit urban nature, he thought it would be nice to create a photo-journal of his visits. Also, he was excited about the opportunity to find out more about city's greenery. As Ben does not own a smartphone, he asked his granddaughter to download the app for him and help him with creating a user profile. Both Ben and his granddaughter had fun while trying out the app for the first time, and continued to go on quests in urban green spaces.

User 4: Fleur is a 29-year-old landscape architect working in the Department for Planning and Sustainability of the Amsterdam Municipality.

She found out about the app during a work meeting and decided to try it out with her colleagues. Fleur is interested in finding out how green space users interact with the space, as well as how they perceive implemented improvement measures. She found the app a useful tool to collect such data.

➔ **Prototyping**

We propose to build on the existing Frei.Raum.Netz application developed for the city of Vienna. The following adjustments of the Frei.Raum.Netz app are proposed for the Amsterdam pilot:
- Adjusting the visual identity to the Amsterdam case (e.g. changing the introductory images and colour pallet)
- Implementing new set of questions and locations for Amsterdam context
- Enabling visits to the same location by multiple users (adjustment will be made in any case for the subsequent campaigns in Vienna)
- Summary statistics of user's own entries
- Instead of taking a photo in all 4 directions, users would be asked to take a photo of their favourite scene in the area (e.g. perimeter of 100 m around the location) and optionally a photo of what they would like to improve
- After a successful quest, users would be presented with an educational information
- After a successfully completing 5 and 10 quests, users would earn a badge
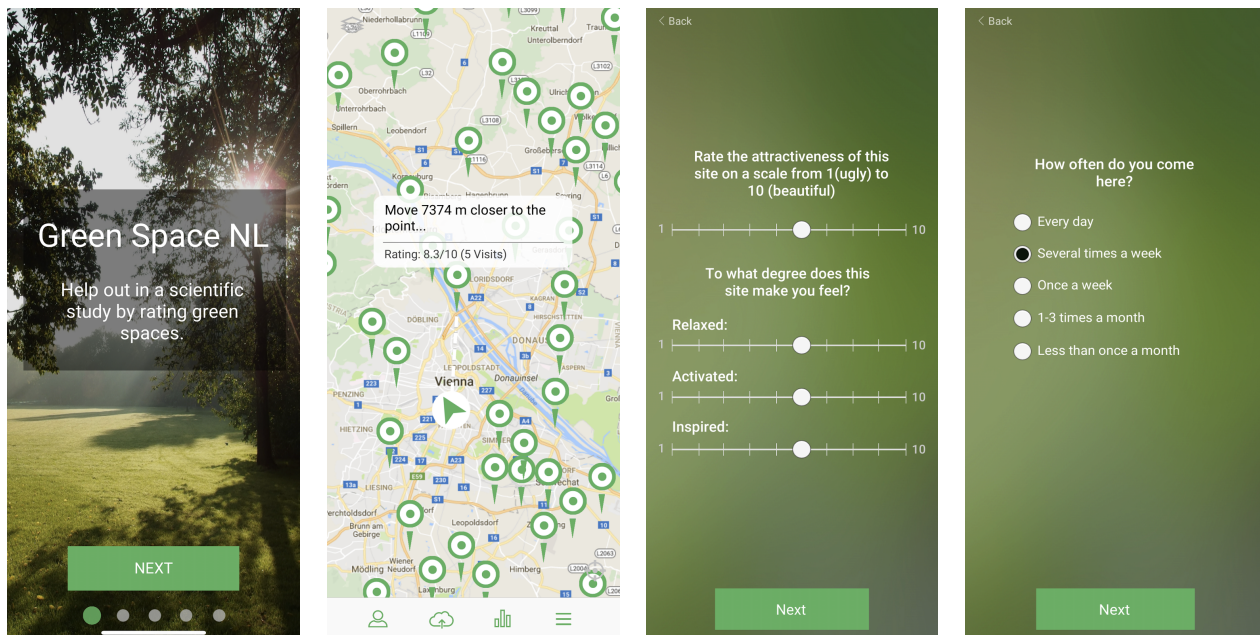
Figure 6: Preliminary screenschots of Amsterdam greenspace monitoring mobile app

➔ **Data control & privacy**

Types of data which will be collected during the campaign include:
- socio-demographic information
- self-reported information on type of activities and frequency of use
- self-reported affective responses (emotions experienced in the green space)
- rating of urban space qualities
- user's location & time
- geo-referenced photographs taken by users and optional additional comments

What data sources are additionally needed to run the campaign? Are these sources openly/freely available?

Additional data needed to run the campaign includes a sample of locations in different types of green spaces within the study area. The set of points will be decided upon based on fieldwork and in consultation with the experts. Spatial data from the Open Geo Data portal of Amsterdam Municipality will be used for setting up the study and analysing results. Other openly available data to be used in the study include a topographic map of the Netherlands and reports from the statistics office. Furthermore, The Big Green Survey 2013 database, and possibly the data collected in the 2018 iteration (which won't be openly available but shared by the City for study purposes) will be used as a benchmark to assess the performance of crowdsourced data.

Where will the data be stored? Who gets access to the data?

The data collected through the campaign will be stored within the FotoQuest database managed by IIASA. Full access to the data should be allowed to the LandSense partners, as well as the Amsterdam Municipality. Individuals participating in the campaign should be able to access their own data in a form of summaries, while the aggregated summaries of all responses and final report should be publically available. Researchers

from other institutions should be allowed to access the data for further analysis after signing the statement of confidentiality.

Terms and conditions should contain sections addressing:

- Who will use data and for what purpose?
- Statement of confidentiality
- Statement of anonymity
- How and where is the data stored?
- How much battery and data allowance is used while using the app?
- Agreement to eliminate or avoid people on the taken photographs

User will be asked to record personal information when creating a user profile including their e-mail address and the following socio-demographic characteristics:

- age
- gender
- work status (employed, student, volunteer, etc.)
- educational level
- household composition
- housing type
- ownership of garden/balcony/allotment
- duration of living in the neighbourhood
- postcode

➔ **Quality Assurance**

Table 8: Quality assurance process: Amsterdam

Quality assurance process	When will the process be implemented, i.e. real-time/near-real time/post-campaign
Improved GPS positioning Location accuracy is important if the specific spot should be visited, however if the green space is considered homogenous it is not crucial	During the campaign
Image quality Notification to take another photo if the quality is bad (e.g. blurry)	Real-time
Temporal coverage Repeated samples for the same citizens in the multiple points in time to detect the changes in perception	During the campaign
Validity & reliability Assessing the internal consistency of contributions and detect outliers	During and post campaign
Trust	During and post campaign

Confidence accumulated over other criterion concerning previously captured data (linked to reliability and validity)	
Comparison with authoritative data Comparison with the data collected through the GGO 2018 survey to assess the performance of CS data in terms of representativeness and biases	During and post campaign
Model-based evaluation Modelling the satisfaction with green spaces based on a set of predictors (e.g. species diversity, presence of water, presence of infrastructure/facilities, accessibility…)	Post-campaign

➔ **Sustainability measures**

If proven successful on a neighbourhood level, potential upscaling activities could involve a city-wide campaign. Additionally, opportunities for partnering with other relevant organizations and projects (e.g. Amsterdam Institute for Advanced Metropolitan Solutions) could be explored.

➔ **Business opportunities**

What are potential business opportunities that could result from your pilot?

This pilot is research-oriented with an aim to advance assessment techniques of human interaction with urban green spaces. If the campaign proves successful, the tool could be presented to and implemented in other cities interested in capturing real-time and location-based data on human-green space interaction.

For whom do you plan to create value and who are the most important customers?

In this pilot the most important client is the Department of Planning and Sustainability (Amsterdam Municipality) which could use the data collected within the campaign to inform new policies regarding green spaces (e.g. type and amount of green spaces within future planned neighbourhoods). Finally, one of the outputs of the study will be a set of recommendations for green space design based on location-based user experiences, which can be a valuable piece of information for the Amsterdam City planners, as well as the general community of planning and landscape architecture experts.

2.1.3 City of Toulouse and surrounding areas

➔ **Storyline**

"IGN produces many different topographic maps from detailed road networks to how the land is used for different purposes. For example, if you go walking in the Pyrenees, you can buy detailed topographic maps from IGN that can help you navigate through the landscape. At the same time, the information contained in these maps underlies many of the decisions made with regard to urban planning, resource management and landscape restoration as well as other environmental issues in France. The problem we face at IGN is the lack of detailed information in some areas and the need to update the map more frequently, since landscape changes are happening in many places around France all the time. By going around Toulouse and helping us to improve the information, you can be involved in mapping and better managing the landscape around you".

Example: *If you live in Occitanie and have a quarry close to your home or you are a quarry operator, you can help IGN to improve its maps. Go to the IGN LandSense Engagement Platform and let us know if they are still active! The most active contributor will receive a 3D map of the Pyrenees mountains.*

➔ **Target groups**

Table 9: Target groups: Toulouse

Target group	Reasons why this target group will participate in the campaign
Local authorities and decision makers and their staff **(primary)**	Local authorities are already engaged in a collaborative approach with IGN. The subjects on which they will contribute are part of their core business or are linked to a concrete professional issue: • Agricultural versus non-agricultural use of land • Transition zones assessment • Distinguish between secondary, tertiary and residential production use • Improvement or update of the 2013 LULC The tests areas are identified collaboratively with them function on their interest: Around Saint Juery communality, Gascone (between Toulouse and Auch), area including the Parc Causses du Quercy
Students (secondary)	• It is part of the curriculum • Students are volunteers; they are interested to contribute thanks to innovate applications • Play and learning are the main levers to motivate them, • Being part of a European research project for which they will become full contributors • Organizing a thematic contribution through the concept of "Carto Party Week" where the goal is to distinguish between secondary, tertiary and residential land use (Stores versus individual residential) Test areas: Occitanie Ouest Region, area on Gascogne (between Toulouse and Auch)
Research community, (secondary)	• To freely access new data, methods and tools to collect specific in-situ data • To go further on different research goals on mapping, maintaining and analyzing LULC data for environmental monitoring. • To generate and disseminate new insights. Test areas: Gascogne (between Toulouse and Auch) and areas identified for change detection and quality assessment services

Citizens (tertiary)	• They care about their environment, they are empowered, they contribute to produce new knowledge, and they contribute to improve public data quality, collaborative sense. • In the category of 'citizens' there are people aware of geographical information systems, IGN activities in general, but also IGN staff in their leisure activity during summer. Test areas: Occitanie Ouest Region, area on Gascogne (between Toulouse and Auch)
OSM community - (tertiary)	• To acquire expertise on LULC data mapping and management; to improve OSM Land Cover data; to have access to sentinel-2 data; to have access to change detection service • Due to the open data policy (relevant motivation for OSM community) that will be applied on Toulouse pilot • Organizing a thematic map party by involving the local OSM community on distinguish between secondary, tertiary and residential production use Test areas: Occitanie Region and Saint Juéry city

➔ **Engagement strategies**

How do you plan to create awareness of the campaign?

Table 10: Engagement strategies: Toulouse

Goal	Target	Engage - Motivate - Communicate
Distinguish between agricultural versus non-agricultural use	Local authorities	Thematic local workshop, mailing list DDT, local streams (Picto platform), LandSense webpage, PF Picto
Transitional areas	Local authorities	Thematic Workshop, mailing list, local streams (state platform)
Distinguish between residential, secondary and tertiary production	Local authorities, Citizens, students, OSM community	• Facebook IGN, Twitter IGN, Linkedin IGN • IGN internal lists: ALL IGN, Echanger, Agora, LASTIG. • Thematic local workshop, mailing list of the Department 81, local streams (Picto platform, CEREMA) • Letters to OSM community via OSM forum, the president of OSM France and some local OSM contributors, • Direct link with schools of engineers in Toulouse ('ENSAT) • Direct link with the Urbanism and Planning Agency • Organize a map party in Toulouse.
Improve and update LULC data from 2013	Local authorities, Research community	• Thematic local workshop, mailing list of the Department 81, local streams (Picto platform, CEREMA), LandSense webpage and social media. • Direct link with universities and institutions working on these topics: Pôle Theia, Cesbio, INRA

Distinguish active/ inactive quarries Change and quality assessment validation	Citizens	Facebook IGN, Twitter IGN, Linkedin IGN

How do you plan to get volunteers/users on board?

- For local authorities' staff, making the contribution part of their work and part of the curriculum for students
- Providing data with open licenses
- Organizing mapathons for mapping LULC and quality assessment. The mapping parties can be both labeled OSM mapping parties or citizen/stakeholders mapping parties (w. linkages to Heidlerberg pilot)
- Proposing easy free to use, friendly and functionally tools
- Giving feedback and being reactive at problems encountered by contributors or requests that they make during the campaign
- Clearly articulate objectives, expectations IGN has from contributors and outcomes
- Target contributors and contributions, do not ask to everyone everything, and in the same time
- Keep it simple, keep it funny

How do you plan to sustain engagement of the users?

- Provide regular feedback on their activities, achieved goals (e.g. "50% of carriers have been validated, great, join us to"...) via LandSense platform for "Pilot Toulouse" (blog)
- Provide a forum page on Landsense Platform for "Pilot Toulouse" to allow contributors to discuss different topics and to help them if needed
- Customize as much as possible the relationship with the contributor (for example, when the person connects on the platform with his/her account, to display the message "Hello Mr Dupont, since your last connection there are 100 new contributions "
- Provide social rewards for contributors. For each contribution, the contributor obtains a point. A ranking can be made and publish the "best three contributors"
- Make accessible and visible their contributions through easy to use tools for downloading data
- Analyse social media (tags and keywords containing #LandsenseToulouse) to measure theirs activities positive or negative in the social media
- Join as much as possible local LULC data community meetings to maintain interest, arrange meetings with LandSense contributors
- Do not forget to say THANK YOU at each end of the campaign, to stress how useful their contribution is for IGN.

How do you plan to give feedback to the users?

