CAPSELLA

COLLECTIVE AWARENESS PLATFORMS FOR ENVIRONMENTALLY-SOUND LAND MANAGEMENT BASED ON DATA TECHNOLOGIES AND AGROBIODIVERSITY

Deliverable 3.6

High-level analysis of bottom-up requirements 2

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Executive Summary

Work package WP3 Conceptual Framework, Requirements & Scenarios creates an interface between i) the theoretical foundations of agro-biodiversity and agri-food sustainability, ii) knowledge and priorities of networks and communities and iii) ICT development. This will be based on a concrete methodology for a collaborative definition of requirements.

The project follows a bottom up approach where the five agricultural-related communities, examined by five CAPSELLA partners (Agroknow, WDT, ZLTO, RSR and SSSA) leaders in their fields, set the requirements and drive the ICT solutions to be developed, enhanced by collective intelligence knowledge sources and open data sets. In deliverable D3.5 High-level analysis of bottom-up requirements 1, each local community elaborated on the description of its ecosystem of stakeholders and actors using archetype personas to describe the functions and activities of the actors in each institution and community supported. In addition, the communities identified and collected important information challenges and needs through an online survey and the organisation of interviews and focus groups.

This deliverable builds upon the results reported in D3.5, taking into account:

- The current status of implementation of each pilot
- The feedback gathered through the interaction with the communities
- The preliminary results of the evaluation activities of the pilots

It presents updated community needs and requirements and identifies current challenges and lessons learnt from the design and implementation process of the pilots so far, with the objective to steer the implementation towards a prototype version of the pilots with strong exploitation potential.

The report is structured as follows: Section 1 briefly outlines the methodology employed to record the current perspective of each community, whereas in Sections 2 to 8 this perspective is presented for each pilot. The last section (i.e. section 9) concludes the report and outlines the next steps.

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1. Introduction

The CAPSELLA project objective is to understand agricultural communities' needs and requirements and support them through a variety of innovative ICT solutions. More specifically, the project aims to:

- Offer open data repositories relevant to regional agro-biodiversity.
- Enhance existing data sets on the agrobiodiversity and food domains.
- Develop a number of community-driven pilot data powered ICT solutions, which will be tested by the communities engaged in the project.

Work package WP3 Conceptual Framework, Requirements & Scenarios creates an interface between i) the theoretical foundations of agro-biodiversity and agri-food sustainability, ii) knowledge and priorities of networks and communities and iii) ICT development. This will be based on a concrete methodology for a collaborative definition of requirements.

The project follows a bottom up approach where the communities set the requirements and drive the solutions to be developed. Five agricultural-related communities have been examined by five CAPSELLA partners, Agroknow, WDT, ZLTO, RSR and SSSA, leaders in their fields, to capture the perspective, challenges and needs of the respective communities for ICT solutions enhanced by collective intelligence knowledge sources and open data sets.

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2. Food Product Data Analytics – The Case of Stevia Hellas Cooperative

The cooperative of Stevia producers called Stevia Hellas includes approximately 100 farmers. La Mia Stevia[1] is the official brand that Stevia Hellas Coop is using to promote its products to the international market. All the coop products are available for industrial use and wholesaling. Stevia Hellas Coop is the first in Europe cultivating stevia in large areas and is also the first successful example in Greece.

The Coop produces Stevia in different forms, including 100% Bio leaves and crystal, pure and liquid stevia in collaboration with European manufacturers. Stevia Hellas Coop has a modern approach to farming, involving Open Data, Sensor Monitoring and even drones for the cultivation observance. Stevia Hellas Coop has been distributing its products into the Greek market and exporting its products to Europe, Africa and America.

The Stevia Hellas Coop Community is related with a wide range of stakeholders, organizations and expert professionals. More information on the Community and its needs can be found in Deliverable D3.5 – Section 2. It is comprised mainly of farmers that wish to be constantly up to date as to the latest best practices and crop cultivation methods as well as be in touch with the consumer needs and perspectives of their products. The managers of the Coop and consulting Agronomists wish to support this process through informed guidance. All three stakeholder groups had expressed the need for specialized access to information that will help them achieve their objectives and keep the Coop sustainable, ensuring its progress. After the results of the stakeholder survey reported in D3.5 the Pilot focuses on eight of the reported sub-categories of stakeholders: Production chain, Processing, Consulting, Sales, Research, Government bodies, Training providers and NGOs/Associations.

The Stevia Pilot acts as a technical solution for a vertical food production unit like the Stevia Hellas Cooperative. It will allow collection, processing and presentation of information from various sources containing open datasets. These sources are social media, where insights about users' opinions can be explored and also publications referring to latest cultivation techniques that can improve the yield of the Cooperative's farmers. For more information on the technical aspects of the pilot see deliverable D4.2 Demonstrator deployment.

2.1 Current status of the pilot

The Stevia demonstrator has been developed in response to the needs of the particular community and is already in pilot operation in the Stevia Hellas Coop Website[2] (Figure 1).

