D4.5 Second Smart Farming Platform Report

smart AKIS
Smart Farming Thematic Network

Document Summary

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Abstract

The purpose of this document is to present the second report on Smart Farming platform, its functionalities, content creation, operation and maintenance activities, which is in compliance with public deliverables of the project.

The report presents the basic structure of official Smart-AKIS project website and Smart Farming Platform as well as all updates and improvements that were implemented between M9 and M30 of the project.

This report is organized in five chapters, each addressing a specific aspect of an online presentation of the project. First chapter describes Smart-AKIS website, which acts as a gate to the platform; the second chapter presents entire platform, while the third chapter brings improvements made between two reports (M09 – M30). Fourth chapter describes the integration of the Smart-AKIS platform in the AgroSense application. The last chapter concludes the work done in the project.

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1. Smart-AKIS project website – short overview

For development of Smart-AKIS website, **WordPress** content management system was used. It is a free and open-source content management system (CMS) based on PHP and MySQL. Features that were used include a plugin architecture and a template system, which allowed us to change the look and functionality of a WordPress website according to our needs and official project visual identity.

The static web site of the Smart-AKIS project is based on WordPress platform and a free design theme, enriched with suitable security plugins.

1.1 Hosting

All data, as well as entire system is stored at SBB EUnet data center. The basic characteristics of the Data Center, among others, are:

- Tier III reliability of the subsystem of power supply and air conditioning. 99.982% availability of the system.
- A diesel engine of 1.6 MW
- Redundant UPS devices in n + 1 configuration
- Dual power supply UPS, dual power supply of machine equipment and IT equipment
- Independent management of power cables and cables of the structural cable system
- Redundant connection to telecommunication infrastructure and multiple connections to international Internet hubs

The company has established Security Policy Information, where is unambiguously stated that the company monitors the process of information usage and prevents deliberate or accidental abuse of data stored in the system. In addition, the company follows ISMS - Information Security Management System - ISO/IEC 27001:2013.

In addition, SSL certificate is implemented, which secures connections from web server to a browser.

1.2 Domain name

The website is accessible through the following domain name:

https://www.smart-akis.com/

1.3 Design

The design of the website is inspired by Smart-AKIS logo and official colors of the project. The consortium has agreed to launch simple and attractive design based upon the use of a streamlined menu with six sections, infographics, and proper images. In addition, the visual design of the website links the project with EIP-AGRI web portal and gives the effect of connected initiatives. The appearance of the homepage is given in figure below:

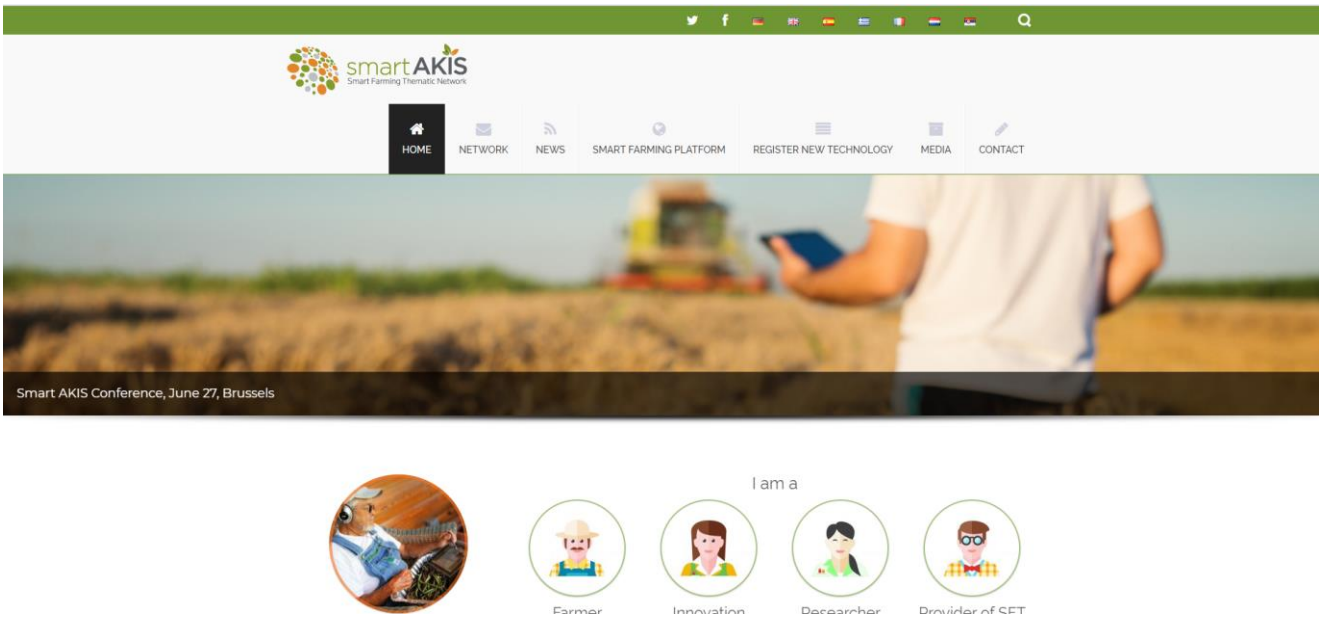


Figure 1: Smart-AKIS home page

1.4 Content

Smart AKIS website plays 2 main roles:

1. Communication and dissemination of the project and
2. Main entry point to the Smart Farming Community Platform services by end-users.

Therefore, access to the site and especially Platform's services was made to be easy, quick and intuitive.