- Organise workshops
- Newsletters (mail, forum, website) to inform about the activities, contributions and results.
- Using official IGN Social media for describing the activity, the contributions and the results.

Table 11: Leaders of the campaign: Toulouse

Lead	Engagement Activity
IGN	The guided campaigns for quarries The opportunistic campaign for improving LU235 class The opportunistic campaign for improving and updating LULC data The guided and opportunistic campaign for improving building classification
PictOccitanie	Campaigns for Agricultural/ Non-agricultural use classes
PictOccitanie PNR	Campaigns for Agricultural/ Non-agricultural use classes
DDT 31	Campaigns for transitional areas
CEREMA	The opportunistic campaign for improving LU235 class The opportunistic campaign for improving and updating LULC data
Urbanism and Planning Agency	The opportunistic campaign for improving LU235 class The opportunistic campaign for mapping historical LULC data

➔ **Timeline & KPIs**

The IGN-France campaign for 2018 will run from Mid-March to Mid-August and will be linked to the annual meeting of the LULC data community in the Occiatnie region, as well as the steering committee meeting of the PictOccitanie Platform.

Table 12: Timeline: Toulouse

Activity	Possible launch date of the campaign in 2018
Distinguish between Agricultural/ Non-agricultural use classes	Mid-March 2018 – Mid-August 2018
Validation of areas in transition	Mid-March 2018 – Mid-August 2018
Improving LU235 class:	Mid-March 2018 – Mid-August 2018 with specific 'sprint activities' during different periods: • Local authorities: March 2018 - August 2018 • Citizen, OSM community: 15 June - 15 august 2018 • Students: during classes
Improve and update LULC data (2013)	Mid-March 2018 – Mid-August 2018
Distinguish quarries in activity VS non-activity	Mid-March 2018 – End of Mai 2018

Table 13: Key Performance Indicators: Toulouse

KPI	Target for the 2018 campaign	Ways to help reach the target
Number of LULC contributions	80% of the total amount of highlighted targets	• Provide regular feedback and % of achievements • Provide social rewards • Social media campaigns • Engage with stakeholders to create a community
Number of validated changes and quality assessment hotspots	80% of the total amount of highlighted targets	• Provide regular feedback and % of achievements • Provide social rewards • Social media campaigns • Engage with citizens and students
Number of contributors	200-500	• Provide regular feedback and % of achievements • Provide social rewards • Social media campaigns • Engage with stakeholders to create a community
Number of mobile apps downloads	200	• Include the mobile application in the curriculum • Send emails to the stakeholders community • Make posts on the OSM community wiki page

➔ **User Profiles**

The contributor may carry out different tasks illustrated in Figure 3: create a report, validate an object, modify, and visualize the activities of the campaign. There are three types of contributors' profiles stakeholder staff, citizens, and students.
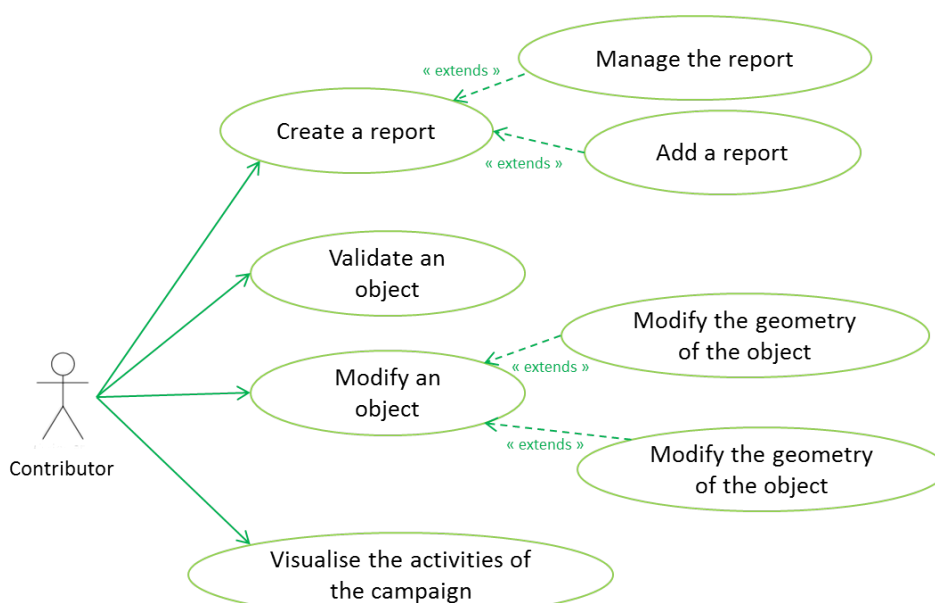

Figure 7 What can a contributor do? Toulouse

Both a mobile application and a web-based tool are being developed. The mobile application is dedicated to guide campaigns and implemented functionalities for assessing goals which not require to be an expert (e.g.. assess if a quarry is active or not), whereas the web based application is dedicated to opportunistic campaigns implementing functionalities that require a minimum expertise on geographic information (e.g. modify the geometry of an object due to an update). The goal of the mobile application is to engage with citizens and students, whereas the web application is more focused on stakeholders. However, these are non-exclusive (i.e. a citizen can login to the web application and public authority staff member can use the mobile application).

User 1: Citizen

Pierre lives in Occitane region, 20 km away from Toulouse. He is passionate about geographic information and new technologies. He reads on IGN Facebook account that IGN is running a campaign to validate if a quarry is still active to improve LULC data. Being also aware of the quality of public data and public service he decides to download the application and contribute. He downloads the mobile app and connects to the platform by using his google account. Since it is the first time he connects to Toulouse pilot he defines his profile (age, gender, background), reads and signs legal conditions.
During the weekend, on a sunny day, Pierre and his son Charles decide to go for a bike ridden green spaces. He decides first to read the guidelines. Then, from the main menu he chooses to contribute on quarries validation and starts to quest points of interest highlighted on the map. For each hotspot, he makes pictures and validates that the quarry is active. He submits the contribution and chooses another object to quest. Pierre continues to use the app, and is currently in 1st place in the ranking. At the end of the camping he wins a 3D map of the Pyrenees Mountain. The information is shared on different IGN social media accounts.

User 2: Stakeholder

Tom is working at Departmental Direction of the Territories and he is in charge of implementing national and local agricultural policies. In order to make analysis to better assist farmers to obtain fonds, he computes indicators by using LULC data produced by IGN. He realizes that the data is not accurate enough and something it is really difficult if the use of a parcel is for agricultural goals or not. He has participated in the workshop organized by IGN to present the Toulouse pilot tools and goals. Tom, with the permission of the head of department, decides to connect to the web application and validates if a parcel has an agricultural use or not. Because his contributions are part of his work he creates an account (username and password) on LandSense Platform and defines his profile (age, gender, background, institution), reads and signs legal conditions. He first decides to read the guidelines. Then, from the main menu he chooses to contribute on Agricultural / Non-Agricultural use for parcels. He realizes by analyzing the orthophoto proposed in the web application that the limits of some parcels are not accurate. He uses a functionality which allows him to modify the geometry and fixes the issue. He does the same for different Agricultural use classes and at the end he saves his contributions. The day after both Tom and his colleagues has access to the corrected data made by Tom. Realizing the benefit of the detailed data, Tom's colleagues decided to contribute also.

User 3: Student

Agnès is a Master student of Agricultural Engineering School in Toulouse. During the first semester of her Geographic information Master she attends a lesson on 'Introduction to biodiversity monitoring and LULC classification' where she is required to work in teams of 4 and to detect changes in landscapes. The teacher was contacted by IGN to participate in the campaign. The teacher decides to use the mobile application proposed by Toulouse pilot to monitor the changes in landscapes. The students are asked to download the

mobile application and to validate hotspots of changes determined by the change Detection Service proposed by LandSense.

Agnès downloads the app, which is available for Android and iOS, uses her Facebook login, defines her profile and signs the legal conditions. When she starts, she makes sure that she has enabled geolocation. During the field trip she can choose one of the points of interest that are marked on the map in the app. The app will guide her and her group to the point. When they have reached their destination they are asked to take pictures of the area and validate if it here is real a change. If yes, then they need to select the new land use and land cover class from a list of classes. They have a doubt about the land use class, so they decide to visualise examples proposed by the app. The examples help them to choose the proper use class. Agnès's team has to complete this process for at least 10 points during the afternoon to make sure they pass this part of the task.

Agnès and her team are pleased with the usability of the app. When the teams come back to the School, all teams visualise their contributions. Agnès enjoyed the application and decides to use it in her free time and contribute to others tasks. She shares on her Facebook and Instagram profile the information about Toulouse pilot.

➔ **Prototyping**

These are the steps undertaken by the contributor when the mobile application is used:

- Connection to the LandSense Platform
  - o If Google account or Facebook account, then fill in the questionnaire regarding his/her profile (age, gender, background, institution if staff), read and sign legal conditions.
  - o If no Google or Facebook account, then the contributor needs to create a profile (user name, email address, password, age, gender, background, institution if staff or students), read and sign legal conditions.
- Choose between reading guidelines or skip
- Choose from the main menu the type of campaign to contribute
- Quest the object and make the contribution (thematic editing, make an alert, take photos)
- Submit the contribution
- Choose another object to quest, go to the main menu or exit the application.
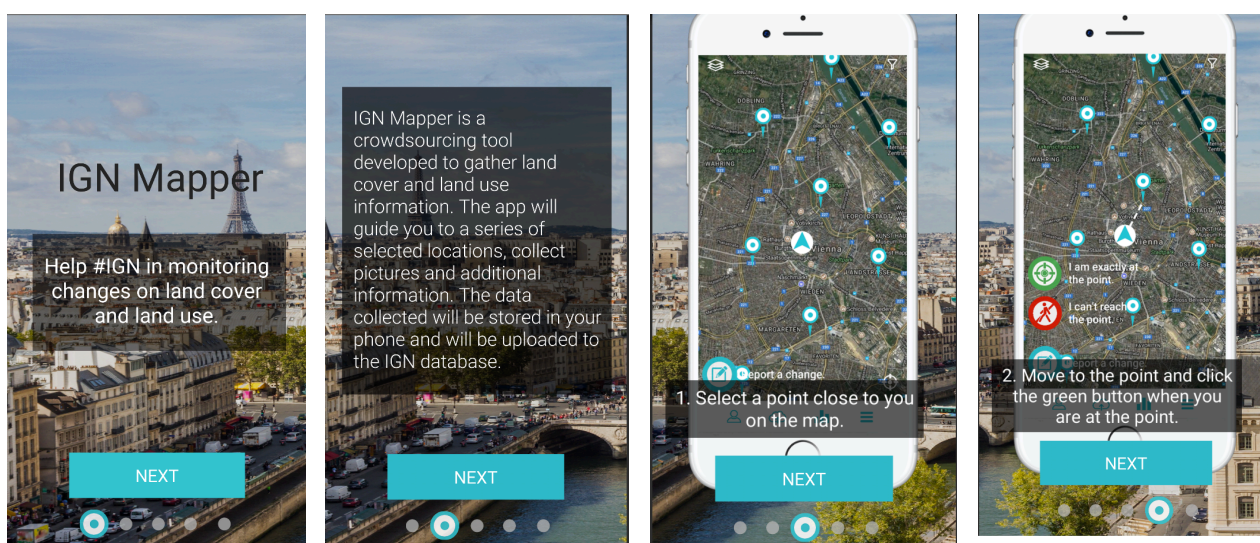

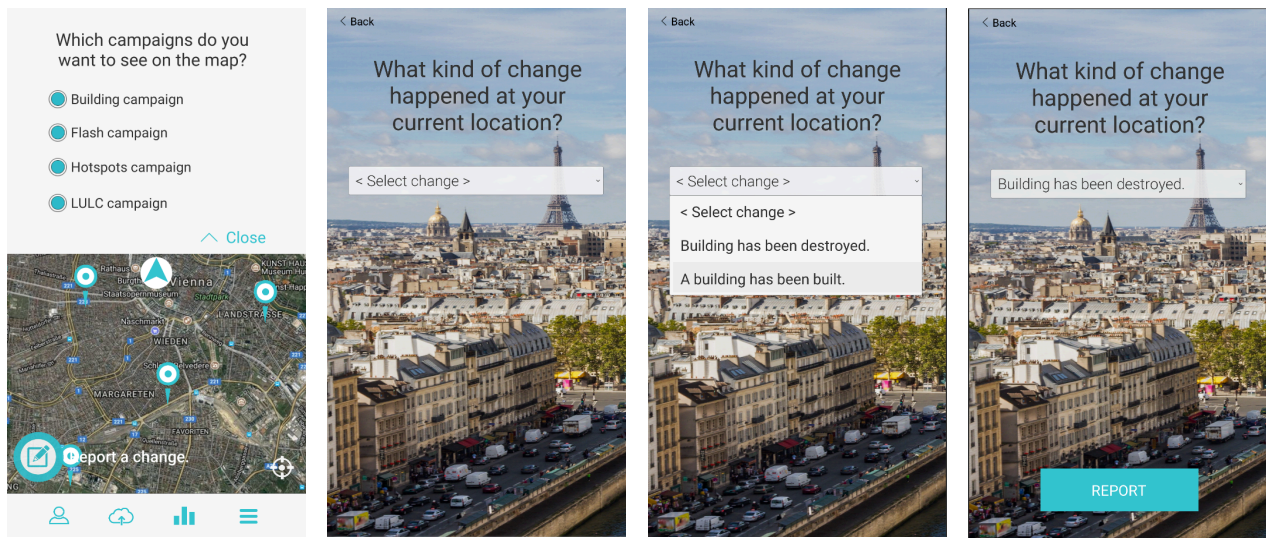*Figure 8: Preliminary screenshots of mobile app: Toulouse*

Figure 9: Preliminary screenshots of mobile app: building campaign

The mobile application should provide to contributors:
- Tutorial on how to use the application (interface)
- Images to help users assigning the good LULC class
- Mapping guidelines depending on the goals and the quality requirements
- Possibility to see both general statistics and their statistics
- Possibility to visualise their own contributions

These are the steps undertaken by the contributor when the web-based tool is used:
- Connection to the LandSense Platform
    - If Google account or Facebook account, then fill in the questionnaire regarding his profile (age, gender, background, institution if staff), read and sign legal conditions
    - If no Google or Facebook account, then the contributor needs to create a profile (id, email address, password, age, gender, background, institution if staff), read and sign legal conditions.
- Choose between reading guidelines or skip
- Choose from the main menu the type of campaign to contribute
- Make the contribution (thematic editing, geometry editing, validation, make an alert)
- Save the session
- Go to the main menu or exit the application.