[1] http://www.lamiastevia.gr

[2] http://www.stevianet.gr/dashboard

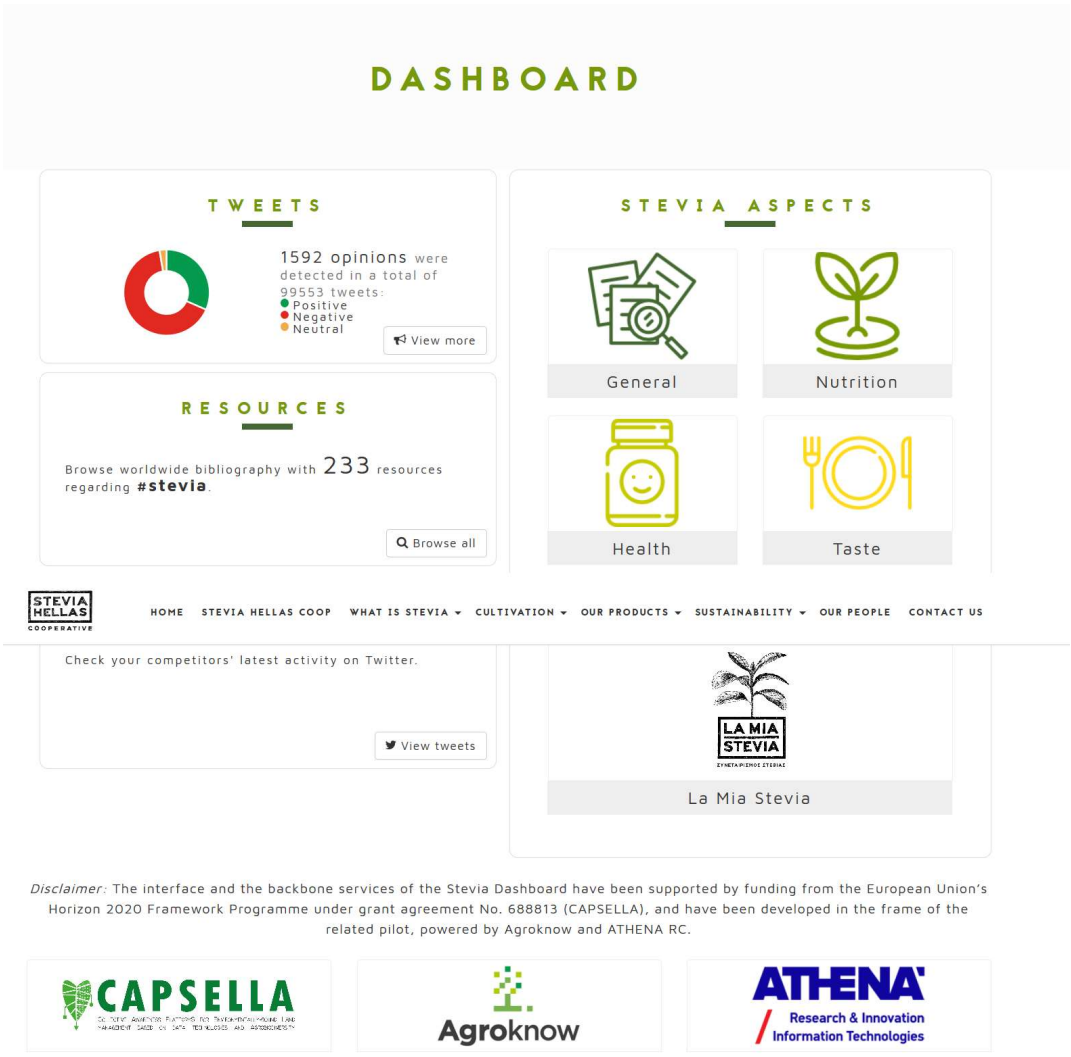

Figure 1 The Stevia - Food Product Data Analytics Pilot Main Screen

The current version of the demonstrator allows the user to explore thousands of tweets as well as hundreds of scientific publications and reports on Stevia, allowing the Stevia Community stakeholders to approach the product from different perspectives.

At the moment, the pilot is at the finalisation stage. During this stage, two new datasets will be integrated in order to update the existing tweets database of the pilot. Both datasets will be provided by ATHENA RC and consist of 179566 tweets (source: Twitter) and 16846 ABSA analysed tweets. This will enrich the pilot with a substantial amount of social insights data that will help cooperative managers to assess how well their stevia product is performing in the market and also receive feedback from Twitter users.

The pilot is currently being evaluated as part of WP4. A small scale evaluation has taken place through online questionnaires and Skype interviews with selected agronomists and cooperative managers. As it was important to receive a preliminary feedback on the functionalities of the application, the following aspects were analysed: Usefulness, Ease of Use, Ease of Learning, Satisfac-

tion, System User Usability, Effectiveness and Efficiency. Four representative cooperative managers and four agronomists have already taken part in the feedback sessions so far. This process will continue until March 2018, providing evaluation data to D4.4 Integrated Evaluation Report & Recommendations.

The overall feedback of the preliminary evaluation is positive, indicating that the pilot is at a good state. Participants claim that they get valuable knowledge from the pilot application and based on the feedback they provide, no major changes to features and functionalities have been requested. Until the termination of the evaluation stage of the application, it is expected though to perform tweaks on the user interface and minor beautifications in order to have a more compact and intuitive look and feel.

2.2 Main needs

The recorded user needs for this pilot have not changed in a major way since the initial requirements elicitation phase of the pilot. Latest interview activities have confirmed that farmers and agronomists would like to be able to better understand the consumers and to gain access in the latest reports and techniques on Stevia cultivation. On the other hand, the Cooperative managers need to get more precise information on the customers' perceptions and thoughts regarding a new product entry in the market.

2.3 Conclusions

The feedback from the Community concerning the pilot is positive and confirms the possibility for future exploitation of the approach, not only for Stevia, but for other products as well. The concept of the development of personalized dashboard(s) for SMEs or farmers' cooperatives which can (a) provide meaningful insights for their food products via social media sentiment analysis, (b) support informed decisions for yield improvement via scientific data could seems to be in fact an exploitable result, as it responds to a real user need.

The one and only big challenge of the pilot is to secure high adoption rates of the application in the stakeholders' communities. The pilot needs to be adopted by the three main personas of the targeted customer segment and also adjusted into their daily routine. For example, it would be a major success if the cooperative managers started using it in order to evaluate the performance of their product and the perception of the consumer.

3. Personalised Food Systems in Public Food Service Pilot

CAPSELLA will develop an open data-driven service in collaboration with a major EU city. The aim of the pilot is to enhance transparency and inform decision making in food supply chain management, public procurement and consumption of meals served at public schools. Based on given food recipes, the application will acquire nutritional, health and social data by users and will exploit nutritional, health, social and other data available in open databases. Aggregated data will form a geo-located interface informing canteen operators and public food procurement officers about the nutritional background and habits of school children across the city. Parents will receive information about the daily/weekly menu served to their children at school, the presence of allergens in each meal, as well as educational material on better and sustainable diets. It will enhance interaction between citizens and public service provided by the City, in order to improve health and nutrition at schools, while reducing the risk and cost of non-communicable diseases, such as obesity and allergies. For more information on the technical aspects of the pilot see deliverable D4.2 Demonstrator deployment.

3.1 Current status

The development of the pilot is based on participatory research in collaboration with local stakeholders in the Cities of Milan and Asti in Italy. This has provided understanding on community needs and requirements and exploration of the types of data repositories already existing and that can be openly shared with the CAPSELLA platform. This research involved multi-stakeholder consultations in the two cities, involving with local actors and experts. CAPSELLA is currently drafting a Memorandum of Understanding and Data Agreement to be signed with the two cities, in order to formalise this partnership. In parallel, all data sources are identified and the pilot enters the development phase. The pilot partner (WDT) is currently finalising a contract with a team of graphic designers for the design of the pilot front-end which will be developed by the ATHENA RC team.

3.2 Main needs

Engagement of partners in the two cities is necessary, in order to ensure successful development and deployment of the pilot. This includes data inputs as well as access to communities of parents that will test and validate the pilot. Following deployment and testing, the CAPSELLA pilot will require dissemination activities in the two cities, in order to ensure maximum adoption by the community.