At the top header of the website the visitor can find links to major Social media networks where Smart-AKIS is present. Next to the links, there is a search engine that allows visitors to easily find topics of interest. Top right side is dedicated to acronyms of the project languages with the link to the respective pages: EN, ES, EL, FR, DE, NL, SR.
Below is presented the site map, with all the content:

- Home
- Network
  - Smart AKIS
  - What is smart farming?
  - EIP-AGRI & Thematic Networks
  - Partners
    - Agricultural University of Athens
    - Stichting Dienst Landbouwkundig Onderzoek
    - Leibniz Centre for Agricultural Landscape Research
    - BioSense Institute
    - ACTA
    - Instituto de Tecnologías Agrarias y Agroalimentarias
    - German Agricultural Society
    - Delphy
    - Iniciativas Innovadoras S.A.L.

        - CEMA aisbl
        - Fédération Régionale des CUMA de l'Ouest
        - David Tinker & Associates Ltd
    - Innovation hubs
    - Results
    - Interactive map
    - Technology Factsheets
    - Smart-AKIS Stories
    - Smart-AKIS Recommendations and Policy Briefs
- News
    - News
    - Events calendar
- Smart farming platform
    - Inventory of Smart Farming Solutions
    - Networking area
- Register new technology
- Media
- Contact
- I am a…
    - Farmer
    - Innovation brokers
    - Researchers
    - Providers of Smart Farming Solutions
- Private area
- Legal notice, privacy and cookie policies
- Sitemap

2. Smart-AKIS Platform – short overview

2.1 Hosting

All data gathered throughout Smart-AKIS project (both website and platform) is stored at SBB EUnet data center. The technical characteristics are presented in chapter 1.1 of this report.

2.2 Domain

The Smart-AKIS website is accessible through the following domain name:

https://www.smart-akis.com/

The website acts as a gateway to the platform:

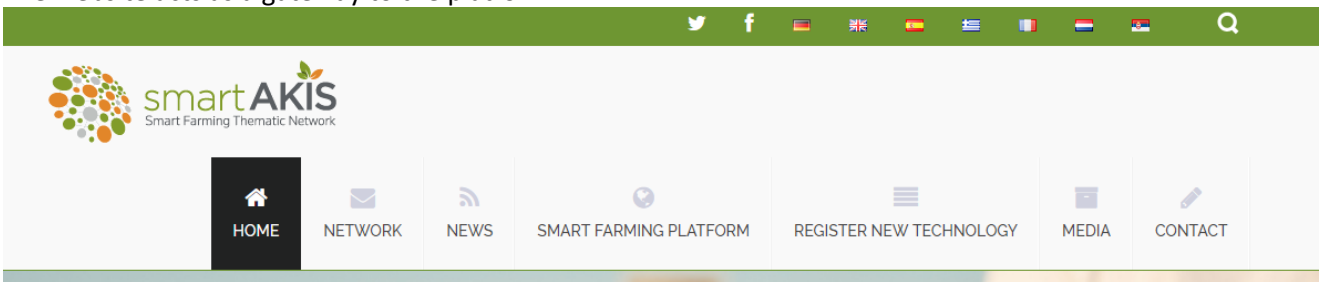


Figure 2: Smart-AKIS menu and connection to Smart Farming Platform

At the same time, the platform can be reached at this link:

https://smart-akis.com/SFCPPortal/#/app-h/dashboard

2.3 Design

The platform follows the visual identity of the project and the website. The official logo and approved colors were used.

2.4 Content

The main intention during platform development was to create an online meeting point between technologies and farmers, so it can be intuitive and user-friendly for both groups.
The first page is the Dashboard which brings the welcome text and short description of the platform (left part of the screen) and several randomly chosen technologies.