The web-based tool should provide to contributors:
- Tutorial on how to use the mapping tool (interface)
- Mapping guidelines depending on with respect with the goals and the quality requirements
- Images to help users assigning the good LULC class
- Possibility to see both general statistics and their statistics
- Possibility to visualise their own contributions

➔ **Data control & privacy**

Specifically what data will you be collecting during the campaign?

Data collected during the campaigns are:
- Geographic objects obtained by modification of the existing geographic objects or by editing new geographic objects
- Reports describing an error or an update to make. There are located points.
- Comments describing the contribution, not mandatory
- Photos characterising the contribution
- Validation data. The contributor click on a geographic object to validate it. Validation here is viewed as "no error exist for this geographic object'

The project team is aware of the fact that the Data Privacy Regulation requires:
- "Data Minimization": Which information does an app need from the user; which information is it passing on to a service; and which information is stored with the contribution of the user. We need to make sure that each app, service, etc. only uses the minimum personal data required. => Input (mandatory) to the Data Management Plan.
- "User must be under control": User must approve that particular personal data is released to an app / service on a case by case basis; perhaps "remember my details??" is allowed. LandSense App must inform the user which information is requested and what it is used for (and in which country). The user must approve; in case the user declines => nothing happens! IdP providers in LandSense must ensure to ask the user for consent and offer at the least two buttons: "OK" and "CANCEL".
- "User must be able to see and manage" which information is stored and where and why and what for. => We need to collect where personal information is stored. And provide the user with a "delete" button.
- "Confidentiality": Which users can access the contributions? Only users accepting term and conditions can access the contributions. Photos taken by users are not available for download. Personal information is not available. The user can access only his personal information.
- Besides that, the user must agree on the license to be used with his/her contribution.

What data sources are additionally needed to run the campaign? Are these sources openly/freely available?
The used sources are illustrated in Figure 6. Some type of data can be modified such as LULC database and building from the BDTopo database produced by IGN, some other can only be visualised such as orthophotos or other themes that can help contributors to assess the LULC class (e.g. road network, rivers, etc).

Data	Edits	Visualisation
LULC DB ®IGN	X	
Buildings from BD Topo ®IGN	X	
Points generated by the CD and QA Service		
Other themes from the BD Topo ®IGN		X
BD ORTHO ®IGN (50cm from 2016, 2013, and 2004)		X
Geoportal: WMS, WFS data		X

Figure 10: Type of data sources: Toulouse

Where will the data be stored? Who gets access to the data?

Data is stored on IGN servers. Both applications and contributors get access to the data. Some type of data can be modified, some other can only be visualised (WMS).

Start outlining the terms and conditions associated with joining the campaign

The terms and conditions should mention:
- The owner of the data
- Licenses and copyrights for tools, input data and contributions
- Liability issues. Provide disclaimer of the quality and reliability arising out of any use of data or maps
- How contributions will be used?
- How personal data is managed, stored and used
- Describe how geolocated photos, where personal information can be retrieved (such as people, a metal plate with the name of a doctor on a building, etc) are managed and encourage contributors not to do it
- How contributors can delete the personal data

Do you intend to collect personal data?
Yes, mainly username, email address for newsletters, profession/education level, institution (for stakeholders staff), age, gender, and postcode.

➔ **Quality Assurance**

Table 14: Quality assurance process: Toulouse

Quality assurance process	When will the process be implemented, i.e. real-time/near-real time/post-campaign
Improve GPS positioning	real -time
Checking for values outside of an allowable range or not possible (e.g. 10 floors for a building having 12 m height)	real -time
Conflation methods when more than observation is recorded at a single location	near-real time
Review by the crowd ; apply for reports, and points coming from CD and QA Services	near-real time
Photos blurring	near-real time
Consistency of data with respect to data specifications and spatial context	post-campaign
Validity and reliability of data	post-campaign
Reliability of contributors	post-campaign
Comparing with other VGI or authoritative data	post-campaign

➔ **Sustainability measures**

What are the potential upscaling activities for the second iteration of your campaign in 2019?

Our current strategy is to implement the same activities for the 2019 campaign but improving them and adapting the engagement/action plans thanks to the lessons learnt in 2018.

➔ **Business opportunities**

What are potential business opportunities that could result from your pilot?

Data will be disseminated as open data to be easily and freely reusable. Although it is difficult to quantify at this stage, open data could enable private companies to produce more reliable and complex indicators, monitoring environmental changes for local authorities, but also for citizens.
Moreover, in the environmental field, the results and benefits are not necessarily measured in "money".

For whom do you plan to create value and who are the most important customers?

In contrast to other pilots, IGN is the main customer.
For IGN, the most important goal within LandSense is to improve our response to public policies by creating more tailored LULC data to the needs of the national environmental reporting of the public authorities for better managing urbanization and artificialisation of the environment. The second goal is to produce more accurate and up to date LULC data, by reducing public costs.

Which one of your customer's problems are you helping to solve?
- IGN's problems
- Ministry of Ecology's problems, which is the supervisory authority of IGN
- IGN partners which are LULC data end users.

How can the LandSense Engagement Platform serve as a channel to reach your customer segments?

By developing the services: Campaigners, change detection and quality assessment that allow us to run campaigns for specific purposes.

For what value are your customers really willing to pay? For what do they currently pay?

Only the State, the Regional administration and IGN pay for producing LULC data. When LandSense finishes, these institutions can decide to invest in LandSense Engagement Platform, if the implemented mechanisms for producing data in a collaborative way contribute to reduce costs in producing and maintaining authoritative LULC data.

2.1.4 City of Heidelberg

➔ **Storyline**

"In order to protect the environment and improve the citizen's life quality, it is necessary to know what types of activities people are undertaking in the different areas of the city and its surroundings. We address this task combining satellite images with people-produced maps to describe the changing environment with different usage classes, for instance urban or forest. Our approach focuses on evaluating the quality of the maps so that decision-makers may rely on it. For instance, exactly where is a city growing or shrinking? What happens to our farm land? Usually this type of information is expensive to acquire and here we demonstrate that existing citizen-created initiatives can help reduce costs to keep track of land use and its changes. Accurate low-cost bookkeeping of land is a prerequisite for good decisions for a good future".

➔ **Target groups**

Table 15: Target groups: Heidelberg pilot

Target group	Reasons why this target group will participate in the campaign
Researchers/Students (primary)	• Results will support specific research goals that rely on accurate, spatially explicit, and up-to-date Land Use and Land Cover (LULC) information for urban/peri-urban areas • Gain insights into new knowledge and expertise to help address issues of current interest in Heidelberg and surrounding areas
Decision makers (secondary)	• Understand land developments in consistent and long-term fashion • Acquire up-to-date results to improve urban and regional planning/monitoring approaches
Engaged citizens/OSM community (tertiary)	• Sense of community and contribution to solving real world problems • Estimate quality of their own community-generated OpenStreetMap Land Use (OSMlu) data through mapathons

➔ **Engagement strategies**

Engagement strategies for the Heidelberg mapathons will be led by GI-Science group at Heidelberg University. We will leverage existing infrastructures and communication channels of the Heidelberg mapping community like the Heidelberg disaster mappers or the Missing Maps team (http://www.geog.uni-heidelberg.de/gis/heigit_disastermanagement_en.html). For our first mapathon in July we aim to spread the word through the GI-science blog (http://k1z.blog.uni-heidelberg.de/2017/06/20/mapathon-open-street-map-land-use-quality/). Additional awareness within the Heidelberg community will be created during seminars, Twitter and Facebook channels. To promote on-boarding of the mapathons, we will advertise through the above mentioned channels and also produce posters to promote the campaigns in lectures. Providing timely feedback to the participants on the achieved progress and results (scientific and practical) is critical to not only sustain engagement, but also offer opportunities to scale the mapathons to other cities. For this winter semester we plan two campaigns targeting validation of recent land changes 19.12.2017 and 06.02.2018 using laco-wiki.net, a LandSense technology.

➔ **Timeline & KPIs**

Four campaigns each year, two campaigns each study semester. For this year winter term, we have two upcoming validation mapathons (campaigns, see above) and completed the first Mapathon this year in July. The launch will be strategically linked to the active Heidelberg disaster mappers (https://disastermappers.wordpress.com/), Missing maps team and the ongoing effort of OpenStreetMap volunteers and local OSM community (http://wiki.openstreetmap.org/wiki/Karlsruhe). Later in 2018 we intend to expand the validation mapathon to other sites were OSM communities exist and an interest regarding its validation ensures sufficient participants (20 + people). A successful mapathon protocol coupled will be expanded and transferred to a larger audience were Mapathons are aimed to be performed in other places outside Heidelberg, for instance Toulouse or Vienna.

Table 16: Key Performance Indicators: Heidelberg

KPI	Target for the 2018 campaign	Ways to help reach the target
Thematic Mapping accuracy	85% thematic accuracy	Mapathons and engaging people to work on OSM or validation + expert validation + algorithm and map improvement
Spatial detail	Minimum Mapping unit (MMU) < 0.01 ha	Usage of VHR data Heidelberg + Toulouse VHR data available
Ongoing validation	Permanent up-to-date validation platform	Couple MapSwipe with Sentinel 2 data, Couple LACO-Wiki with Sentinel 2 data

➔ **User Profiles**

For the specific case of the Heidelberg pilot study, two typical contributor groups and one consumer group exist.
Typical contributor:

- **University Student** (Geography + others) - enthusiastic students interested in OSM contribution often they are already active in OSM, disaster mappers or Humanitarian open OSM team (HOT).
- **OSM Contributor / Geographer / Environmentalist** - A person (student, local activist and any citizen willing to contribute) motivated to improve the quality and completeness of VGI geometric and semantic information.

Typical users (consumers):

- **Public Agency Worker (PAW)** - A PAW whose task is the monitoring and updating of LULC in the jurisdiction of his agencies.
- Companies interested in land status and development

One contributor group is formed by regular OSM volunteers which continuously improve and update the LULC product through their contributions within OpenStreetMap. Second contributor group are Mapathon volunteers, which provide estimation of map accuracy, accuracy confidence and provide training data for machine learning based improvement of the map. Users are any persons which require up-to-date land use information, for instance municipalities or local/regional/continental/planetary planning institutes. Within the planned mapathons, these groups will answer questionnaires regarding their level of experience and

skills in photo-interpretation, remote sensing and LULC. Additionally, we will provide detailed image interpretation and mapping guidelines to all participants to help steer them through the mapathons.

➔ **Prototyping**

The prototype or in this case the technical approach/methodology has already been established (Schultz et al, 2017) and the web platform is accessible via http://osmlanduse.org. The initial implementation of the technical methodology to cities relevant to the LandSense project (Heidelberg, Toulouse and Vienna) was performed during http://k1z.blog.uni-heidelberg.de/2017/06/20/mapathon-open-street-map-land-use-quality/. Results are currently prepared for publication (Generating land use from OpenStreetMap: two approaches compared) and have been presented at http://www.ilus2017.ioer.info/program.html. A pending feature for the methodology is to facilitate remote sensing time series analysis to provide suggestions of currently ongoing land use changes which will be validated and investigated during LandSense mapathons.

➔ **Data control & privacy**

No personal data is collected. Exclusively results are stored and further processed. Any data collected and products generated align to Open Database License (ODbL), and all generated data is made publicly available.

➔ **Quality Assurance**

Some of the quality assurance processes for the mapping activities lead by UHEI are described in Table 17.

Table 17: Quality assurance process: Heidelberg

Quality assurance process	When will the process be implemented, i.e. real-time/near-real time/post-campaign
Survey contributors experience	pre-campaign
Good practice map validation (LACO-Wiki) + Expression of certainty: "Would other contributors agree?" Overall-, user-, producer - accuracy + confidence interval *Stage 0 (essential reference data, fraction of total)* Reference data created by experts to estimate contributor's reliability (Stage 1 reference data set). Sample size is fraction of total sample population. *Stage 1 (reference data, total population)* Full reference data set to estimate product accuracy. *Stage 2 (latent reference data, fraction of total)* Fraction of stage 1 sample population for cross user redundant interpretation.	Dedicated campaign (Mapathon)
Latent analysis, agreement among participants	post-campaign
Intrinsic indicators	post-campaign

Types of processes include (but are not limited to):
- Review by experts
- Review by the crowd
- Conflation methods when more than observation is recorded at a single location
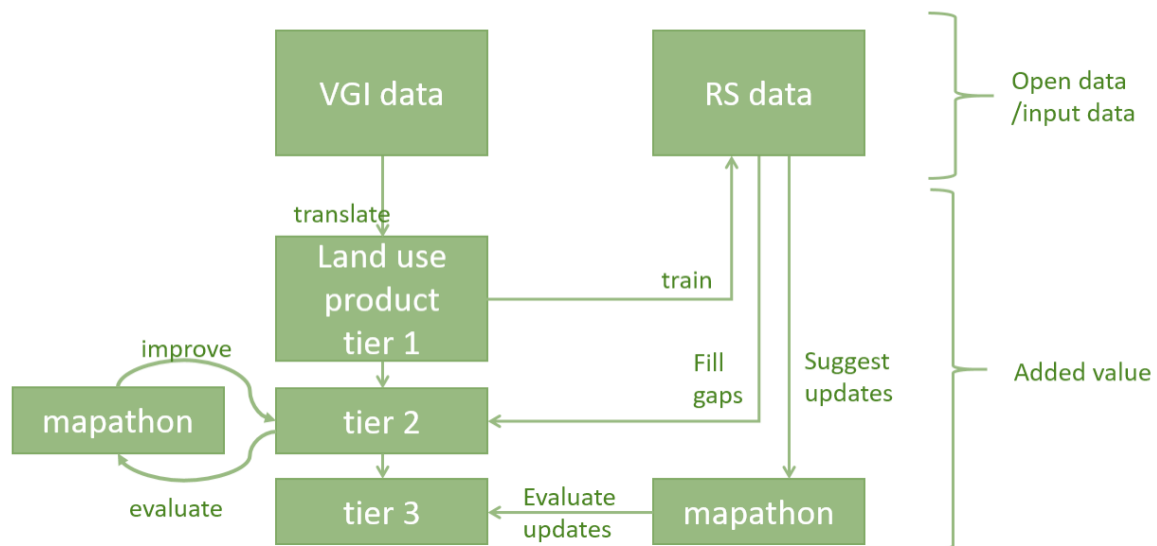- Measures of user trust or reliability

Figure 11: Data flow and machine learning

➔ **Sustainability measures**

Which associations and user groups you would like to meet at first LandSense Service Incubator event (Jun/Jul 2018)? Do you plan long-term collaboration with some of them?