3.3 Conclusions

Several EU cities are just now starting to understand the benefits of open data driven services in the public food sector. CAPSELLA is implementing one of the first ICT services in the sector. This has necessitated repetitive consultations with at least five cities, until the two target communities were identified. Cities are very wary about their image in a sensitive subject such as public school food. As a result, the pilot partner (WDT) has put a considerable effort in engagement activities

and negotiations with the pilot communities, often faced with conflicting interests within the communities themselves. It is expected that such barriers to the adoption of open data innovation will be removed, as the benefits of data driven solutions are more widely disseminated across the public sector and the wider community.

4. Personalised Food Systems in "Meal Prediction" Pilot

The meal prediction tool pilot will prototype an open data driven solution to enhance transparency and better informed consumer choices in the dining sector. Based on geo-location, the application with acquire personalised preferences data by users and will exploit data related menus and restaurant ratings available in open datasets. The service will inform consumers about restaurants serving menus that match to their individual preferences. The suggestions will be evaluated against four criteria that relate to location, price, online ratings and sentiment analysis of customer experiences in each restaurant. Sentiment analysis will be conducted in order to enhance the suggestions provided by the service, on the basis of consumer responses as they are expressed in social media. This aggregated data will be used in order to better inform consumers about the best available dining options in their vicinity. Simultaneously, it will connect restaurant owners with their clients, offering insights on certain areas in which they under- or over-perform. This is expected to generate further benefits, such as improvement of quality of service and overall increase of customer satisfaction. For more information on the technical aspects of the pilot see deliverable D4.2 Demonstrator deployment.

4.1 Current status

After the withdrawal of the piloting partner there was need to change a focus of the pilot. Instead of building the service around ingredients and menu optimization, the pilot has a new focus on providing recommendations based on geo-localized data, customer preferences and sentiment analysis. The pilot partners (WDT and ATHENA) are now beginning the development phase, in collaboration with a team of graphic designers for the design of the front-end application.

4.2 Main needs

This pilot will require testing and validation by an existing network from the hotel and restaurant association in the Czech Republic. This network is expected to enhance the pilot with data inputs regarding their menus, allowing the service to become area specific. The pilot partner (WDT) is planning presentations to members of the Czech Chefs association, which is planned for February - April 2018, in order to receive useful feedback. Trials will also take place in Greece, in order to test the location-specific aspects of the application.

4.3 Conclusions

During the process of community engagement, the pilot slightly changed its focus from ingredient-revenue optimization to receiving geo-localised customer preferences. Despite this change, CAPSELLA is able to exploit data from the same user groups and communities. These communities are already identified and are expected to support the pilot and will be encouraged to provide feedback during the development process. During deployment, the pilot partner will gather useful insights from these communities, in order to finalize the details of the exploitation and business plan to ensure the sustainability of the service.

5. The Seed Pilot

The seed pilot focused on the need to optimize data collection on decentralized and participatory (i.e. multi-actor) research managed by RSR. The App developed within CAPSELLA for the Seed pilot will help RSR to improve efficiency of data entry in a context that involves several people in several locations at the same time, reducing the risk of errors and facilitating data storage and analysis. For more information on the technical aspects of the pilot see deliverable D4.2 Demonstrator deployment.

The mind map in Figure 2 describes the data flow of RSR participatory plant breeding research in Italy. The red circle underlines how the app developed within CAPSELLA is focusing on the creation of a proper database from the experimental fields data.

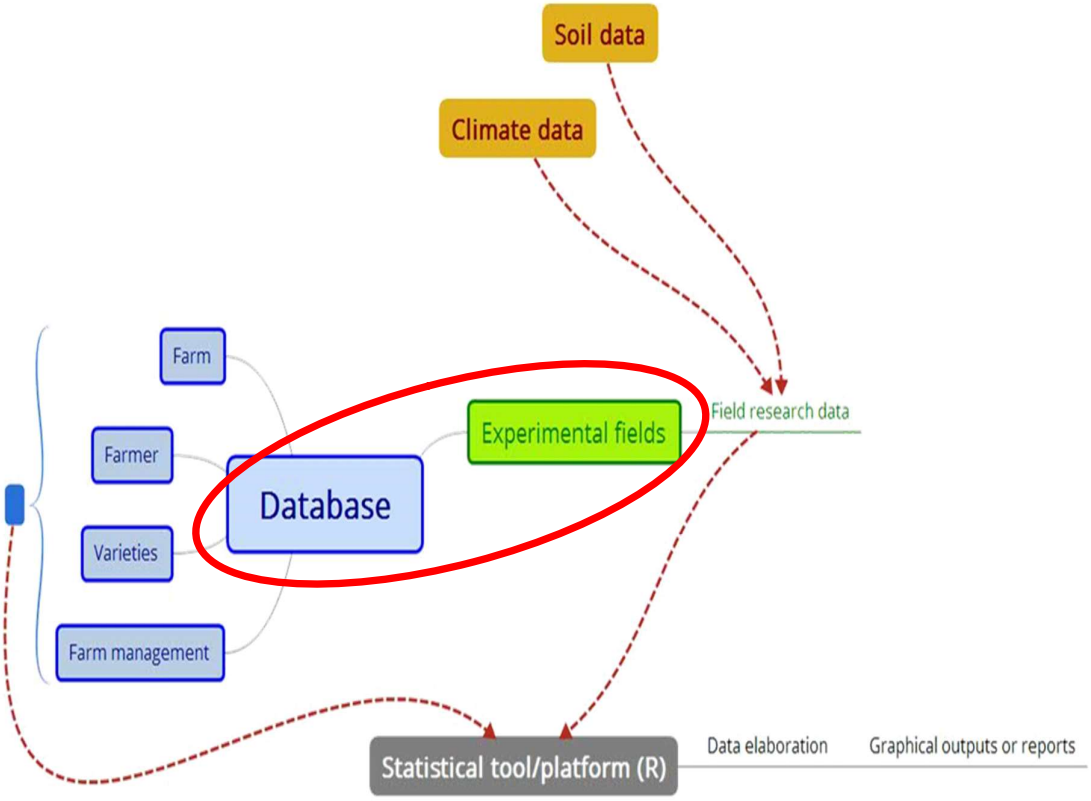

Figure 2 Workflow of the RSR participatory breeding research

The stakeholders involved in the testing and evaluation phase of the seed pilot are the researchers managing data from farmers fields and the farmers collecting data in their fields.

5.1 Current status

The RSR community provided input to Agroknow to develop the app and then through an iterative design process the first prototype was developed with the objective to reflect as closely as possible the needs of the users. The challenge in this process was related to the capacity of the two partners to understand each other: for the RSR community it was the first experience in designing

an ICT tool for their activity so expectations in some cases were not realistic, but this experience gave to RSR much needed know-how on the way to interact with the ICT community. For Agroknow it was specifically challenging to understand the logic and the needs for the RSR community as they were really specific, in particular the issue of intellectual property rights and the role of different types of users in the pilot scenario.