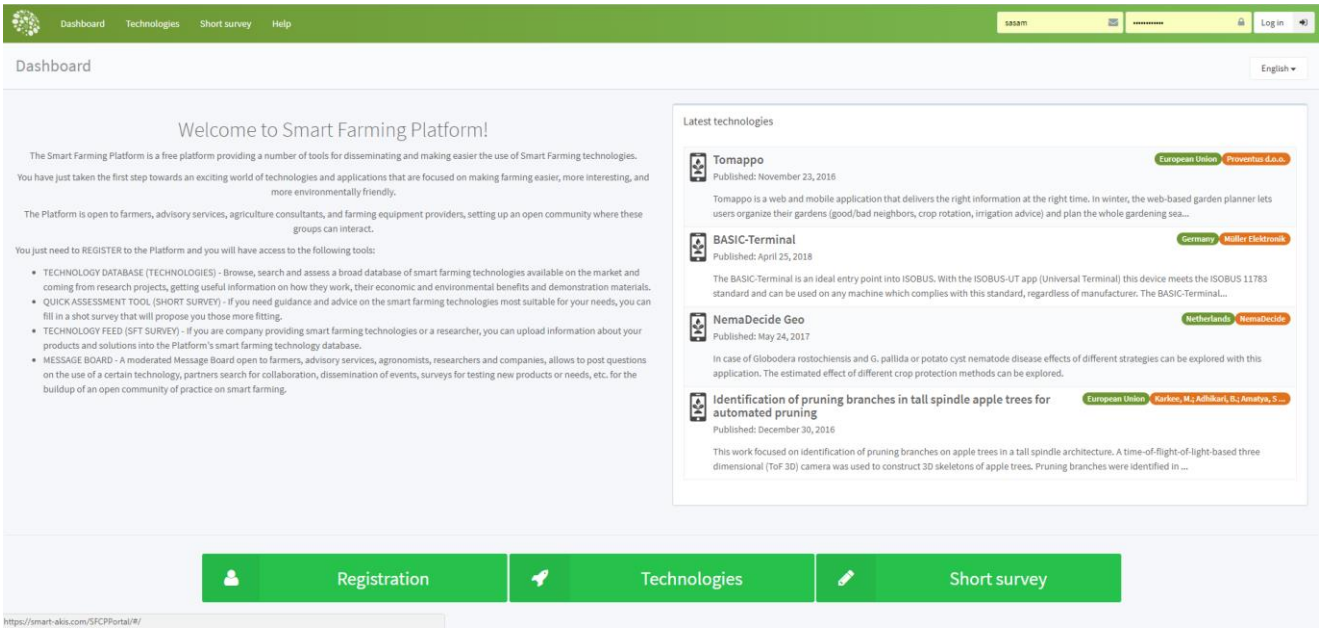


Figure 3: Smart-AKIS Dashboard

The next section is dedicated to Technologies – namely all technologies in the platform are presented in this chapter in so-called technology cards. Following pictures briefly present this section:

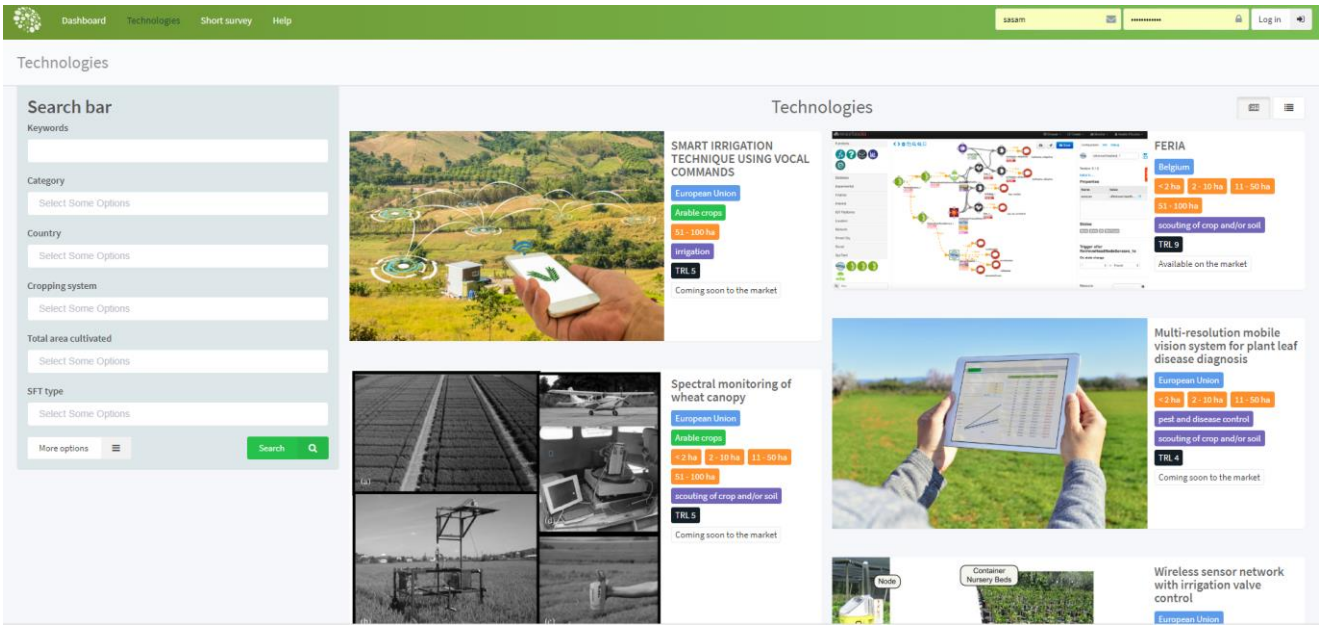


Figure 4: Smart-AKIS Technologies

In order to receive personalized list of technologies, we developed short survey. It has just four questions based on which we can suggest solutions that might be useful for farmers. Preview is on the following picture:

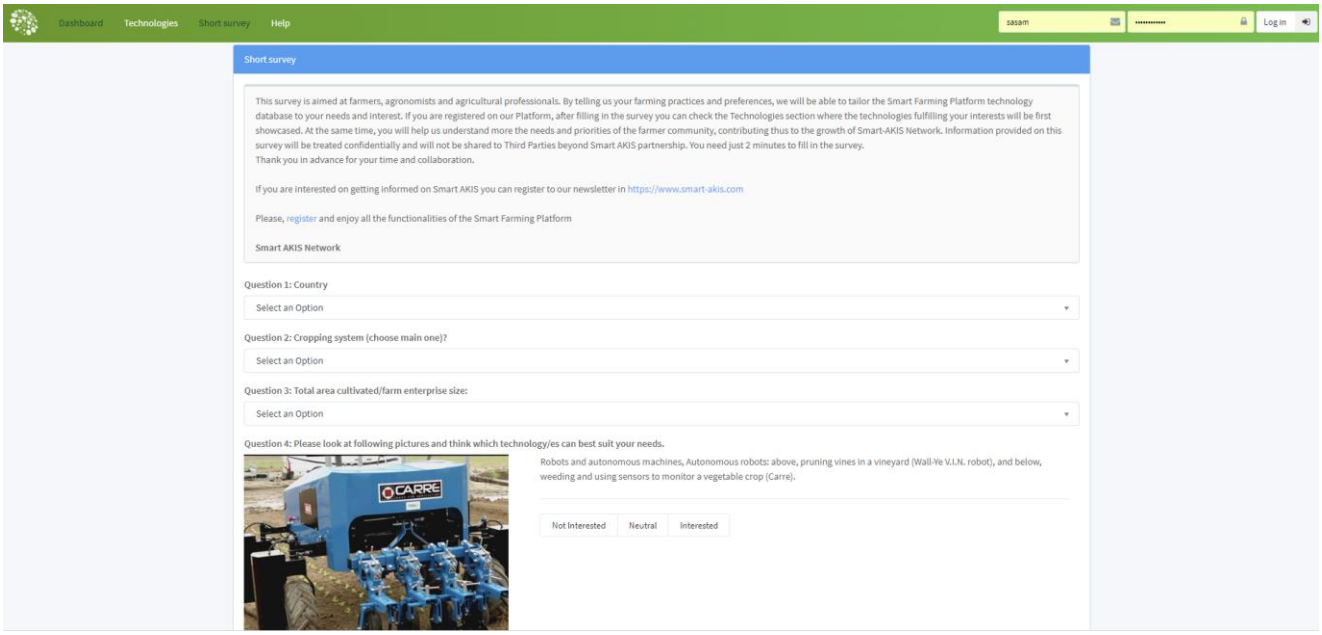


Figure 5: Smart-AKIS Short survey

The last option that is available for unregistered users is Help desk, with answers on frequently asked questions and help desk email (smartakis.helpdesk@biosense.rs).

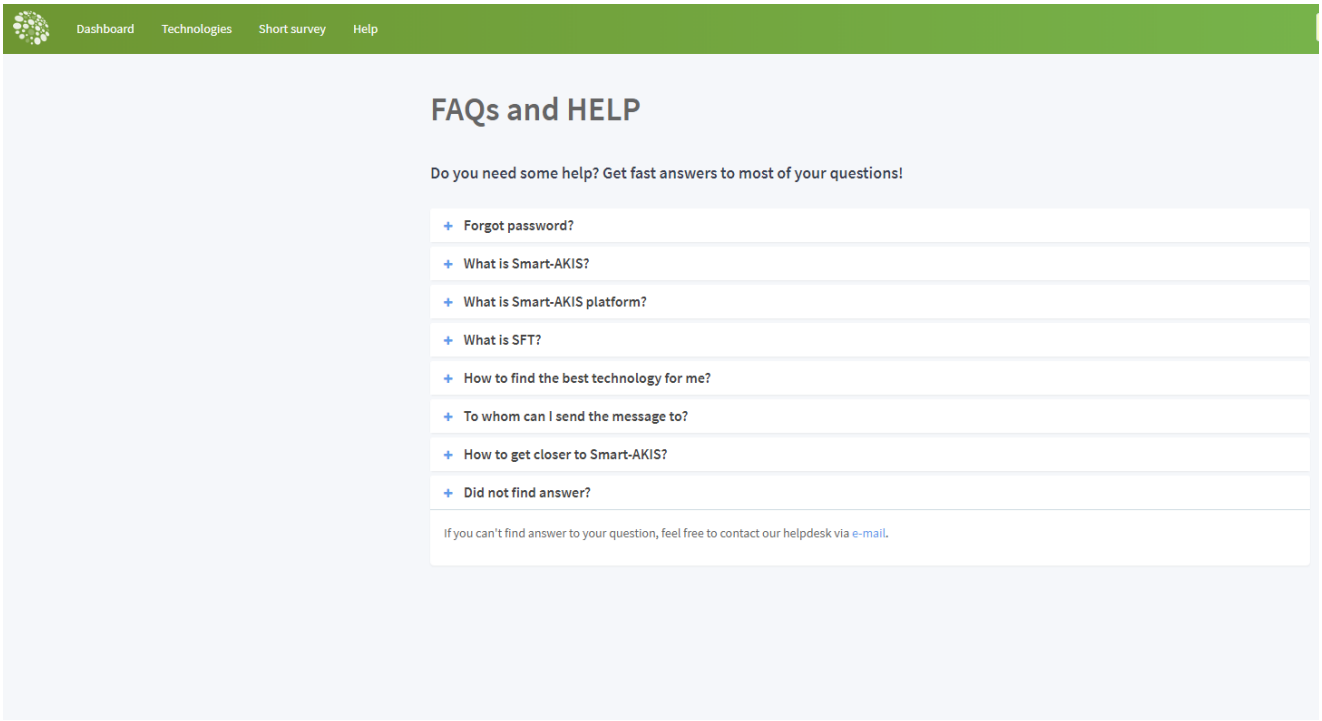


Figure 6: Smart-AKIS Help desk

Registered users have one more possibility: to exchange messages on message board with other registered farmers, providers of SFT technologies, researchers and innovation brokers.