Land management entities from government and municipalities, decision makers and land planners. Business professionals and start-up advisors, market research firms and advertisement companies.

What are the potential upscaling activities for the second iteration of your campaign in 2019?

European and global scale usage of areas specific OSM and RS data as well as improvement of spatial resolution. Additionally, planning for local mapping events in Toulouse are underway.

➔ **Business opportunities**

What are potential business opportunities that could result from your pilot?

To provide up-to-date land use information for decision makers (i.e. companies, governmental agencies). Clients can decide on the spatial and temporal resolution of their desired land use products and we sell the service to setup the product. Providing up-to-date thematic information provide significant value (i.e. land management, urban planning, land-use forecasting) to currently existing processes that offer outdated low accuracy thematic information.

3 Theme "Agricultural Land Use"

3.1.1 Serbia

➔ **Storyline**

"Negative impacts of climate change and unpredictability of weather conditions have immense influence on food production. With our new CropSupport application farmers and farmer communities can rapidly access valuable up-to-date information on vegetation health status, soil moisture, and weather forecasts that will help them improve farm management practices. At the same time, CropSupport will enable farmers to collect and share information on their crops with scientists to collectively better understand negative impacts of climate changes on agricultural activities and food production. The pilot focused on the Vojvodina province of Serbia, will demonstrate the benefits of citizen science and earth observation technologies for the farmer communities".

➔ **Target groups**

As it is shown in Table 18, the Agricultural Land Use pilot is focused around three key target groups.

Table 18: Target groups: Serbia

Target group	Reasons why this target group will participate in the campaign
Students (50 students from 2 agricultural high-schools) *primary*	This target group will participate in the LandSense campaigns in order to generate interest within young members of farm households, as many of the students are coming from families involved in agri-food business. By participating in this pilot activity – students will get an opportunity to acquire new, relevant and practical knowledge related to use of modern technology in agricultural sector, which is currently not available within official curriculum.
Farmers (25 Serbian farmers) *primary*	This group has been targeted to participate in the campaign because it is a community that spends majority of their working hours on the field. Farmers are valuable candidates to regularly collect in situ data on LULC in exchange for EO-based information (i.e. NDVI, weather forecasts, soil mosture) on their fields/crops. The LandSense team has to showcase that the technology has a large potential to increase efficiency, reduce costs and realize greater yields.
Farmer associations *secondary*	This group will be engaged in the campaign to facilitate contact with farmers and to help InoSens to organize workshops. In return, this group will get an opportunity to offer to its members a free CropSupport service and thus be a pioneer in introducing modern technology in Serbian agricultural sector.

➔ **Engagement strategies**

The Agricultural demo case engagement strategies will have two phases, following involvement of the two main pilot groups – students and farmers. Detailed plan for both phases are presented below.

Phase 1: "Empowering rural youth to become citizen scientists"

Phase 1 aims to encourage citizen and farmer involvement in the pilot and to stimulate uptake of the CropSupport application. To accomplish this, a high-level degree of interest should be generated in the farming community, while the value of the CropSupport should be clearly and convincingly demonstrated to a wide pool of intended end-users.

To generate interest within the farming community, the pilot will initially focus on a context that it recognizes as an effective entry-point into Serbian farming communities. Student population represents a demographic group that has demonstrated higher adoption rates of technology (Lencses et al.,2014). Two agricultural high schools will be targeted. LandSense partner, InoSens will connect with administration early on, to introduce the program and solicit permission to organize pilot activities within their schools and to receive support in this endeavour. The next step will be to contact teachers recommended by administration, and seek to present remote-sensing in agriculture during their lectures. These opportunities will allow the InoSens team to introduce the crowdsourcing competition to students. Teams of 5 students will be created in each school. The teams will compete with each other to provide as much crowdsourced LULC data about agricultural land as possible through the CropSupport application. The teams can accomplish this in whichever way they choose, if necessary, InoSens will assist them to provide a strategy. All photos will be assessed for quality and an appropriate point system will be created. Such gamification approaches have been shown as exceptionally effective in the education of children and adolescents and have large potential to stimulate higher participation in this pilot.

Finally, the engaged students will get feedback about their activities during 2 workshops (Table 19). The 2nd workshop *'The half-way point'* will be organized in order to accelerate the competition during spring time. Feedback on use of the application will be gathered from participants, and support offered where needed. The 3rd workshop *'The finish line'* will mark the end of the competition, when results will be viewed and shown. Also, if possible, the contribution of LULC data will be presented to participants. Prizes will be awarded to the best teams, while all participants will receive a certificate.

Phase 2: "Citizen Science applied in the real world"

Phase 2 will aim to drive and maximize uptake of the CropSupport application by the key end-user group: farmers. Farmers will be reached through farmer associations, private companies engaging in outgrowing schemes, agriculture extension services, etc., building from awareness created during Phase 1. Workshops/info days will be organized in several locations, and farmers showing high interest will be enrolled in the pilot. Initially, InoSens will provide training to farmers on how to use the application, and particularly how to interpret EO data (i.e. NDVI, soil moisture maps). The training plan will be very flexible, allowing it to adjust to meeting needs that are identified as the pilot progresses. Close contact will be maintained with farmers throughout the pilot phase, creating a personal feedback loop on all functions and aspects of the application. Based on experience gained during Phase 1, there will possibly be an option to encourage farmers to "level-up" within the application as well as additional reward options for the top user(s).

The expected impact is to generate a large amount of crowdsourced LULC data via CropSupport to simplify its user experience and to provide highly relevant insights into designing the CropSupport exploitation strategy for implementation in an operational setting.

→ **Timeline & KPIs**

Detailed plan for the pilot campaign is presented in Table 19 and Table 20.

Table 19: Phase 1 timeline: June 2017- September 2018

Tentative date of task completion	Activity	Description
1 Jun, 17	Define precise concept	The precise details and activities will be defined, along with internal InoSens task division.
7 Jun, 17	Contact administration of 2 agricultural schools	Emails, phone calls, and official documents will be exchanged with schools. This will include face-to-face meetings with principals.
15 Sep, 17	Specify teachers and classes to engage and contact teachers	School administration will facilitate contact with teachers. InoSens will contact them and plan when to present the CropSupport and the competition of phase 1 to students.
15 Oct, 17	Promote competition to students	InoSens will promote the competition during lectures in several classes, and encourage interested studentsto sign up. The promotion will be packaged in a general lecture about remote sensing in agriculture.
30 Oct,17	Pilot teams have been formed	A list of teams has been established. Creation of teams will be up to the students, and be facilitated by InoSens when needed. First come first serve will apply for a total of 10 teams of 5 students.
15 Nov, 17	Workshop 1- "The start line"	Students will be presented with relevant background: LandSense project, pilot background, citizen science, etc. The rules of the competition will be defined and the timetable. Remote sensing in agriculture will be presented. The teams will be encouraged to use the opportunity to develop a strategy, with support offered by InoSens staff. It is envisioned that workshops will take place in each agricultural school.
1 Apr, 18	Workshop 2 "The halfway point"	This workshop aims to accelerate the competition during spring time. Feedback on use of the application will be gathered from participants, and support offered where needed. InoSens staff will be available for brainstorming with the students.
30 Sep, 18	Workshop 3 "The finish line"	The workshop will be the end of the competition, with results will be viewed and shown. If possible, the contribution of LULC data should be presented to participants. Prizes will be handed out to first three teams. All participants will receive a certificate.

Table 20: Phase 2 timeline December 2018 – October 2019

Tentative date of task completion	Activity	Description
31 Dec, 18	Define precise concept	The precise details and activities will be defined, along with the InoSens internal division of labour.

31 Jan, 19	**Contact farmer organizations**	Emails, phone calls, and official documents will be exchanged with farmer associations. This may include face-to-face meetings if required.
31 Jan, 19	**Prepare information packages and send out packages**	Informative material about the CropSupport application, its benefits, and the LandSense project as a whole will be prepared.
28 Feb, 19	**Introductory workshops**	Farmer associations happy to facilitate contact with farmers will help organize workshops for its farmers. Remote sensing in agriculture and the value of crowdsourcing will be presented. Farmers willing to try out CropSupport and engage in close collaboration with InoSens team will be sought and signed up. It is expected that many farmers will have to be reached to form this core group.
10 Mar, 19	**Form core group**	Commitment of 25 farmers will be accomplished, with administrative tasks all completed, e.g. consent forms. A plan will be devised with each farmer how they will use the application in line with their needs/ambitions.
15 May, 19	**Complete spring season**	Data about spring activities (land preparation, sowing, seed varieties used, etc.) will be gathered up to this point. InoSens will be in close contact with 25 farmers to follow their farming practices.
31 Aug, 19	**Complete summer season**	Data about summer activities (weeding, yields from harvest, etc.) will be gathered up to this point. InoSens will be in close contact with 25 farmers.
15 Oct, 19	**Complete autumn season**	Data about autumn activities (harvesting, land preparation, fertilizer application, etc.) will be gathered up to this point. InoSens will be in close contact with 25 farmers.
15 Oct, 19	**Completion workshops**	Farmers that participated will be gathered to be shown results from their crowdsourced data (to the possible extent). Possible gifts of gratitude will be considered.

Key Performance Indicators (KPIs) are set to specify goals for Phase 1 and Phase 2 of the Agricultural Land Use Pilot. In addition, strategies to reach these goals are outlined (see Table 21).

Table 21: Key Performance Indicators: Serbia

KPI	Target for the 2018 campaign	Ways to help reach the target
Phase I (students)		
Number of Agricultural high-school involved	2	Personal contact with high-school near Novi Sad, where InoSens office is located. Face-to-face contact with the school's principals
Number of Participants	35+ students, but could be expanded	In collaboration with the school representatives, InoSens team will target the most motivated students
Number of photos	1750+ photos	InoSens will help student teams to establish their strategies for collecting data. Setting up a timeline when the students should

		go to collect data (e.g. during their practical activities), taking into account student schedule, crop calendar and Sentinel schedule.
Additional high-level data	175+ high level data	By organising 2nd and 3rd workshops as well as pursuing personal contact with the school representatives, InoSens will facilitate the students to collect data for certain farms through whole season.
Phase II (farmers)		
Number of Participants	25+ farmers	Engaging farmers through their organizations, agriculture extension services in 3 municipalities in Vojvodina.
Number of photos	150+ photos	Workshops organized in several locations, only farmers expressing high interest level will be engaged
Additional high-level data	15+ additional high-level data	

➔ User Profiles

There are many different user profiles that we expect to be engaged in using CropSupport. Some of their experiences might be depicted by following user stories:

User 1: A dairy farmer

Djordje is a dairy farmer in the northern Serbian village of Susek. He has 20 heads of Holstein Friesian cattle which are fed on a variety of pastures around the village. However, the Holstein Friesian breed can be sensitive to the quality of grazed lands. One day spent on a pasture that is of poorer quality can lower Djordje`s cow`s productivity, and for a small farmer like Djordje, this lowered productivity has far reaching consequences. Furthermore, Djordje has no way of knowing the quality of the pasture beforehand, given that the pastures are closely located but spread around a rugged peak of the Fruska Gora mountain range. A similar situation applies for other dairy farmers in the village.

Djordje does not apply any technology in his farming, but he is tech savvy in his private life, owning a smartphone and PC. One night he reads an article about the CropSupport application on a local agricultural news website. He finds out that there is a way for him and his fellow farmers to come together and solve the problem of not knowing which pasture to take their cattle to feed on. Farmers download the CropSupport app and snap geo-referenced shots of their pastures. They upload the pictures and in return receive a multitude of satellite-based data which allows them to understand the types of grass, their quality and quantity at each pasture. This allows the local dairy farmers to let their cattle graze on the best pastures, while allowing other pastures to regenerate.

This leads to an efficient cycle for using the pastures who`s functioning is constantly monitored. The local municipality learns about the effects CropSupport has had on effective pasture use in the area. Other farmers are encouraged to use CropSupport during regular municipal meetings. Very soon, almost all cattle farmers in Susek are using CropSupport to organize and coordinate grazing.

User 3: Agricultural Extension Service Officer

Dejan works for the Agricultural Extension Service of the Autonomous Province of Vojvodina. He visits farmers often across the country and advises them on a multitude of issues. Dejan specializes in work with small holder farmers who own up to 1.5 hectares. These farmers` land is small enough for them to know the very specific characteristics of their fields. They`ve also been farming these fields for generations. When Dejan tells them about the CropSupport application they are hesitant. They have little need to receive any additional data about their land since they know it very well.