An example screen of the App is presented in Figure 3.

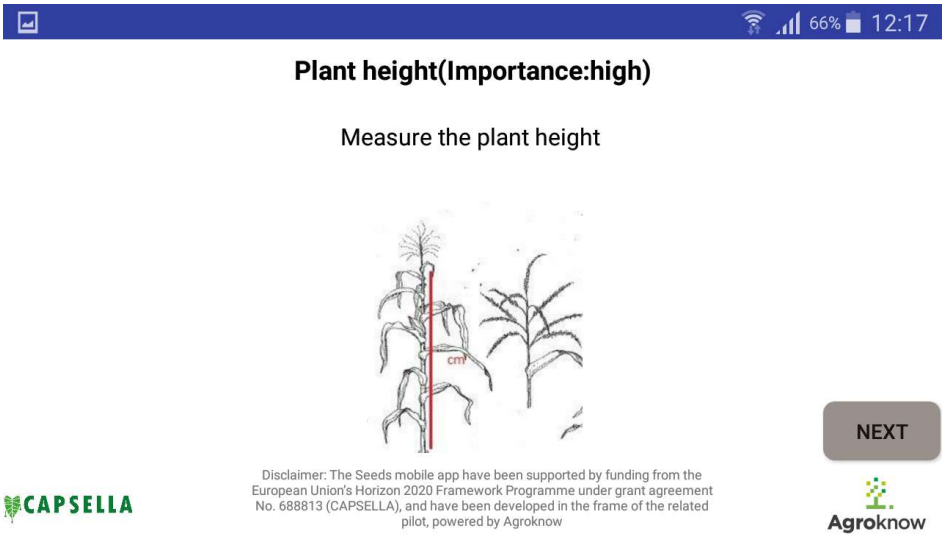

Figure 3 Seed pilot - Measuring plant height

During March 2017, thanks to a Memorandum of Understanding signed with the EU 2020 project DIVERSIFOOD, a joint meeting with other European seed/farmers networks was organized to share information about seed data management. That was an important discussion for the seed pilot as it gave some insight on the future opportunity to harmonize data collection and storage approaches with those used by other seed/farmers networks. This harmonization process has not been part of CAPSELLA app as it was decided to focus on the RSR community for the CAPSELLA project lifespan.

The sowing season 2017 will be the opportunity to test and evaluate the app on farmers fields. They will use the app to report data on their experiments for season 2017-2018. A questionnaire will be given to at least 10 people involved in data collection to collect feedback from the testing phase and three more in-depth interviews will be done with researchers animating the work of the farmers network and directly involved in data analysis.

5.2 Main needs

Some open issues are still under discussion within the Seed pilot. One of them is related to the need for an administrator account or two accounts with different authentication levels for the App that would allow RSR researchers to set up the experiment before each data collection period. In this way, that the final user, which is often the farmer itself, would not need to know the exact experimental design, as is the case now (Figure 4), and would be able to focus on just collecting data

about his/her field and register his/her notes and evaluation. This need has been taken into account and development proceeds towards this direction.

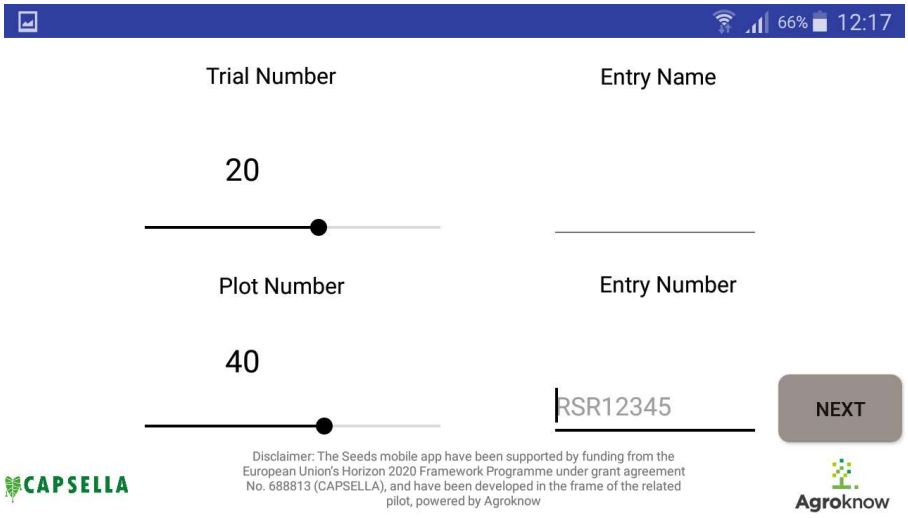

Figure 4 Seed pilot - Setting up the experiment

Another expectation of the RSR community was related to the possibility to have a web-based application for data entry so that a laptop or a pc can also be used. This requirement will be considered as part of the sustainability actions of the pilot demonstrator. Finally, the web interface of the CAPSELLA App will be used for data visualization and exports for further data analysis.

The RSR community had some difficulties to use the app as some the users had Apple-iOS devices. They commented on the need to create a version of the App that can cover these platforms as well. This is also a requirement to be considered as part of the sustainability actions of the pilot demonstrator.

5.3 Conclusions

The Seed Pilot is well under way with a working prototype for Android mobile devices and preliminary evaluation activities results are consistent with the initial requirements for efficient data entry. Moreover, the web interface of the CAPSELLA App is well under way by offering data management, visualization and export tasks.

6. The Storytelling on (food) production pilot

This pilot demonstrator, available as a web application[3] (Figure 5), aims to provide farmers with a technical solution that helps them to guide visitors in their farm. The demonstrator has the following characteristics:

- Help farmers to compose and edit stories: easy upload and arrangement of basic media (photos, video, scans from paper), flexible inclusion of connecting story blocks, possibility to include multi story lines
- Presenting to visitors the edited stories in a flexible way: they can choose from multi storylines and skip part of the stories. The presentation works on different platforms (desktop pcs, tablets, etc)
- Collect feedback from farmers and visitors to improve the stories
- Re-use of story blocks (connecting stories, photos, video, etc) for new stories.