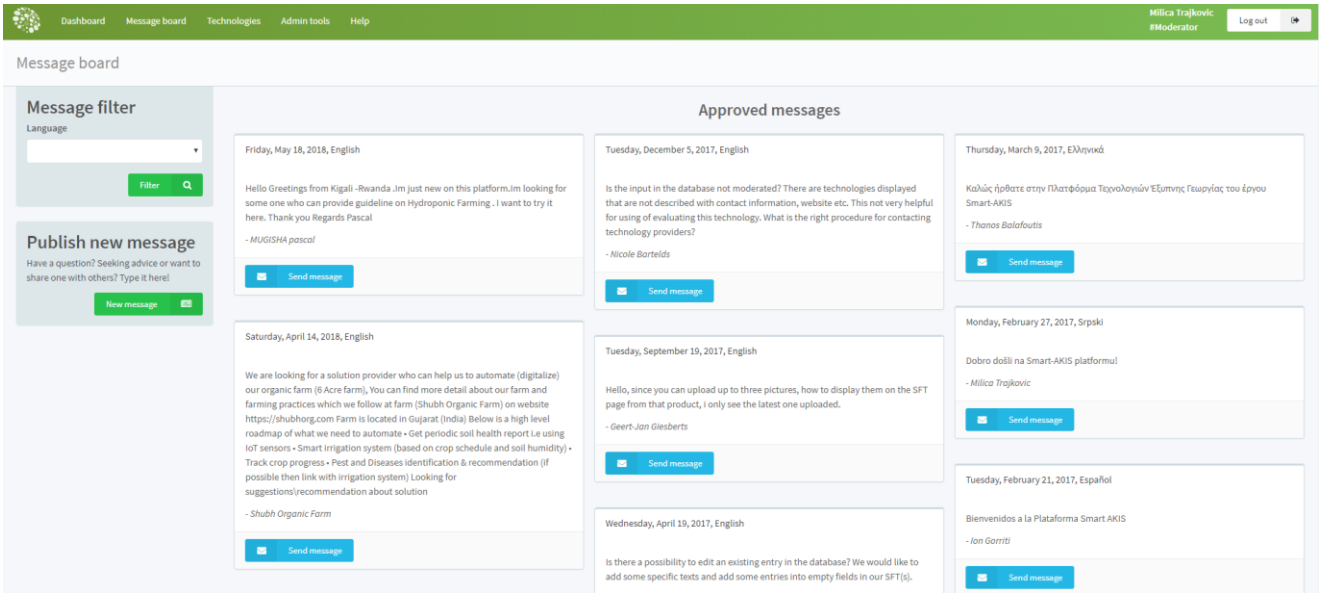


Figure 7: Smart-AKIS Message board

3. Improvements M09 – M30

3.1 Front office – user experience

3.1.1 Search engine

Compared to the version released in M09, improvements incorporated in search engine are:

- New open field for inserting Keywords. This field "reads" farm card description and if the word(s) is found, the engine suggests the technology card as one of the results. The algorithm goes through following questions/answers in LimeSurvey: Company name / Vendor / Project coordinator / Author; Name of the SFT (native language) – all words; Name of the SFT (in English) – all words; keywords; Description of the SFT (in English)
- Filter category, which filters technologies according to three large groups: product available on the market, research project, and scientific paper.

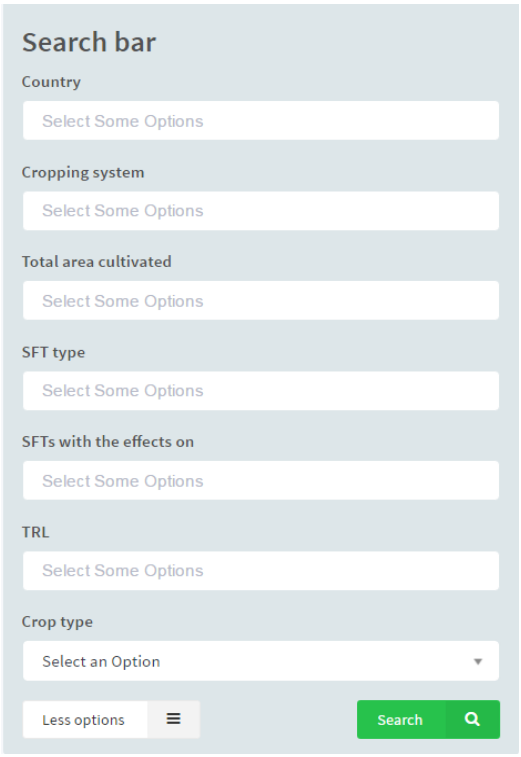
M09	M30
	

Table 1: Search engine in M09 and in M30

All visitors to Smart-AKIS platform have an option to search and read information regarding Smart-AKIS technologies, regardless on their registration status.

For registered users we provided one more search option – to list all technologies in the database (Figure 8). For unregistered users the button „inventory list“ is not displayed due to potential security issues (if bots attack the platform and continuously press the button, it can significantly decrease performance of the server).

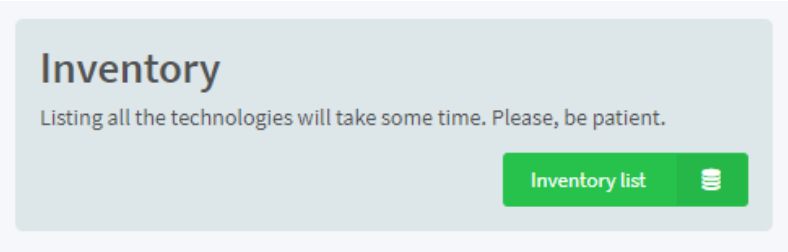


Figure 8: Inventory list

In addition, all technologies marked to be products are automatically added to the TRL9 group, so one can search in both using TRL filter and category filter.

3.1.2 Technology card improvements

During all improvements and modifications, we were putting an effort to keep the visual identity and the functionalities that visitors are used to. Nevertheless, during the life of the project we realized some aspects of the technology card that need to be improved:

a) Picture presentation – although we allowed multiple uploads on the survey, we were not able to present all pictures, just one. This mistake was corrected by implementation of carousel (slideshow) in the pictures.