However, during one visit to the farmers, Dejan started noticing that his farmers were beginning to complain more and more about the issue of illegal landfills forming on their lands. They complain that other farmers illegally dump waste on their fields and that it affecting the safety of their production, as many of these waste piles include pesticide and fertilizer packaging. Moreover, these small-holder farmers are left with the costs of cleaning up these illegal landfills. The small-holder farmers informed local authorities. But the local authorities are hesitant to act as the farmers cannot provide an overview of where these landfills are appearing. Each farmer calls in separately to report an illegal landfill. Authorities are unable to understand where the landfills are, nor how many there are. Hearing this, Dejan proposes to the farmers that they start taking pictures of their land and uploading them through CropSupport. In return, CropSupport will provide them with pictures of their land and with the locations of every illegal landfill. This would allow them to track their locations and provide authorities with a single comprehensive report about the location of the landfills. The plan worked, and the farmers were happy to inform Dejan that the local waste management company sent personnel and equipment to clean up all the landfills.

Unfortunately, this has not stopped other farmers from illegally disposing their waste. So Dejan and his farmers regularly upload pictures of their fields through CropSupport. In return they are provided with the locations and size of illegal landfills. Once a month the farmers get together and are able to submit a comprehensive report to the authorities who are then obliged to take necessary measures. The information provided by CropSupport begins to alert the local authorities to the full breadth of the illegal landfill phenomenon. Realizing that this problem is impacting local agriculture, local authorities are encouraging other farmers to use CropSupport application so that more and more data becomes available about the location and size of illegal landfills.

➔ **Prototyping**

The CropSupport prototype already exist in form of website and mobile application and it is currently available only for Android mobile devices. In order to use CropSupport application, both PC and a mobile device (smart phone or tablet computer) are needed:

- On PC – one accesses CropSupport through **LandSense engagement platform** by using internet browser (e.g. Chrome, Mozilla, Explorer, etc.);
- On mobile device -one must first download the application from CropSupport engagement platform and then install it on personal device.

The CropSupport web application

One uses the CropSupport **web application** (Figures 12 - 17) to draw a polygon over a parcel, to access the EO-based data and to record a custom farm management diary and notes. Internet access is essential to use the web app.
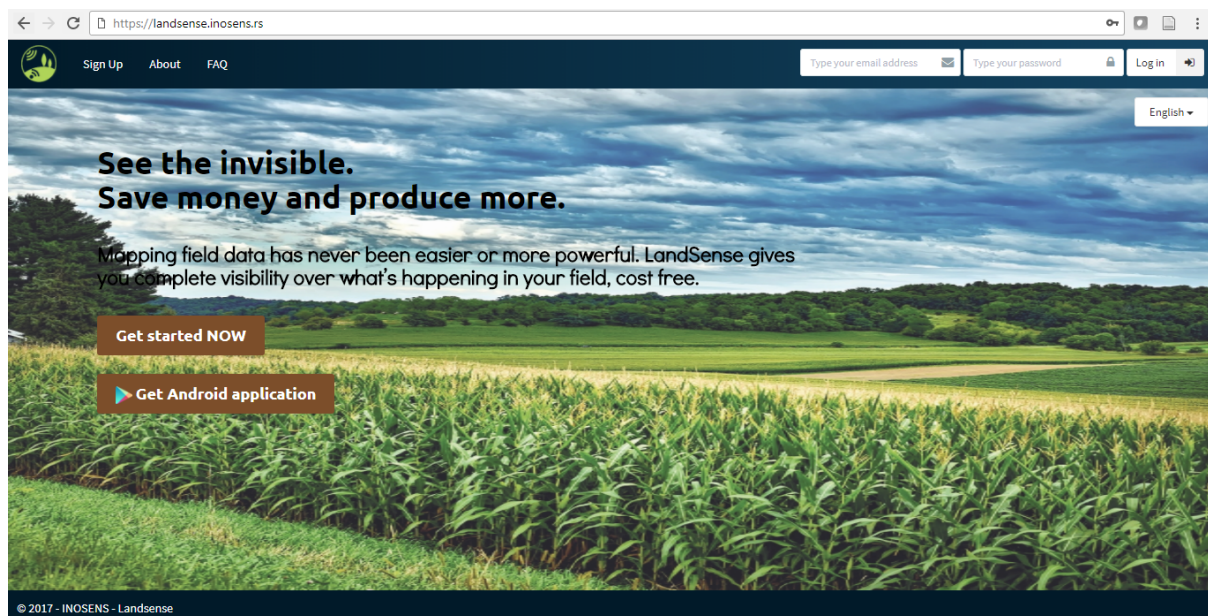

Figure 12: The CropSupport web application's home page

- Users can create a new LandSense account via both web or mobile application
- Using a PC and one of the web browsers to open LandSense webpage, users launch the web application and open a free account by registering herself/himself (click on "Sign Up" at the top left corner)
- Users will launch the mobile application (click on "Sign Up" in the center of screen);
- Users fill in all required fields and click Register;
- Users will receive an email asking to validate the account;
- Users should open the email and click on the link to validate her/his LandSense account
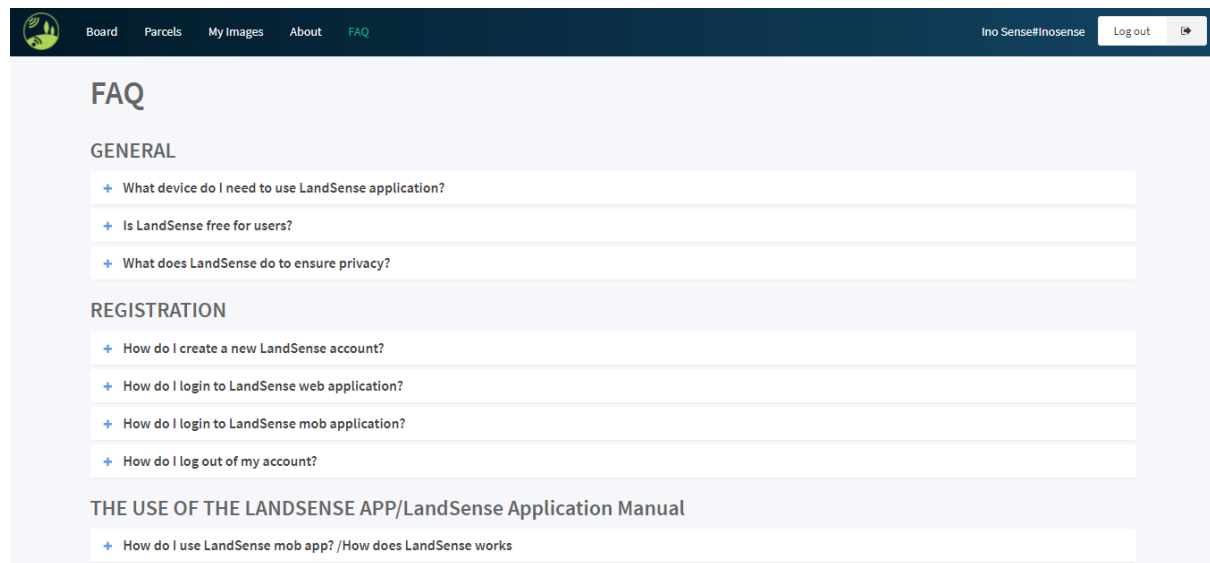
Figure 13: The CropSupport web application's FAQ section

User can read "Frequently asked questions (FAQ)" to obtain information regarding the use and purpose of CropSupport.
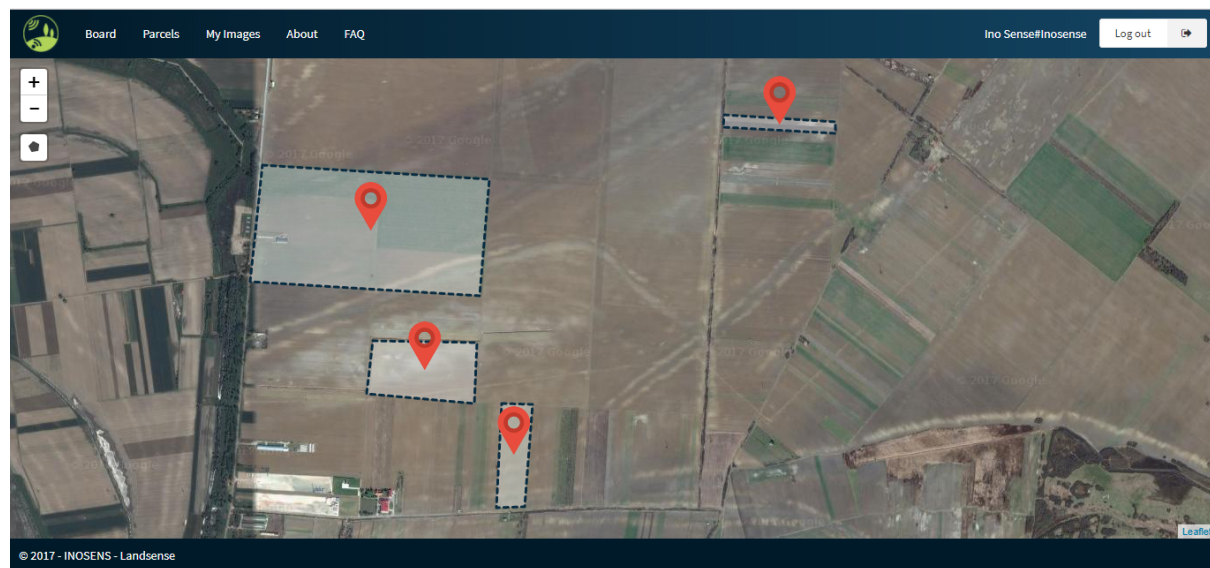

Figure 14: The CropSupport web application – main user's interface

How does a user assign her/his parcels location on the map?
- Users must click on the option "Map" in the main menu;
- Users must locate her/his parcel (by using the computer mouse and options 'Zoom In/Out')
- To outline the contours of the parcel, users must click on the 'Draw Polygon' (on the top left-hand side of the screen, beneath the 'Zoom Out' button)
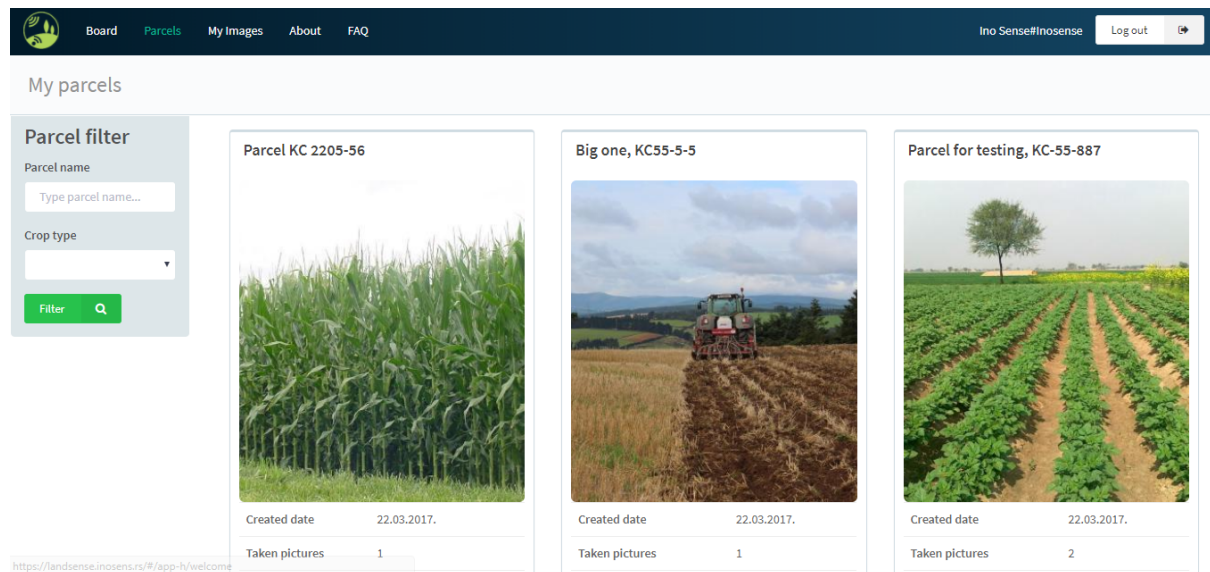
Figure 15: The CropSupport web application's – user interface related to collected information

This section offers user the ability to access information about her/his parcels – weather forecast and NDVI maps. Also, it allows user to take notes and keep records of variety of agricultural activities such us: tillage, planting, fertigation, plant protection and harvesting.
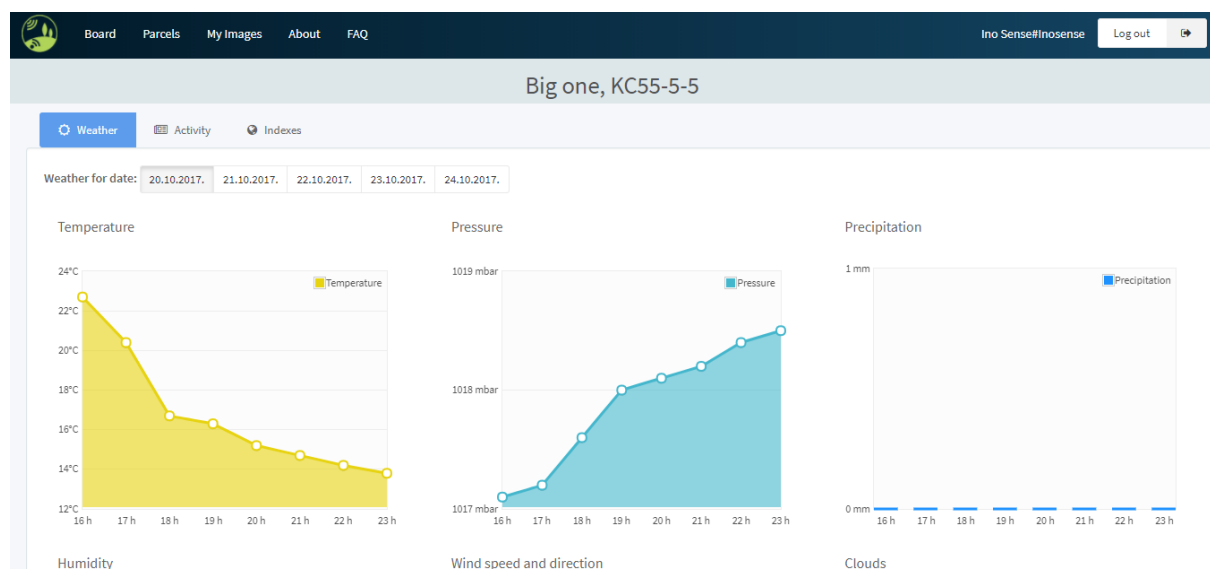