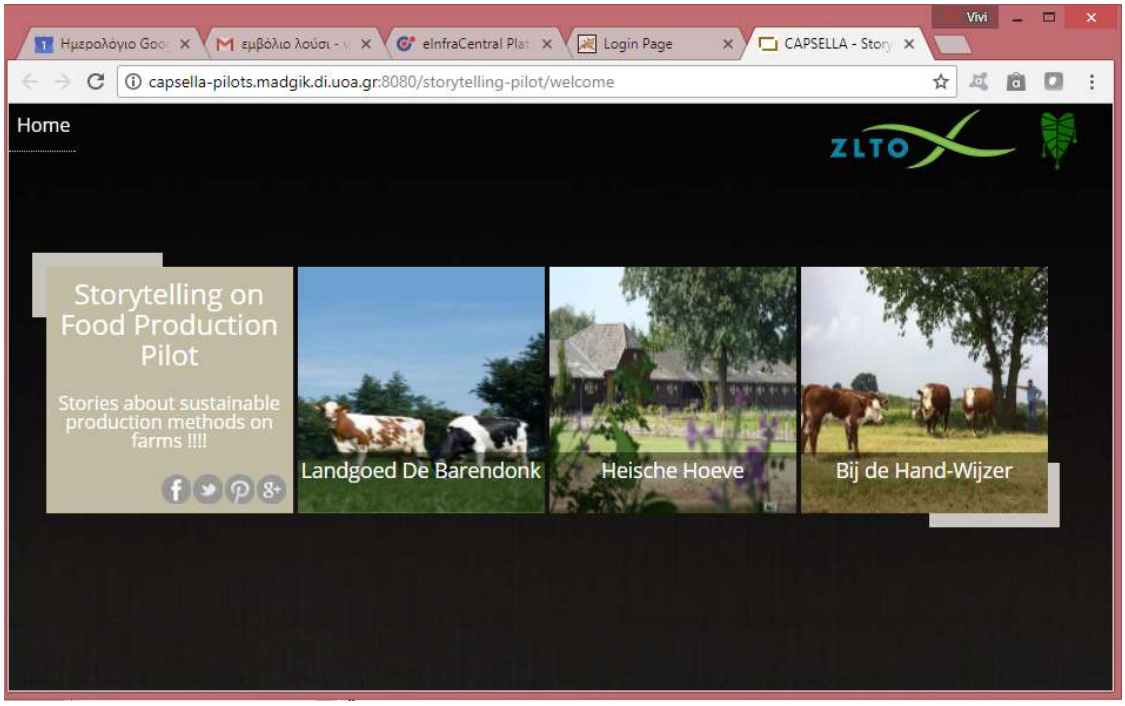

Figure 5 Storytelling App main screen

For more information on the technical aspects of the pilot see deliverable D4.2 Demonstrator deployment.

[3] http://capsella-pilots.madgik.di.uoa.gr:8080/storytelling-pilot/welcome

6.1 Current status

There has been a change of focus within the pilot. Initially, the focus was on farm shops, with the need to optimise their produce by collecting feedback from clients. This proved to be challenging as an activity within CAPSELLA.

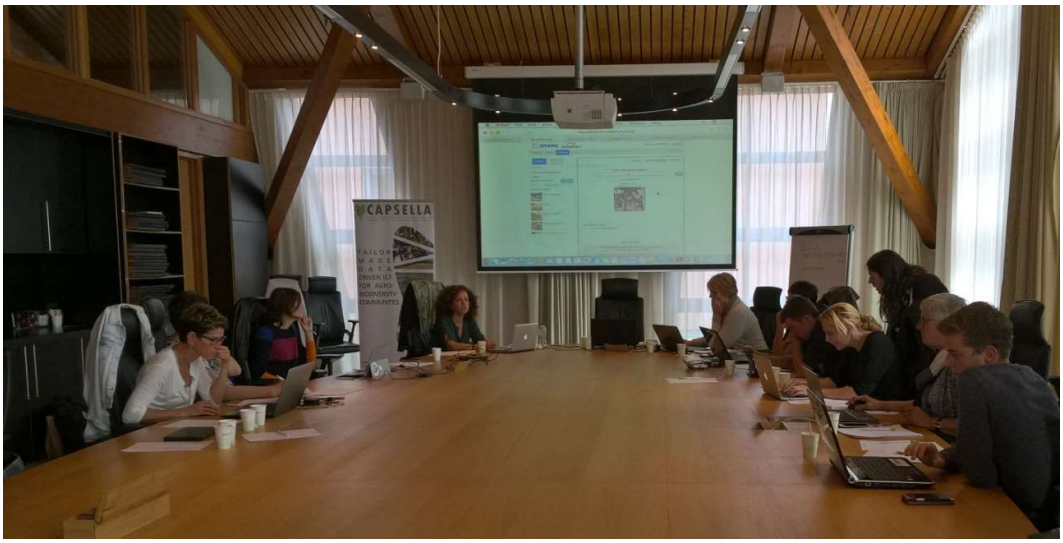

Figure 6 Storytelling Pilot - Focus group during evaluation

However, within the ZLTO farmers community another group was identified with the need for storytelling: farmers with regular visitors from schools ('Klasseboeren' = (top)class farmers) and also a group engaged in other activities, such as meeting facilities – on – the – farm (multi-functional farms - MFF). These groups had the need to communicate their story in an interactive way, looking for a lesser investment in time than guided tours.

The 'Virtual Exhibition' tool, developed at Athena Research Centre, was identified as an appropriate candidate tool. In this tool two stories were developed and an evaluation tool place with 9 farmers in order to expand its use (Figure 5 & Figure 7).