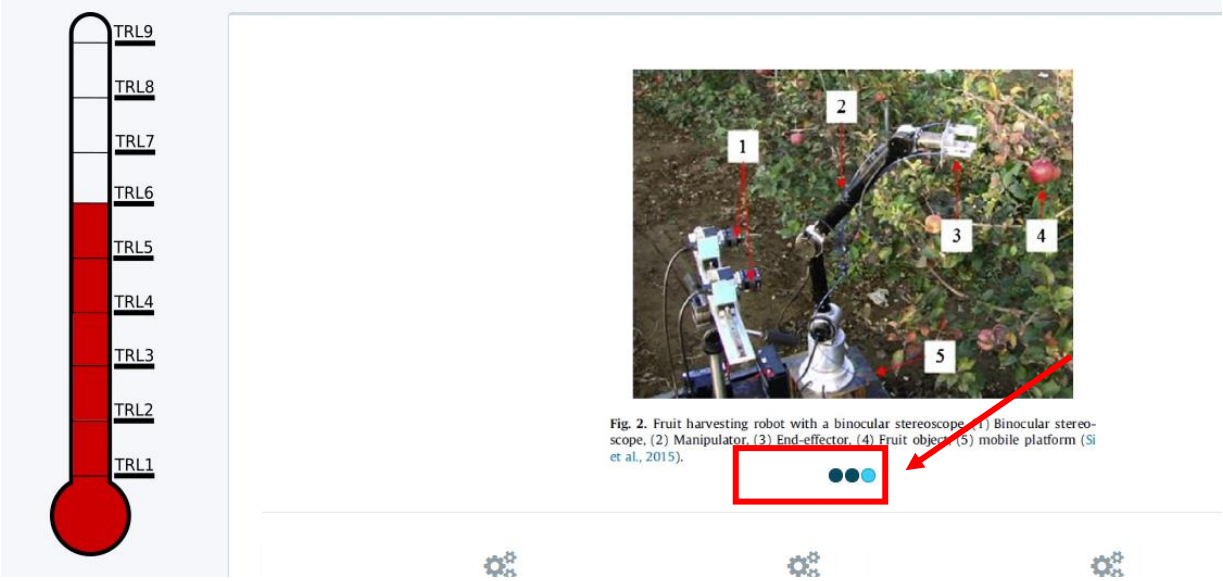


Figure 9: Carousel on the technology cards for multiple pictures presentation

b) Technology Factsheets (HTML and PDF of every technology card) – Smart-AKIS consortium fosters the interoperability and reusability of the data gathered during the life of the project. Therefore, we have developed a special sector on the card called “Find out more” where user can find some additional

information regarding technology. In addition, we are providing a HTML and PDF version of each technology, so it can be reused in other platforms and for different purposes.

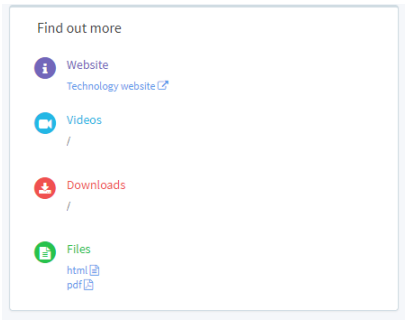


Figure 10: HTML and PDF of the technology card ready for download

Title	Agroptima
Title (native language)	
Category	• Recording or mapping technology • Farm Management Information System
Short summary for practitioners (Practice abstract) in English)	Agroptima is a simple and modern mobile APP and a cloud software tool for farmers, designed with farmers. It will have a simple interface and farmers can work from the fields without internet connection. Agroptima allows the farmer to keep record of his activities, crops and to analyze costs, based on real data he gathers with his smartphone. In addition, the cloud will have an API to connect to the machines so machine generated data can be used for further decision making.
Short summary for practitioners	
Website	https://www.agroptima.com/en/
Audiovisual material	
Links to other websites	
Additional comments	
Keywords	Farming practice | Plant production and horticulture
Additional keywords	Mobile App
Geographical location (NUTS)	ES
Other geographical location	Global
Cropping systems	
Field operations	Fertilization | Crop and soil scouting
SIFT users	Farmer | Contractor
Education level of users	All
Farm size (ha)	0-2 | 2-10 | 10-50 | 50-100 | 200-500 | >500

Project name	Agroptima, "The Internet of Fields": mobile farm management software
Project coordinator	Agroptima (Spain)
Project partners	Agro Igualada SCCL (Spain) | MTT Agrifood Research Finland (Finland)
Project period	2014 - 2016
Project status	finished
Objective of the project (native language)	Agroptima is a simple and modern mobile APP and a cloud software tool for farmers. Farmers can work from the fields without internet connection. Agroptima allows the farmer to keep record of his activities, crops and to analyze costs, based on real data he gathers with his smartphone. In addition, the cloud will have an API to connect to the machines so machine generated data can be used for further decision making.
Objective of the project (in English)	Agroptima is a simple and modern mobile APP and a cloud software tool for farmers. Farmers can work from the fields without internet connection. Agroptima allows the farmer to keep record of his activities, crops and to analyze costs, based on real data he gathers with his smartphone. In addition, the cloud will have an API to connect to the machines so machine generated data can be used for further decision making.

Figure 11: HTML preview

The PDF example is presented in Annex 1. At the same time, the list of all PDFs and HTMLs is presented on the project website as well.