Figure 16: The CropSupport web application's – user interface – weather forecast

"Weather forecast" option gives users accurate weather forecast for micro location where the parcel is drawn, as well as the forecast for next four upcoming days. "Weather forecast" option covers the following data: temperature, pressure, precipitation, humidity, wind speed, direction and clouds.
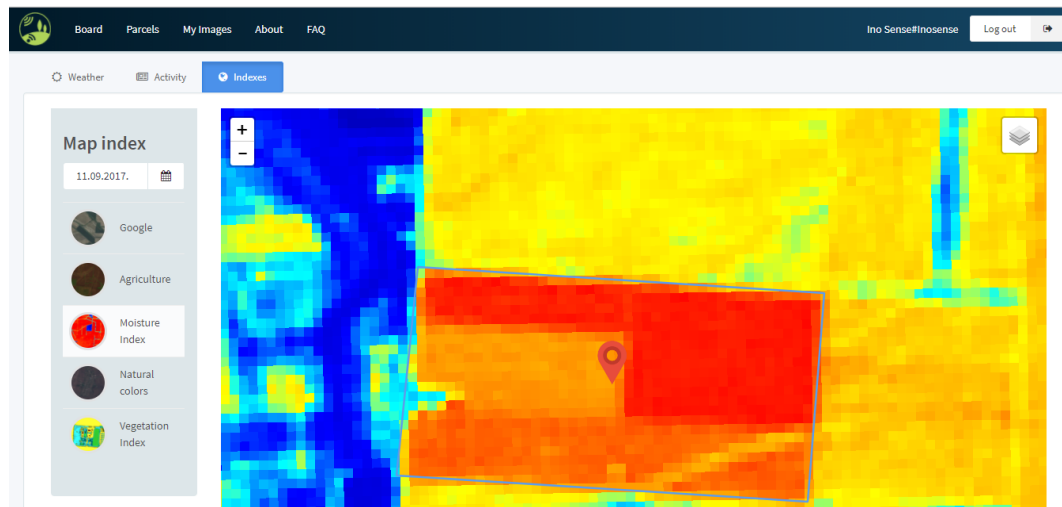
Figure 17: The CropSupport web application's – user interface – NDVI indexes

NDVI (Normalized Difference Vegetation Index) maps are graphical indicators used to analyze remote sensing measurements and assess whether the parcel being observed contains live green vegetation or not. LandSense application offers 5 specific maps: Google map, Agriculture map, Moisture index, Natural colour and Vegetation index. From these NDVI maps and through the LandSense app you can get early warnings for possible stress caused by pests, diseases, lack of moisture or soil nutrients, based on the combine analyssi of the recent satellite data and historical time series.

The CropSupport mobile application

The CropSupport **mobile application** (Figures 18 - 19) is used to take a photo and enter basic information about a parcel (crop name; crop type).

- Users must take into account that "accuracy" parameter, which is located in the info box below command "Take a picture", has to be lower than 20m to be able to take a photo. Once the application automatically calibrates the "accuracy" parameter, users can click on "Take a Picture." Additionally, internet access is not required for user to take photos of the parcels.
- Once user regains access to the Internet, the photos will be automatically synchronized with their user account and will be accessible via the web application's map interface
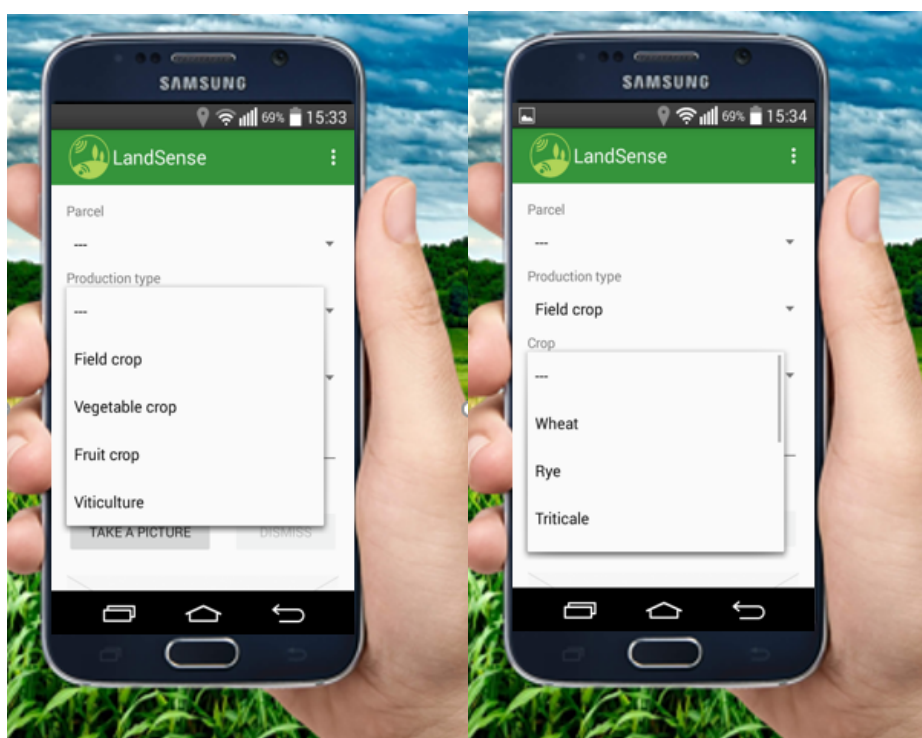
Figure 18: CropSupport mobile app – user interfaces

Figure 19: CropSupport mobile app– user interface for entering data on production and crop types

➔ **Data control & privacy**

The CropSupport application was designed to require minimum personal data from its users. While using the application, a user will be informed which information is needed from him/her, which information is passing to a service, and which information is stored along with what it is used for. InoSens adopts the principle that the "user must be under control", meaning that users must have the choice to approve that their personal data is released to the CropSupport application. Data control and privacy issues related to collected data must to be carefully considered. In relation to this, we present the main kind of data/information that will be collected, data sources which will be needed to run the campaign and where will data be stored.

User personal data (i.e. direct user information):
- First name, Last name
- Email address (in near future: integrate to LandSense federation)

NOTE: User approval needed

Data collected by user during the campaign:
- Parcel location (parcel borders/limits, i.e. occupying area),
- Image of the parcel (date, time)
- Crop type and pheno-phase (e.g. blooming, growing, etc.),
- Current activity in the field (e.g. fertilization, irrigation, etc.)
- Personal notes

Data sources needed to run the campaign (i.e. indirect user information):
- Satellite imagery (Sentinel-2), Airbus high resolution satellite imagery (to be determined)
- Weather forecast (www.yr.no service, freely available)
- Meta data from smartphone (latitude, longitude, azimuth, pitch, roll, inclination...)

NOTE: user approval needed

Where will the data be stored?
- Pilot – Phase I (stored at InoSens server, shared with GEO Wiki, open data)
- Pilot – Phase II (stored at InoSens server, shared upon user approval)

➔ **Quality Assurance**

The quality assurance and quality control concerns linked to the volunteered geographic information (VGI) within this demonstration pilot are related to the quality of shared data by farmers while using both smartphones and web applications (e.g. data entry accuracy; adequate spatial position of a farmer while taking a photo; use of smartphone with minimal technical requirement; frequency of data entry). The main quality assurance processes are presented in Table 22.

There is an initial assumption that data provided by the farmer is truthful so as to establish a collaboration and synergistic working relationship between the LandSense team and the farmers. Cropsupport is intended to exchange truthful data, leverage mutual benefits, and establish trust between the parties involved. However, unintentional entry of wrong data is possible to occur due to farmer IT illiteracy, pure technical performance of mobile devices, etc. As such a system of data quality control and checks should help prevent such scenarios.

Table 22: Quality assurance process: Serbia

Quality assurance process	When will the process be implemented, i.e. real-time/near-real time/post-campaign
Processes related to positioning/GPS	**- Real Time** While using mobile app, the accuracy level control allows a user to take a photo only if the accuracy is below 20m. To utilize the mobile device GPS option and to obtain certain accuracy (precision) level, the mobile device has to be connected with certain number of satellites. To make sure that a farmer is taking a photo only when the phone is connected with necessary number of satellites and when it has obtained required accuracy level (<20m) – the application will be in "green mode" (i.e. "unlocked"). When the requirements are not fulfilled, the application will be in "red mode" (i.e. "locked") and farmer will not be able to take a photo.
GPS on/off on a user smartphone (photo contains all metadata only when the GPS option is switched on)	**- Real Time** To make sure that a photo contains all information, the GPS option on a mobile device is always automatically switching on (if it is not already in "on" mode) when a farmer runs the application.
Measures of user reliability (parcel borders, crop info)	**- Near real time or post-campaign** User data input, will be checked by experts via administrator interface. Administrator interface will allow expert to check validity and reliability of data.
Synchronization/Upload of photos taken by farmers to the server and the web application	**- Real-time/near-real time** After taking a photo, a farmer should upload it to the server and web application (either immediately after the photo has been taken or once there is a sufficient internet connection). → to make sure that a photo is uploaded to the server, the farmer will be informed about how many photos should be uploaded to the server each time when he/she runs the mobile application (i.e. an "info box" will pop-up with information about how many photos "are waiting to be uploaded"); → if a mobile device loses internet connection while uploading a photo, the photo could be re-uploaded again (i.e. the photo will not be deleted).
Does a photo match the crop field drawn in the web application?	**- Real-time and post-campaign** A photo taken in a crop field by a farmer, once it has been uploaded, should be positioned within area of drawn polygon (crop field) in the web application. → To make sure that uploaded photo is matching the drawn polygon, the application software will utilize some of the metadata attached to the photo that are related to the user spatial position while he/she had been taking the photo (i.e. the exact direction of a farmer while he/she had taking photo will be known). Note: this quality control is directly dependent on technical performance of a mobile device. → In the case when, for some reason, a photo is not positioned within the area of drawn polygon (e.g. it is near but outside of the polygon) the web application user has a possibility to "pair" the photo with the polygon simply by dragging the photo in the area of the polygon.
Correctly drawn polygon (crop field).	Farmer draws polygon in the web application in order to mark his/her crop field. The web application uses Google Earth imagery as a basemap over which user marks his/her crop field.

	→ to make sure that farmer could precisely demarcate his/her crop field, in a case where the Google Earth imagery is old and does not correspond exactly to reality, user of the application could utilize "natural colour" or "vegetation" indices to get right position, size, and edges of the crop field.
Right description of the crop type and crop phenological information.	Farmers can enter information about the crop type and crop phenological information by using both mobile and web application. → (internal validation or self-validation) To make sure that farmer provides accurate information, an uploaded photo is used as "groundtruth", i.e. farmer is using photo of the crop field as a proof for the descriptive information he/she provided; → (external validation) To make sure that a farmer provides right information, an uploaded photo would be "manually" checked by the application administrators. Each new user will be initially evaluated whether his/her uploaded photo is matching the provided information related to crop type, phenological stages, etc. If every photo is matching with the provided descriptive information, the user of the application will be marked as "*trustful user*". However, the quality of his/her collected data will be periodically checked in future.

➔ **Sustainability measures**

Expected user groups at the 1st LandSense Incubator event

For this demonstration pilot the expected user groups to meet at the first Landsense incubator event would include groups such as European SME's, start-ups, tech companies, students, and other individuals interested in EO industry and developing new ideas within the agri-sector. The idea of the LandSense Incubator event is to promote and facilitate ecosystem building and therefore establish collaboration that will last throughout the project leading to market ready solutions in the post-project phase.

Expected solutions to be proposed within LandSense Challenge:

Open topics and ideas that would lead to the exploitation of CropSupport services and contribute to the transfer, assessment, valuation, uptake and exploitation of LULC data and related results within the agrifood sector.

Potential upscaling activities for 2nd iteration of the campaign in 2019:

The 2nd iteration will involve a more comprehensive solution development that follows ideas generated from the 1st iteration, and lead towards MVP development of the same services. Moreover, the insights derived from the pilot activities will be exploited and will be used as inputs in further upscaling of ideas. This way, a circular iteration between pilot activities and incubator activities will be nurtured.

➔ **Business opportunities**

Potential business opportunities that could result from the pilot:

Two potential business opportunities result from the pilot. First one is commercialization of tested and validated services targeting farmers and governments (paying/monitoring authorities for agricultural

subsidies). Secondly, the commercialization of the acquired in-situ data targeting all EO data seekers (researchers, SME's, etc.). Activities from Cropsupport intends to create value for several groups including famers, government, EO-data seekers and other actors along the value chain (i.e. agronomists, agri-tech companies). CropSupport can also directly help to solve key questions for the stakeholders, such as how to best optimize the use of fertilizers and other inputs, and how to improve crop classification transparency.

Additionally, the LandSense Engagement Platform represents a hub that gathers a vast number of relevant stakeholders involved in EO and in-situ data collection. As such, the platform will serve as direct channel for reaching customers interested in exploitation of CropSupport services. Also, the platform will enable customers to use the CropSupport either as a particular solution or in combination with other LandSense services.