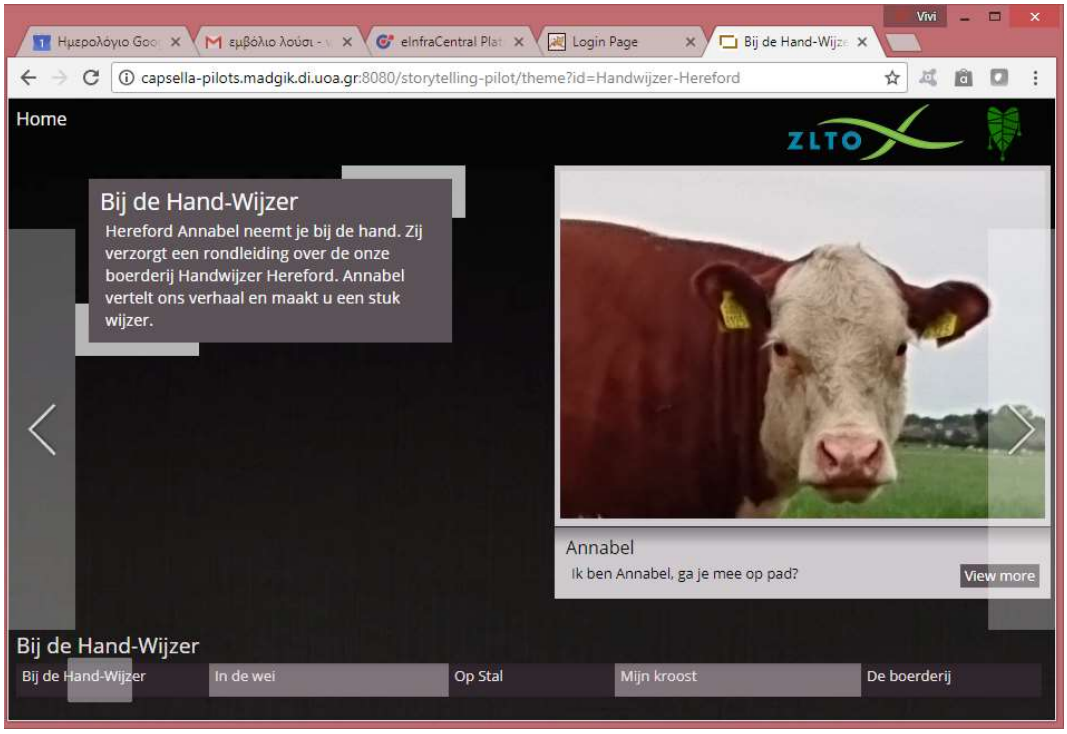

Figure 7 Storytelling App - Part of a story

6.2 Main needs

The preliminary evaluation of the tool brought forth current user needs and insight on further development (Figure 6).

Firstly, although the Virtual Exhibition tool was considered relatively easy to use, the users would like an even simpler tool: *"super simple and fool proof"*.

If possible, geo-location functions should be added to the tool so as to link geo referenced data to the created stories.

It could also be possible for the authors of the stories to exchange story elements.

So far, the needs of 'stand-alone' operation of the tool have been described. To continue the development, it is crucial to create the conditions for a central management and support structure:

- Support for farmers at start and when having problems (including authorization to change stories)
- Intervene when stories are of bad quality
- Provide a structure to make it be possible for the authors of the stories to exchange story elements.
- Physical meetings and courses where farmers stimulate each other to get better
- Organisation that channels traffic to the stories
- A minimum number of VE instances, that make it possible to cover the costs of the support

When the solutions for the 'stand-alone' needs are tested, the next step will be to develop and test the support structure.

6.3 Conclusions

The preliminary evaluation results are positive. The Pilot will be able to meet the objectives set at the start of the project: 5 stories.

Within the ZLTO, however, it remains a challenge to develop a supporting structure with a sustainable business plan to facilitate and distribute stories.

7. The Precision Agriculture Pilot

The pilot found its focus after the beginning of the project and through interaction with the Community: from general development of precision applications to compost, which is the core of soil health. Within Precision Compost management, there is an additional objective for the calculation of variable compost spreading.

The pilot aims to deploy a web based tool that optimises effect of compost with Precision Agriculture techniques. Application of compost is an important measure to stop the decreasing organic matter content - and related buffer capacity and biodiversity in soils - in the cultivation zone. The application is limited by laws that prevent nutrient pollution of soil water. The tool helps to apply more compost on poor zones in parcels: it uses field zones based on five levels of electric conductivity (=organic matter content) soil scans and calculates per field zone the application rate (kg/m^2) so that the desired amount of compost is optimally applied. For more information on the technical aspects of the pilot see deliverable D4.2 Demonstrator deployment. The pilot is available as a web application[4] (Figure 8).

[4] http://dl014.madgik.di.uoa.gr:8080/compost-calculator/#/

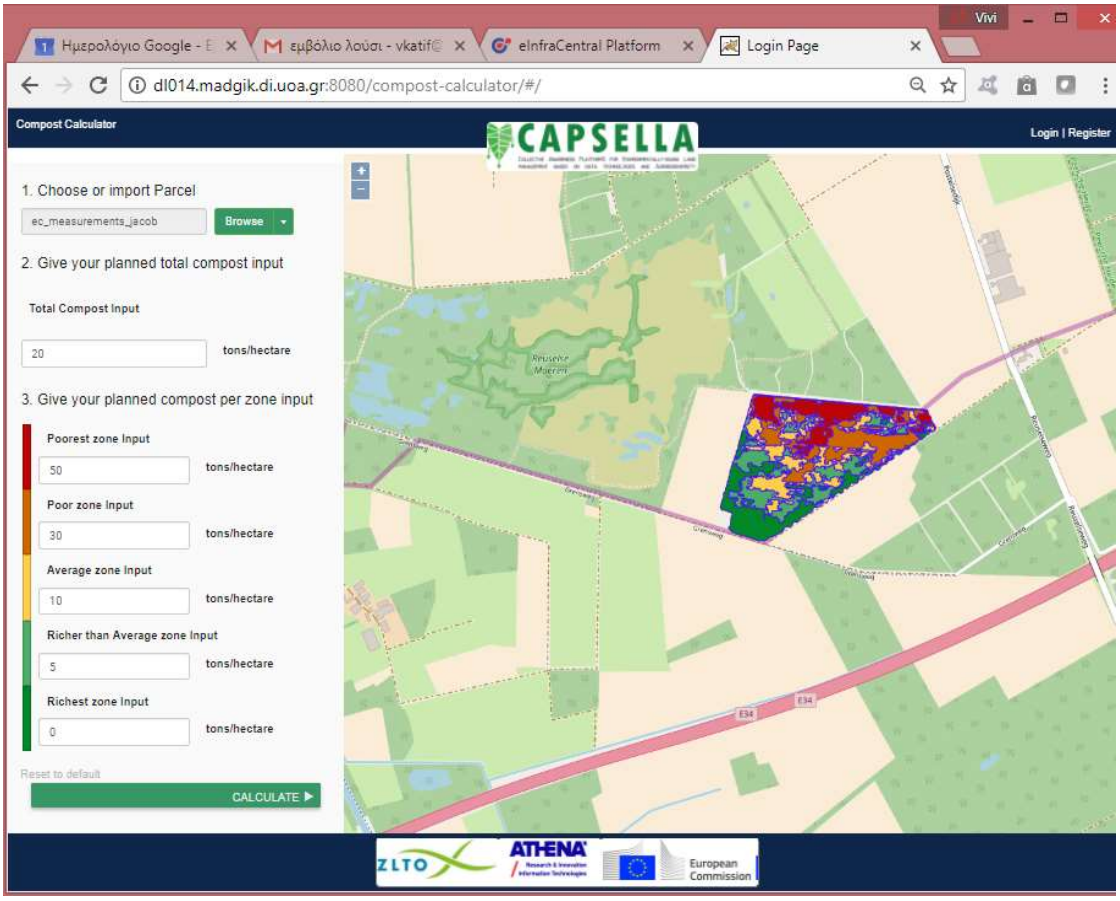

Figure 8 The Compost Calculator Pilot main screen

There was a change of focus in the involved stakeholders within the pilot, starting with pioneer farmers (2% frontrunners), and then changing to early adopters (40% advanced).

Supporting stakeholders that have also been involved, namely compost processors, contractors and advisors (within ZLTO). They will become more involved after November 2017 as the first version of the Compost Calculator will be ready.

7.1 Current status

The Compost Calculator was tested in March 2017 by the core farmer group. The 2nd version was updated with a more intuitive design and layout.

In September 2017, a ZLTO soil expert did the 2nd test. In both tests an advisor/project leader reported the needs and translated them to targets in the building process. This version received very positive feedback by the users.

The next evaluation will take place with the farmers group on December 1, 2017, in combination with the Spade Test /Soil Health tool.

7.2 Main needs

Phase 1: The needs of the core farmer (a pioneer), retrieved from the 1st test are focussed on the question 'does it work at the end?' This is translated in the following needs:

- Reliable import of soil scan maps
- Calculations of surface of the area in different EC-value ranges (field zones)
- Control that field zones are in the parcel boundaries
- Include download of parcel boundaries from open databases, on soil use
- Use different layers under the field zone/parcel boundaries, so that farmers can relate the measured values to visual observations
- Reliable calculation of the compost density and total amount of compost, this implies calculations on geo related files.

The test was positive on all requirements; with the limitation that one soil scan was used as basis. Flexible import of soil scans comes after Phase 2.

Phase 1a: The compost processor could have a powerful influence on the uptake of the tool. Therefore the needs of the compost processor were determined on March 17, 2017. It was expected that the users would appreciate more detailed information about the amount of compost that could be applied. This proved not accurate: the processor made clear to us, that we could work with general good practices. On one hand, this made detailed soil scans and models less relevant, on the other hand this had the advantage that we could make the tool easy to use.

Phase 2: The needs of the early majority of farmers were tested in September 2017, by a ZLTO advisor with much experience in advisory tools for farmers. Needs of the early majority group of farmers differ substantially from those of the pioneers. Whereas a pioneer doesn't mind doing extra handwork (f.i. up- and downloading), the early majority asks for one-button-solutions. This is translated in the following needs:

- Easy import of data, through a step by step with as few steps as possible
- Predefined common practice values, so that one 'calculate' push gives an almost-good result
- Clear results, so that the result of the calculation can be easily compared to the expected total application of compost
- Visualisation of the input and calculations
- Easy optimisation of the result: change and recalculate
- One-button export to a task map
- Data storage should be possible

All these needs were positively tested, except the flexible import and data storage.

Apart from these basic needs, the tool should be a flexible Practical integration of Compost Calculator and Soil health app, so that there is enough functionality to make the product attractive. Furthermore it may be appreciated that the tool and datasets are linked to platforms that farmers use, like Akkerweb, Boer en Bunder (NL), 365Farmnet (EU).

Phase 3: in November 2017 a group of farmers will test the separate functions from Compost Calculator and Soil Health tests. This test will give us a basis to prioritize integration.

The 1st evaluation of the beta version of the pilot will guide further development of the tool in one or more of the following directions:

- Background on compost and manure legislation (Dutch)
- Supporting calculations of max. Application, based on legislation
- Work with self-defined number of management zones (in beta standard 5)
- Work with self-defined (drawn) borders of management zones (not based on soil scans).
- Work on farm level, calculate the application over parcels.

The last two options can provide a link to the soil health pilot as the 'spade test' can be used instead of soil scan.

7.3 Conclusions

The development of the Compost Calculator led to an easy to use application.

Tests with farmers in November and January are expected to give directions for final development. It is foreseen that farmers will not be very demanding on software integration of modules, as long as the user experience is not confusing. We expect farmers will appreciate that the Compost Calculator can also work without the soil scan. Using general soil maps (if available) is the easiest option, but determining and mapping soil quality with the spade test brings more involvement in the group.

It is planned to evaluate what is better for a tool that helps farmers with their decisions and gives groups a basis to have good interaction.

8. The Soil Health Pilot

The Soil health pilot, counting on two very active core communities (AEGILOPS and ESAPODA farmers' associations), active from the very beginning of the project, has moved from requirements collection, to tools development and, then, to the outcomes evaluation phase according to the initial needs of the involved stakeholders. The availability of the actual demonstrator applications (from June 2017) allowed for a practical evaluation of the extent to which the pilot activities have met the initial requirements. Working directly with the demonstrator applications allowed for new or more detailed requirements to emerge from core communities. At evaluation stage, we have also involved new end-users communities and this allowed looking for additional requirement not detected in the very first piloting phases.

8.1 Current status

The current demonstrator of the soil health pilot consists of the CAPSELLA Soil Health online platform[5] and an android app for the Spade test[6]. The Spade Test function is complete and has both an online and android app version. The functions "soil organic matter dynamics" and "knowledge base" are still under development. The "spade test" (i. e. qualitative method for soil conditions monitoring) is the key function of the demonstrator. It responds to the major initial requirement from the core communities to obtain a digital tool for self-monitoring of soil conditions. For more information on the technical aspects of the pilot see deliverable D4.2 Demonstrator deployment.

[5]https://soilhealth.capsella.eu/ and https://github.com/CAPSELLA/Soil-Health-Web-Application