4 Theme "Forest and Habitat Monitoring"

4.1.1 Spain

➔ **Story line**

"All across the globe, common bird species, such as those living in agricultural fields, are declining. The abuse of fertilisers and the intensive farming practices are making their habitats and food disappear. Spain is lucky to have the largest Natura 2000 network in Europe, but many of these sites are still endangered. The LandSense mobile app and the BirdLife network of committed volunteers will try to make a difference by reporting threats to biodiversity and changes in specific habitats (arid lands, wetlands, grasslands, etc.). The data generated will help to improve BirdLife's network of Important Bird and Biodiversity Areas and other areas important for people. Citizens will benefit from having a tool in their smartphones or laptops that can be used to inform local authorities about the threats and changes. A summary of the citizens' contributions will be communicated in an intuitive and appealing way to demonstrate the potential of citizen science and earth observations"

➔ **Target groups**

Table 23: Target groups: Spain

Target group	Reasons why this target group will participate in the campaign
National IBA coordinator (SEO/BirdLife staff)	• Improve the relationships and communication with volunteers, refresh their engagement • Reach a wider audience and recruit new volunteers • Promote SEO's IBA/Natura 2000 Programme • Once the app and the web-app are up and running, significant time-saving to produce the annual reports related to the state of the IBAs.
IBA caretakers (already engaged)	• They will feel they are part of the bigger picture and that they can actively contribute not only gathering data but also participating in the workshops and consultations. • They will have the opportunity to co-design the mobile app and web-app, so they will feel inspired and motivated to use it. • It will be easier to report back to SEO with the mobile/web-app.

	• They will receive specific trainings on threats and they can exchange experiences and best practices through the platforms.
Bird Monitoring Volunteers (already engaged)	• Until now, their main focus was to count birds, but now they have an exciting opportunity to report threats at the same time, so their volunteered time will be even more valuable • They will receive specific trainings on threats and they can exchange experiences, attend workshops, participate actively in the consultation process, etc.
Other citizens	• Nature lovers, outdoor sport people, biology students, non-bird naturalists, etc, could see an opportunity to participate in a pilot case linked to areas they are attached to. • Moreover, other BLI partners in Europe could be inspired by LandSense and design their own campaigns to call for citizen action using our mobile app.

➔ Engagement Strategies

How do you plan to create awareness of the campaign in 2018?

In 2018, we will use BirdLife and LandSense regular communication channels (WebSite, Newsletter, Social Media, etc) to present the case for the 5 planned campaigns:
- Campaign 1(Communication): **'Join the Army of IBA Caretakers!'**
- Campaign 2(Data collection): "**Threats to biodiversity within IBAs**"
- Campaign 3 (Communication): "**The Most Threatened IBAs**"
- Campaign 4 (Data collection): **"Wetland Day"**
- Campaign 5 (Communication): **"What's threatening your local IBAs?"** (IBAs per province)

How do you plan to get volunteers/users on board?

In 2017, SEO/BirdLife has organized a range of activities to promote LandSense and recruit volunteers:

- **Online survey** on citizen science, remote sensing and mobile apps
    - https://www.seo.org/landsense/
- **LandSense article** on SEO/BirdLife magazine
    - https://www.seo.org/landsense/
- **LandSense Presentation** on the National Ornithological Congress
    - https://www.seo.org/2017/03/22/xxiii-congreso-espanol-de-ornitologia/
- **Workshop 1 (Nov) - Mobile app testing** for Monitoring Programme Coordinators (volunteers) and remote sensing opportunities.

How do you plan to sustain engagement of the users?
- In June 2018, an IBA Monitoring workshop will be organized for IBA Caretakers (volunteers). It will be discussed how helpful the app is, their doubts regarding the classification of threats, the use of the web-app, etc.
- Will produce yearly reports of monitoring and censuses results and will distribute them to bird monitoring surveyors and IBA caretakers. We need to find innovative ways of encouraging volunteers to keep the data coming in. SEO's network of volunteers is vast and funds are very limited to bring them all in for training and best-practice sharing.

- Given the funding constraints, we plan to organize several webinars to explain how the mobile app works and how people can contribute.
- Ranking volunteer contributions, raising volunteers' profile based on their contributions are options to explore, showcasing their work in BLI's magazines.

How do you plan to give feedback to the users?

- Mobile app will inform users about the state of their observations, threats happening in their area that have been reported by other users, etc. The app will also inform them when they enter in a N2000 sites or IBA.
- Results from the Bird Monitoring Programmes and IBA reports are sent yearly to volunteers by email and SEO/BirdLife bulletin.
- BirdLife Datazone section for LandSense: http://datazone.birdlife.org/info/citizenscience/landsense
- World Bird & Biodiversity Database.
- Article on BirdLife Magazine.
- Articles on SEO/BirdLife's own magazine.

Which partner will lead the engagement for the campaign?
- SEO/BirdLife will lead activities in Spain.
- BirdLife Europe coordinates data flow and communication.

➔ **Timeline**

What is the launch date of the campaigns?

The launch date of the campaign in 2018 is still not fully decided, but it will be before the bird breeding season in 2018, which means that by Spring 2018 the web and mobile app should be fully operational. We will link LandSense app to the ongoing bird counts organized by SEO every year. The idea is that birdwatchers already using SEO/Birdlife apps (https://www.seguimientodeaves.org/) will also download the new LandSense app and use it to monitor threats to biodiversity and habitats during their field trips.

- National Breeding Bird Survey (SACRE): we will use this important event to test LandSense app. Bird survey campaigns run for different periods of time, but usually go on average for 3 months. This campaign will go from April 18 to June18.
- Winter Bird Counts(SACIN): from November to February next year
- Noctua: nocturnal bird counts
- Birds and Climate
- Spring Atlas
- Winter Atlas
- Migra: bird migration counts
- Waterbirds

Additionally, there will be some other opportunities to promote the monitoring of habitat changes and threats to biodiversity through LandSense app:
  - World Wetlands Day (2nd February 2018)
  - Global IBAs in Danger Initiative http://datazone.birdlife.org/site/ibasindanger

How long do you plan to run the campaign for in 2018?
February 2018 – December 2018

Table 24: Key Performance Indicators: Spain

KPI	Target for the 2018 campaign	Ways to help reach the target
Number of Wetland IBA data uploaded through app	At least 10 wetland habitats updated in 2018	Communication channels from SEO/BirdLife and BLI International Social Media, Press releases, IBA caretaker workshops.
Number of IBAiD updated in 2018	At least 3 IBAiD updated	Communication channels from SEO/BirdLife and BLI International Social Media, Press releases, IBA caretaker workshops.
Number of IBA habitat threats updated in 2018	At least 20 IBA habitat data is updated	Communication channels from SEO/BirdLife and BLI International Social Media, Press releases, IBA caretaker workshops.
Number of alerts validated in Spain	At least 4 alerts addressed (challenge to quantify target without seeing how often alerts are launched in Spain)	Communication channels from SEO/BirdLife and BLI International Social Media, Press releases, IBA caretaker workshops.

Provide a brief timeline for campaigns that will run post-2018.

In 2019, there will be 2 campaigns focused on communication and 1 on data collection. Thanks to the lessons learnt in 2018 campaigns, BirdLife team will be able to improve the results:

- Jan-Feb, Campaign 3 (Communication): The Most Threatened IBAs
- Feb-Mar, Campaign 4 (Data collection): Wetland Day
- Mar-April, Campaign 5 (Communication): What's threatening your local IBAs? (IBAs per province)

➔ **User profiles**

User 1: Antonio is a 45-year-old IBA Caretaker

Antonio is a keen birdwatcher and has been volunteering for SEO/BirdLife during the past 9 years. He requested to become an IBA caretaker because he lives close to this wetland IBA and enjoys visiting it almost every month and counting birds. He knows the site by heart, so it is easy for him to detect changes. Past June, he read an article about LandSense on SEO's bulletin and decided to participate in the online survey to share his opinion about the use of mobile apps and remote sensing to monitor changes in the habitats. He doesn't fully understand the process and he likes writing his observations in a notebook, but he becomes curious about the power of citizen science. When SEO launches the campaign "Join the Army of Caretakers!" Antonio

feels proud of being one of them and encouraged to share his knowledge with others. He downloads the mobile app and realizes how easy to use it is, and is glad that his observations will be ready to use when he completes the annual IBA report on threats and habitat conditions, which he will send to SEO/BirdLife.

User 2: Cristina is a 28-year-old naturalist

Cristina joined SEO/BirdLife volunteer network two years ago to participate in the annual Bird Monitoring Counts. She is in charge of some plots close to her grandmother's village, within one hour's drive from Madrid. She signed up for LandSense Newsletter after reading a tweet from SEO talking about one of the meetings, since she likes learning about technology and use of remote sensing applied to nature conservation. A couple of days before the official launch of the Breeding Bird Survey Campaign, she receives an email from the Coordinator explaining how to download the LandSense mobile app and how to collect the information. She already uses 3 apps for the bird counts, but none of them allows her to report threats or changes in the habitat! She downloads it and sends a message to the Volunteer Whatsapp group suggesting people to use it to compare later the number of threats in each site. They find it easy to use and they love the ranking table, but they would like to suggest some changes to the list of threats, so they contact SEO, who implements the changes thanks to IIASA app developer.

User 3: Andrea is a 35-year-old outdoor enthusiast

Andrea lives very close to Sierra Nevada National Park and she has a very active life. She goes running 3 times during the week, and during the weekend she likes hiking, climbing and dedicating some time to nature photography. She is concern about the lack of rain this year and how it is affecting to one of her favourite spots, a wetland. Some days ago, she heard about the Wetlands Day, so she decided to participate in the event to learn a bit more about the topic. She meets volunteers and staff from SEO/BirdLife who show her the new mobile app that will make a difference in threat reporting in Spain. She realizes she can contribute with a lot of information to try to stop the degradation of the areas she usually visits. She shares info about the event on Facebook and Twitter and decides to become a member of SEO/BirdLife to support their work.

➔ **Prototyping**

a) **Mobile app**

The mobile app will be developed and tested from autumn 2017 to February 2018. The dates are tentative and subject to change, but the launch of the app should happen in March, just before the Breeding Bird Counts undertaken by SEO volunteers. There are four key functionalities in the mobile app:

● **Record**: User marks the location of the threat and reports it by choosing one option from a set of dropdown menus (threats, severity, scope and timing). The different options will provide a final score to the threat reported. User will be able to take a picture or upload a picture later using a pin to mark the location of the threat. The mobile app will send a "Thank you message" to inform that the submission was successful.

● **Alerts** (tbc)**:** the Change Detection Service will provide latitude/longitude coordinates where the changes are happening according to Sentinel-2 imagery. The mobile app will ask the user to validate changes close to his/her location, but the user will be also able to actively select any other spots highlighted by the Change Detection Service.

The data collected through **Record** and **Alerts** will be shown in a map in the LandSense Engagement Platform so other users can access the information and compare observations. However, contributor's name will not be made public. This information will be essential for SEO/BirdLife to identify threatened areas that may need local action. If a significant number of threats are reported within an IBA boundaries, the data will help the IBA caretaker and IBA national coordinator to produce the most updated IBA Monitoring report and support any policy & advocacy actions needed.

- **Protected Areas/IBAs/Natura 200 sites** (tbc): the app will send a notification to the users when they "enter" in one of these areas, showing them the boundaries and some information about the main habitat, the key species and the main threats.

- **Profile** (tbc): it will display the number of observations per user, a national/regional ranking list with the best threat reporters, etc.
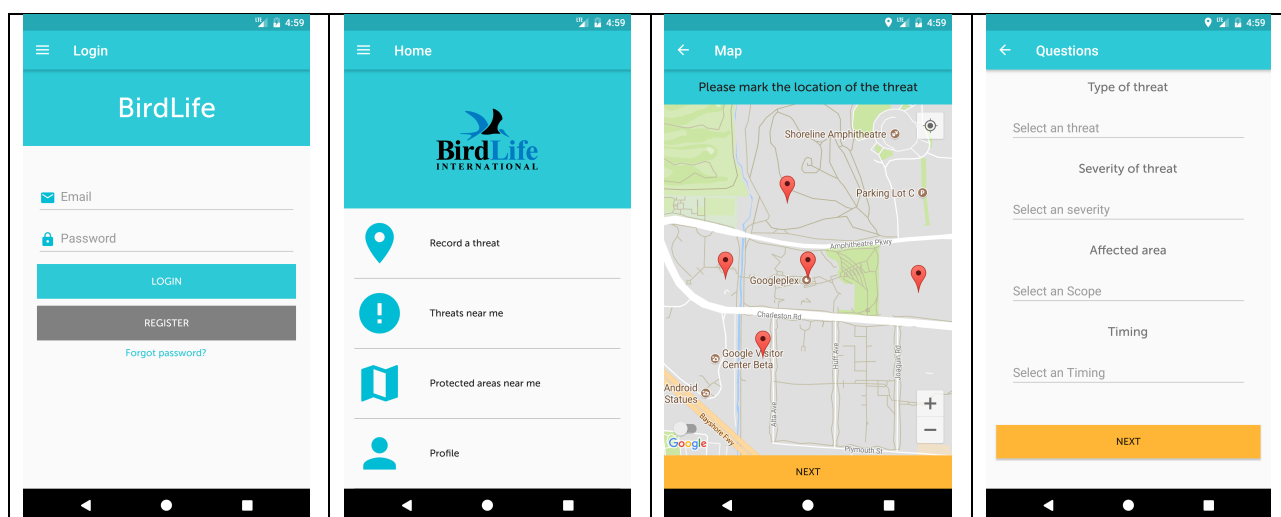

Figure 20: Preliminary screenshots of the threat reporting app

b) Web-based app

The web based app will serve as the backbone of IBA/Natura2000 site monitoring in Spain, as it will collect and analyse threat information and LULC data provided by the citizens. This tool will facilitate vital knowledge sharing between the volunteer network and BirdLife staff. There is a potential to scale up by creating a long-term sustainable tool useful for other European BirdLife Partners which should ideally be connected to our global database WBDB.

IBA caretakers are committed to provide an IBA state annual report (paper/excel spreadsheet) to SEO/BirdLife. Once validated by the National IBA coordinator (SEO/BirdLife staff), the information is manually fed into the global database WBDB.

In Spain, this web-based app will not only make a real difference in the information flow from volunteers to BirdLife Partners by reducing the amount of time they invest in feeding the databases, but also facilitating the communication and feedback among them.