[6] https://github.com/CAPSELLA/Soil-Health-Mobile-Application

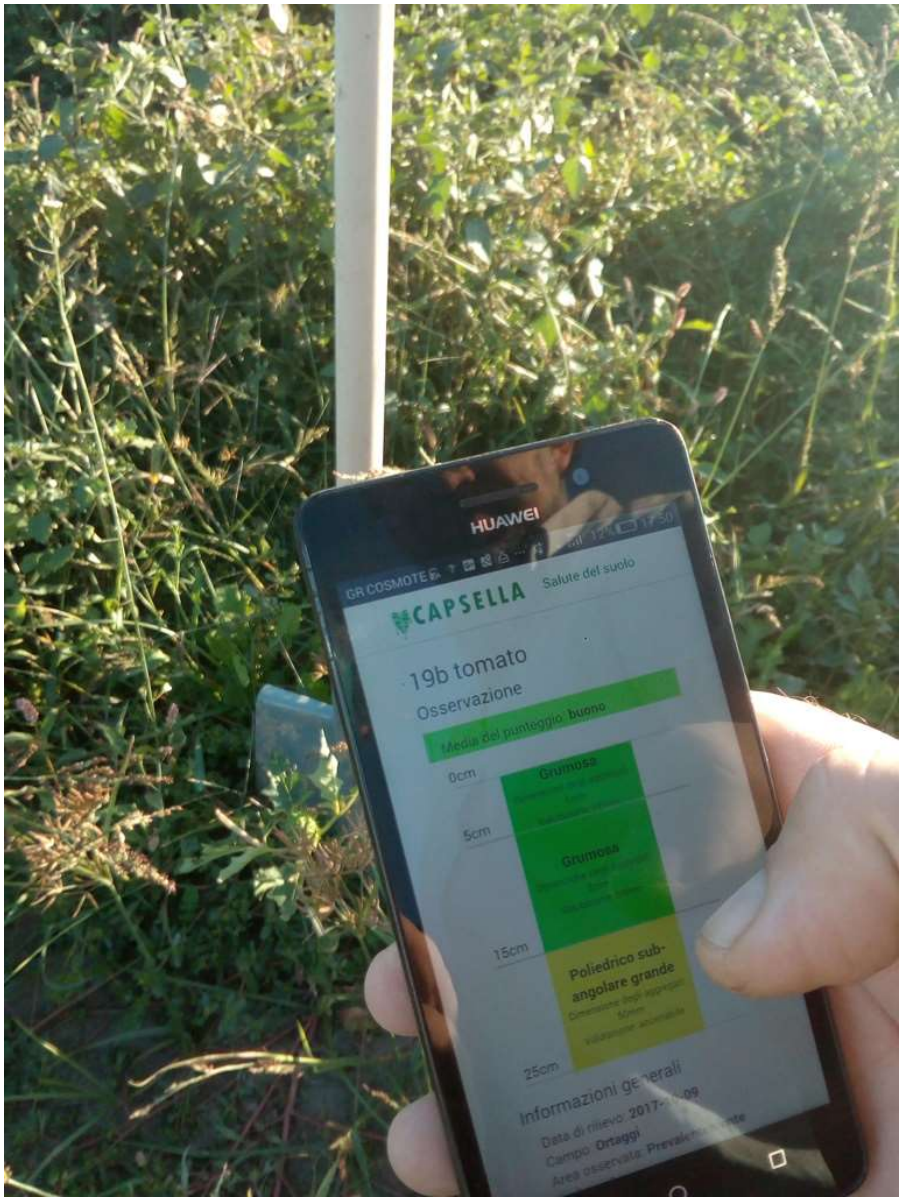

Figure 9 The Soil Health App tested on the Field

8.2 Main needs

The demonstrator has been presented to the core communities members in dedicated meetings (on June 26-27 2017 to ESAPODA and on October 8 2017 to AEGILOPS group). The two meetings had three key objectives:

1. Discuss key issues on soil health and how digital tools can support sustainable farming in keeping soil fertility;
2. Get feedback on how well the demonstrator applications cover the needs of core communities as collected at the beginning of the co-innovation path;
3. Evaluate the technical products of the pilot (web and android app).

The spade test web function and related android app have been tested in groups in the two events. During the farmers workshop "Let's cultivate biodiversity 2017" organized by Rete Semi Rurali on 9 June the demonstrator has been presented to stakeholders not belonging to core communities. Two consultants (expert of organic and biodynamic agriculture) have independently tested the spade test function on the field. We have as well recorded spade test observations from seven farms in Greece with the support of the farmers. This allowed testing the app in different soil and farming types.

Figure 10 Testing the Soil Health App on the field

The outcomes of these activities in meeting the initial requirements of the core communities as collected at the beginning of the co-innovation path are reported here. We present also the additional requirements in terms of content of the demonstrator as outcomes of the presented activities with the core-communities and external end-users. The suggestions refer only to the spade test function on the platform and the related android app. The other functions on the soil-health.capsella.eu platform were not discussed in depth with end-users, as they are not yet completed.

A set of needs have been identified, on additional implementations to be done to meet initial content requirements by the core communities emerging through the use of the demonstrator:

- Section on shape and dimension of soil aggregates should be improved for being useful in all types of soil. The integration of the spade test methodology used with other methodologies for qualitative soil observation could help in this objective.
- Section about wild flora should be extended and customized per site (e.g. version for Greece and for Italy).

- Section about "soil life" should be extended. Integration of spade test function with biodiversity level quantification methods (e.g. QBS-e method for earthworms by University of Padua) would strengthen the importance of biological fertility in soil health management. Spade test shows well the physical fertility but the integration with biodiversity monitoring methods would give a great plus to the platform of overall soil health monitoring. Improve section about biodiversity with insect indicator species could be also interesting for farmers.
- The platform should be enriched with more pictures, video descriptions and examples.
- A section about crop diseases could be added to meet other needs of farmers in terms of digital tools for self-evaluation, even if it is not directly connected with the soil health management.
- A section about soil texture should be added to make clearer the connection between soil type and adjustments to be done for having a useful qualitative observation of the soil conditions.
- Explain that the app can also be used for samplings deeper than 30 cm (e.g. if you use a field drill you can go deeper than 30 com and you can still record info with the app).
- The section about roots observations should be simplified to allow easy observation without need for specific training.
- The section about soil colour could be extended and made more general.

8.3 Conclusions

During the testing activities of this pilot demonstrator, we have noticed large interest about the application. The end-users recognise it as a digital solution at support of the initial requirement of getting digital tools for monitoring soil conditions. Most of the end-users involved found the demonstrator useful for raising awareness about the key topic of soil fertility. We did not get feedback about having too much content or content not meeting the initial requirements. Most of the feedback was about the request to add additional functions to complement the spade test with additional information of soil conditions. We are carefully taking into account the additional requirements and needs emerged and, in the limits of time, resources and competence of the consortium will try to work on that. We will give priority to the topics most connected with the soil health topic and with the self-monitoring methodologies.

9. Conclusions

The CAPSELLA pilots form an appealing kaleidoscope of concepts and ideas in the wider area of Agriculture, Agro-biodiversity and Food. The pilot cases are currently in different stages of implementation, all having progressed to the point where the user needs and requirements identified early in the project and presented in D3.5 have been either confirmed or updated according to the on-going interaction with the respecting Communities.

Each pilot individually is addressed to one or more key stakeholder types as identified in D3.5 (Figure 11), and consequently CAPSELLA collectively is working in parallel with representatives of all the stakeholder types.

Figure 11 Overview of the CAPSELLA main stakeholder types

As a result, the pilot development has brought forth the potential for future combination of some of the CAPSELLA products, as it the case of the Compost Calculator (Section 7) and the Soil Health Pilot (Section 8).

Each pilot faced different challenges, related to the domain itself, as Agro-biodiversity is an applied field and research requires the collaboration of farmers, who need to be convinced about the potential of the offered digital solutions before committing their time to them. This fact highlights even more the need for tools that aim for simplicity, clarity, intuitiveness of the interface, ensuring a straightforward user experience.

Furthermore, the general, yet not fully resolved issue of open data and ethics, privacy and licensing issues around it has been an additional challenge for the pilots that mainly rely on using such datasets.

The progress of all pilots and the preliminary evaluation results suggest that the pilots are on the right track to achieve their objectives and the needs that have been recorded will guide the future development of the offered solutions towards, exploitable outcomes for the relevant communities.