The development will begin in January 2018 and it is planned to be launched in summer 2018, when it is expected to receive a significant amount of data through the app.

At this stage, we are still defining the technicalities and functionalities of the web-app, but SEO/BirdLife has propose some contents that will be very useful for their work plan and for their volunteers, since the raw data will be transformed in easy-to-understand dashboards and maps.

- Map of threats and changes detected by the satellite
- IBA caretakers section: IBA form(pressure, state, response)
- Dashboards: Number of threats recorded/month, Number of threats recorded/year, Number of threats recorded/region, Number of threats recorded/province, Number of threats recorded/type, Number of threats according to some conditions (create filters), Species trends within my IBA, Threat trends within my IBA, remote sensing triggered alerts within my IBA.
- Queries IBA inventory

➔ **Data control & privacy**

Specifically what data will you be collecting during the campaign?

The data that is collected through the mobile app consists of threat observations, habitat changes and pictures of the site and/or the threat. Some personal data will be needed for the user registration (name, surname and email).

What data sources are additionally needed to run the campaign? Are these sources openly/freely available?

- IBA boundaries(available)
- Natura 2000 sites boundaries(available)
- SEO/BirdLife volunteer database(available)
- Species distribution data (tbc, but it is available)
- Sentinel 2 imagery (available)
- Meta data from smartphone (latitude, longitude, azimuth, etc.)

Where will the data be stored? Who gets access to the data?

Discussions are planned for early January to determine the optimal data strorage and flow for both the app and the web platform. These details will be provided in the update deliverable (D2.3). Users will be able to download their data in different formats. The reports produced by the IBA caretakers will be only available to the public once the information is validated by SEO/BirdLife.

Start outlining the terms and conditions associated with joining the campaign. Do you intend to collect personal data?

SEO/BirdLife volunteers will be automatically logged-in within the app by simply using their SEO username thanks to the LandSense Federation System. Their observations will be filtered by their SEO profile (IBA caretaker or Volunteer of the Monitoring Programmes). Users that are not registered within SEO user

database, will have to register and provide their name, surname and email. Additionally the LandSense team is aware of the Data Privacy Regulations.

➔ **Quality assurance**

Table 25: Quality assurance: Spain

Quality assurance process	When will the process be implemented, i.e. real-time/near-real time/post-campaign
Users have the ability to select remote sensing triggered alerts and validate these as true threats. A process needs to assess the quality of these validations which will need to include: • Proximity to the alert with the hypothesis that the nearer a user is to the alert location, the more likely the resulting report threat will be valid. • Some level of trust on the users themselves probably based on previous valid threats identified. • Possible interpretation of the user provided photo/s.	Post-campaign
Location of the user is either derived from their current location (assuming a connected GPS input) or a selected point on a map. In the former, there needs to be some assurance on the quality of the GPS input and the latter needs some assurance on location accuracy which could either be user provided (e.g. 'My accuracy is 500m') or be derived from the map scale of input (e.g. selecting a point from a map of the world will have a large potential location accuracy error).	Real time
Habitat classification can have the following quality assurance - • A set of rules that would flag some obvious errors such as selecting a marine habitat classification in the middle of a terrestrial area. • Some level of assurance could be given based on previous habitat reports by other users in the same or similar location. • Some level of trust relating to the users themselves probably based on previous valid habitats identified. • Possible interpretation of the user provided photo/s • Possible comparison with land cover mapping to identify errors although the issue here is a mismatch with the habitat classification used by BirdLife (sourced from IUCN)	Post campaign although real-time advisory warnings could be given.
Review by crowd - Some aspects of a user-provided report could be reviewed by other users including the habitat classification but it is less useful when looking at threats which can be highly temporally variable (e.g. a completely valid report of logging in 2016 should not be downgraded simply because the threat is not evident to a different user in 2017).	Real-time
• Threat classification can have the following quality assurance - • A set of rules that would flag some obvious errors such as selecting a logging threat classification in the middle of the sea	Post-campaign

- Some level of assurance could be given based on previous threat reports by other users in the same or similar locations. However, there would need to be a temporal window assigned to this assurance as threat are much more temporally variable than habitats.
- Some level of trust relating to the user themselves probably based on previous valid threats identified.
- Possible interpretation of the user provided photo/s
- Possible comparison with land cover mapping to identify errors although the issue here is a mismatch with the habitat classification used by BirdLife (sourced from IUCN).

➔ **Sustainability measures**

Which associations and user groups you would like to meet at first LandSense Service Incubator event (Jun/Jul 2018)?

- Spanish SME's interested in nature conservation to become sponsors of SEO/BirdLife (outdoor clothing, photography/optics companies, and travel agencies) and support LandSense campaigns.
- Spanish companies committed to improve their environmental performance and impacts on nature (power suppliers such as Iberdrola, mining, etc)
- Start-ups or tech companies, students, and other individuals interested in nature conservation and EO industry to develop new ideas for monitoring changes in the habitat.
- Representatives of the Ministry of Environment to establish collaboration with SEO and find solutions for the effective monitoring of Natura 2000 network in Spain.
- Land management entities from municipalities
- Market research firms with an environmental focus.

We will apply the lessons learnt in 2018 to the data collection campaign we will undertake in 2019. The results of both data collection campaigns will feed into the communication campaigns to be developed in 2019 (most threatened IBAs at a national/regional level).

➔ **Business opportunities**

What are potential business opportunities that could result from your pilot?

- Contract signed between the National government and SEO/BirdLife to provide them with up to date information for the next reporting period under Art 12 and Art17. LandSense derived data (habitat monitoring, threats to biodiversity, etc.) would be very valuable.
- Commercialization of validated data targeting regional governments.

For whom do you plan to create value and who are the most important customers?

- BirdLife volunteer network
- National government
- Regional authorities
- Local authorities

Which one of your customer's problems are you helping to solve?

- BirdLife volunteer network

Right now there is no tool available in Spain to report threats to biodiversity in a structured way. LandSense tools will enable citizens to request information to local authorities or call for action in urgent cases.

- National government

Member States are required to report about the progress made with the implementation of the Birds Directive under Article 12. The reporting is focused on data related to the status of bird populations, thereby streamlining the reporting with the reporting under Article 17 of the Habitats Directive. The Article 12 report contains information on status and trends of bird populations together with information on main pressures and threats. The report further contains information related to the impact of the Natura 2000 network and conservation measures. Therefore, the results derived from LandSense should feed the reports provided by the National government to the EC.

- Regional authorities

The effective management of national parks and N2000 sites requires a significant amount of data not always available because of the limited resources or the time constraints. LandSense could provide information about threats and LULC changes to Regional authorities to support the decision-making process.

- Local authorities

There is a need for better and timely information about threats to be acted upon. LandSense tools will help them to make better informed decisions.

The contextualized presentation of the data provided by citizens will be the main hook to our customer segments. A European platform that offers reliable and up to date information related to habitat and threat monitoring should be of great interest if well promoted.

4.1.2 Indonesia

➔ **Story line**

"Flores is the homeland of Komodo dragons, the enchanted Kelimutu tri-colored volcanic lakes, and one of world's best dive sites. This fascinating Indonesian island is famous for its unique biodiversity and cultural heritage. Five of its 19 endemic bird species are globally threatened and the ecosystems are rapidly being degraded by tourism development and deforestation. In an effort to protect this amazing part of the world, the Key Biodiversity Area Mbeliling – Tanjung Kerita Mese was established some years ago. Currently, Local communities play a central role in the protection of the site since they have been involved in several conservation projects over the past years, but it is not enough. We need to encourage local stewardship of these sites and foster more sustainable use and management practices. LandSense tools will allow local communities to participate in the data collection and interpretation of the data in order to implement new management plans within the villages and within the KBA".

➔ **Target groups**

Table 26: Target groups: Indonesia

Target group	Reasons why this target group will participate in the campaign
National IBA coordinator (Burung staff)	• Improve the relationships and communication with local communities, refresh their engagement • Reach a wider audience and recruit new volunteers • Promote the IBA/KBA Programme • Once the app and the web-app are up and running, significant time-saving to produce the annual reports related to the state of the IBAs.
Local Conservation Development Group (already engaged)	• Genuine care for the forest, since water quality and other aspects directly affects their life. • They will feel they are part of the big picture and that they can actively contribute not only gathering data in situ but also participating in the workshops and consultations • They may feel inspired and motivated to use technologies • It will be easier to do the annual reports they send to Burung Indonesia • They will receive specific trainings on threats and they can exchange experiences and best practices with other villages.
Village Government	• Easier access to data for village planning
District Forestry Agency	• They will be able to use LandSense mobile app to gather their own data
Local Community	• Genuine care for the forest, since water quality and other aspects directly affects their life.

➔ **Engagement Strategies**

How do you plan to create awareness of the campaign in 2018

For 2018, BirdLife and LandSense regular communication channels (WebSite, Newsletter, Social Media, etc) will present the case for the campaigns. It is important to consider that access to mobile phones and computers is very limited, so we are still discussing with Burung Indonesia how best to promote app.
• Meeting with the village government.
• Training of trainers
• Data collection campaign

How do you plan to get volunteers/users onboard?

During 2017, Burung has organized a range of activities to promote LandSense and get decision makers, politicians and local communities on board:
• May 17: Stakeholder Consultation https://landsense.eu/News/8
• June 17: Visits to the villages and meetings with the Local Conservation Development Group

How do you plan to sustain engagement of the users?
• A meeting with local politicians and decision makers will take place and two workshops will be organized to highlight the benefits of IBA/KBA Monitoring and other opportunities.

- Ranking the contributions of the different Local Conservation Development Group
- Providing Local heroes awards (ongoing BirdLife International initiative)

How do you plan to give feedback to the users?
- Mobile app will inform users about the state of their observations, threats happening in their area that have been reported by other users, etc. The app will also inform them when they enter in a KBA/ IBA.
- Burung will produce yearly reports with the data gathered by the locals and distribute paper copies in the villages. Results will be also shared in Burung's website and social media.
- Showcasing Local Conservation Groups work in BLI's magazines.
- BirdLife Datazone section for LandSense: http://datazone.birdlife.org/info/citizenscience/landsense
- World Bird & Biodiversity Database.
- Article on BirdLife Magazine showcasing Local Conservation Groups work
- Articles on Burung's magazine

Which partner will lead the engagement for the campaign?
- Burung will lead activities in Indonesia
- BirdLife Europe coordinates data flow and communication

➔ **Timeline**

What is the launch date of the campaigns?

Burung has planned 3 main campaigns but the dates are tentative and subject to change:
- End of February/March: meeting with the Village Government to get them onboard during the implementation of LandSense so they participate in the monitoring process. Ideally, the village government will integrate the monitoring of the environmental services in the village management plans.
- July 2018 Training of trainers focused on Burung regional coordinators (KBA coordinator and village facilitator): How to use LandSense mobile app, the Change Detection Service and the Engagement Platform?
- September 2018: Training of Local Conservation Development Group: How to use LandSense mobile app? What are the direct benefits of monitoring the environmental services and threats to biodiversity?

Can the launch be linked to an ongoing event/community?

We will link data collection through the LandSense app to the ongoing bird counts organized by Burung every year and to the existing projects which try to monitor ecosystem services.

On top of this, there will be some other opportunities to promote the monitoring of habitat changes and threats to biodiversity through LandSense app:
- World Wetlands Day (2nd February 2018)
- Global IBAs in Danger Initiative http://datazone.birdlife.org/site/ibasindanger

How long do you plan to run the campaign for in 2018?

 February 2018 – September 2018

Table 27 Key Performance Indicators: Indonesia

KPI	Target for the 2018 campaign	Ways to help reach the target
Number of IBA data uploaded through app	At least area of IBA Mbeliling that covered by the targeted 4 villages are updated	Local government consultation process, and training workshop for CDG.
Number of alerts validated in KBA Mbeliling – Tanjung Kerita mese	At least 4 alerts addressed (but still difficult to write target without seeing how often alerts are launched in Indonesia)	Burung Indonesia networks in KBA Mbeliling

➜ **User profiles**

User 1: Jihad is a 29-year-old member of the Local Conservation Development Group

Jihad joined the LCDV 3 years ago, when an international conservation project was implementing some actions in the village. He received training on ecosystem services and how to monitor them. He is really concern about the new hotels that are being built and the degradation of the forest and its consequences for the water cycle, so he decides to participate in the workshop that Burung organizes in June 2017. He always liked birds, so he wants to know how to collaborate with Burung and learn how to use a mobile app and other technologies to become a ranger one day.

User 2: Rahmat is 45-year-old representative of the Village government

Rahmat has been working for the local village for the past 15 years. He is very excited about the tourism promotion that the National government is doing for Flores because many jobs will be created. However, he is aware of the problems they will have to face because of the lack of spatial management plans, detailed maps and protection of the biodiversity hotspots. He has received an invitation from Burung to participate in a LandSense meeting to talk about remote sensing and habitat monitoring using a mobile app. He doesn't know exactly what they want to do, but he decides to give it a try because there may be some opportunities for the locals.

➜ **Prototyping**

Discussions are still ongoing. Not everyone in the local communities has a smartphone, so we need to explore other funding opportunities to provide them with them. Additional elements including Data Control, Quality assurance, sustainability measures and business opportunities will be developed for the update deliverable (D2.3).

5 Conclusion

Through these pilot cases starting in early 2018, we will have the opportunity to test the LandSense Citizen Observatory. The various themes pilots employ different methodologies to aggregate innovative EO technologies, community-based environmental monitoring and information delivery systems to tackle local and regional environmental challenges. Within the next months each pilot case will be able to evaluate the impact (i.e. policy, economic, social, etc.) and sustainability of the LandSense Citizen Observatory and facilitate knowledge exchange with other EU citizen observatories. Upon completion of the first iteration of demonstration cases and feedback consolidation in WP4, modifications to the action plans (D2.3) will be made to support the second iteration of demonstration pilots and potential upscaling opportunities.

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