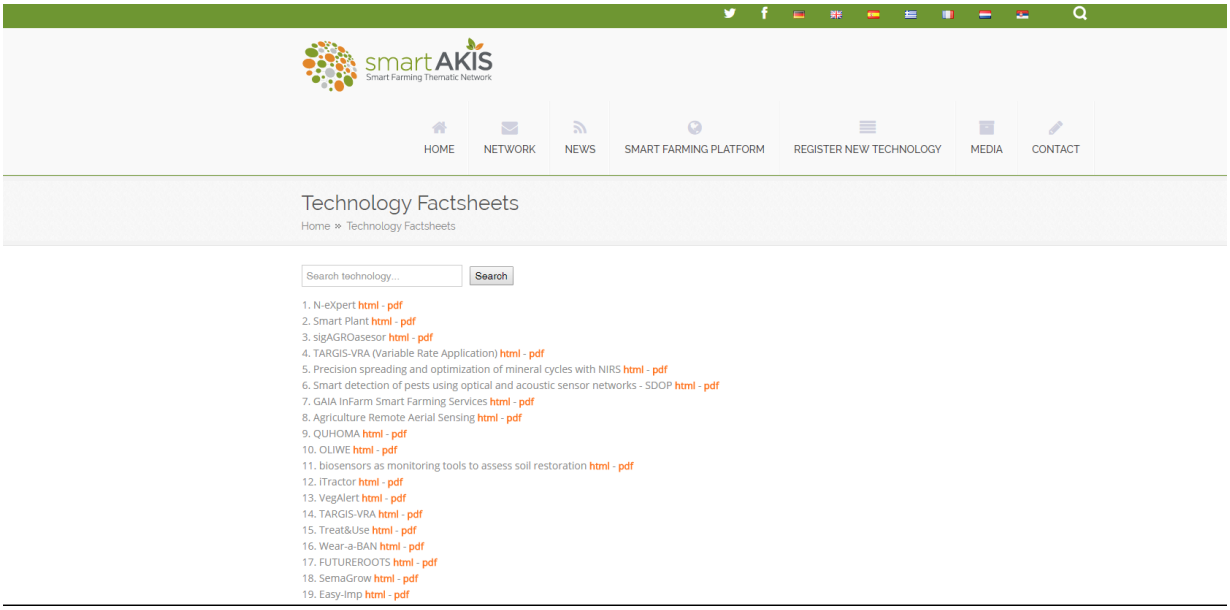


Figure 12: Technology Factsheets on the project website

3.1.3 Short Survey

While working with farmers on many face-to-face meeting and workshops, we realized that it is not well explained the purpose of the Short Survey. Therefore, we added the introductory text before the survey.

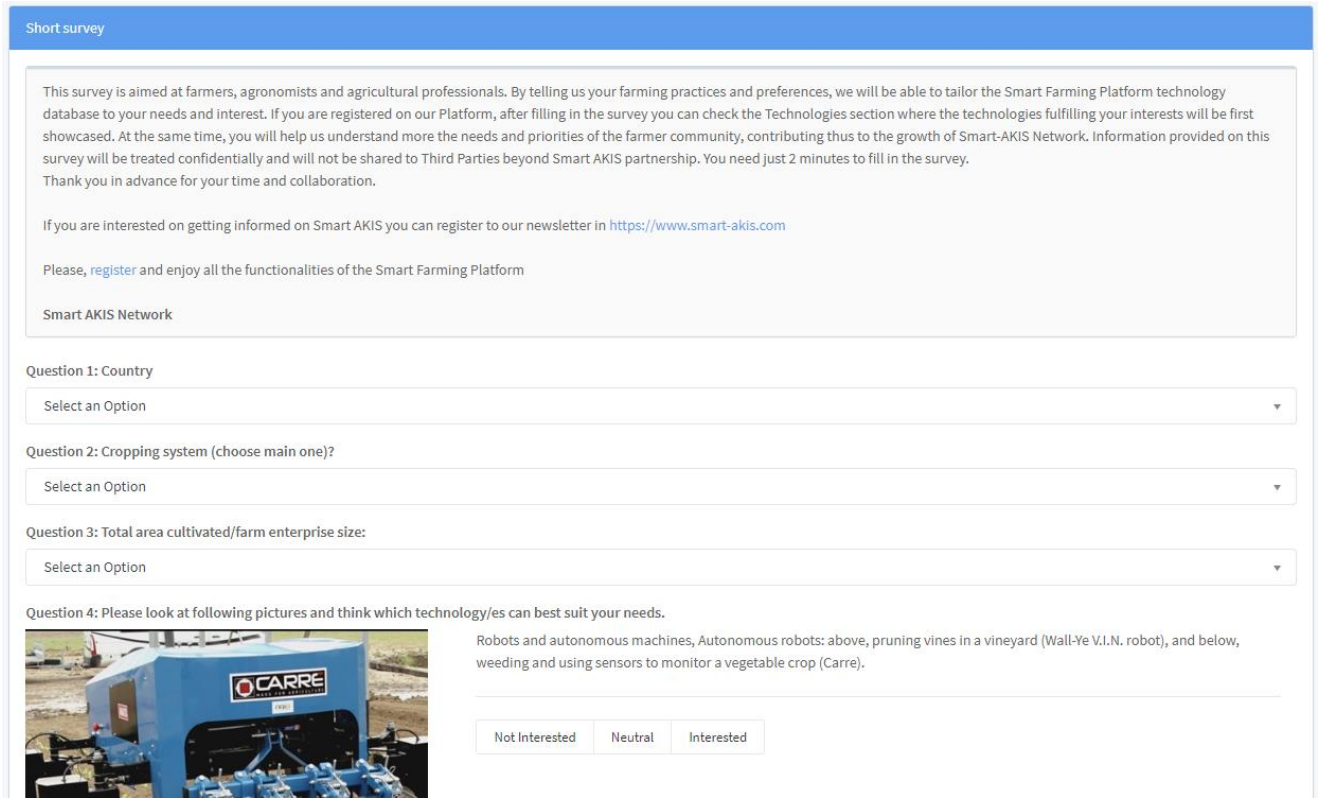


Figure 13: Short survey introductory text

3.1.4 Technology preview

Feedback received from users (mainly farmers) indicated that they prefer to have different preview of the technologies than initially envisioned. Therefore, we implemented additional mode for technology presentation:

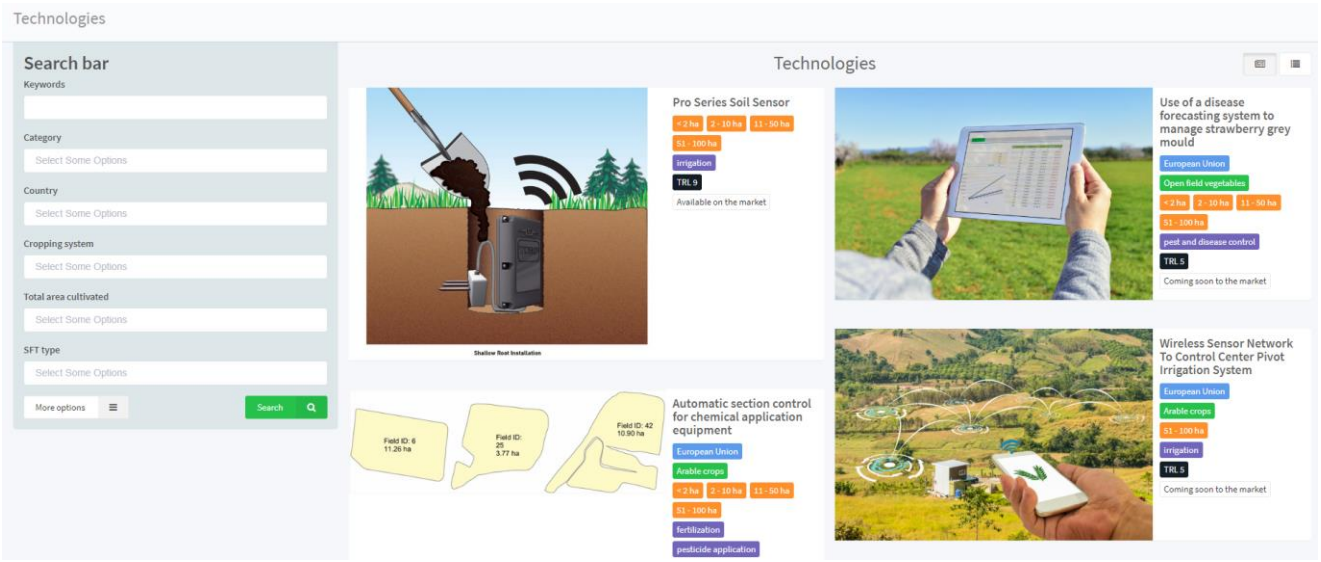


Figure 14: Mode of technology presentation

and compact mode:

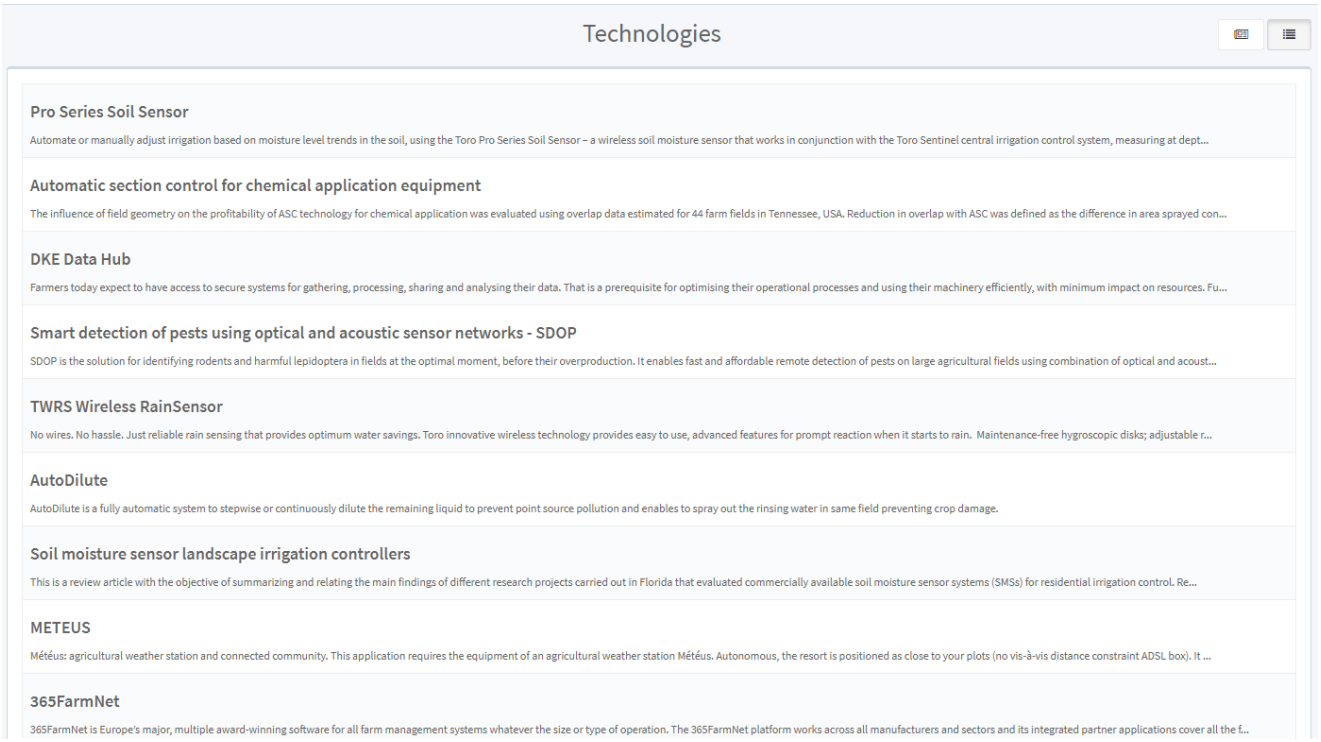
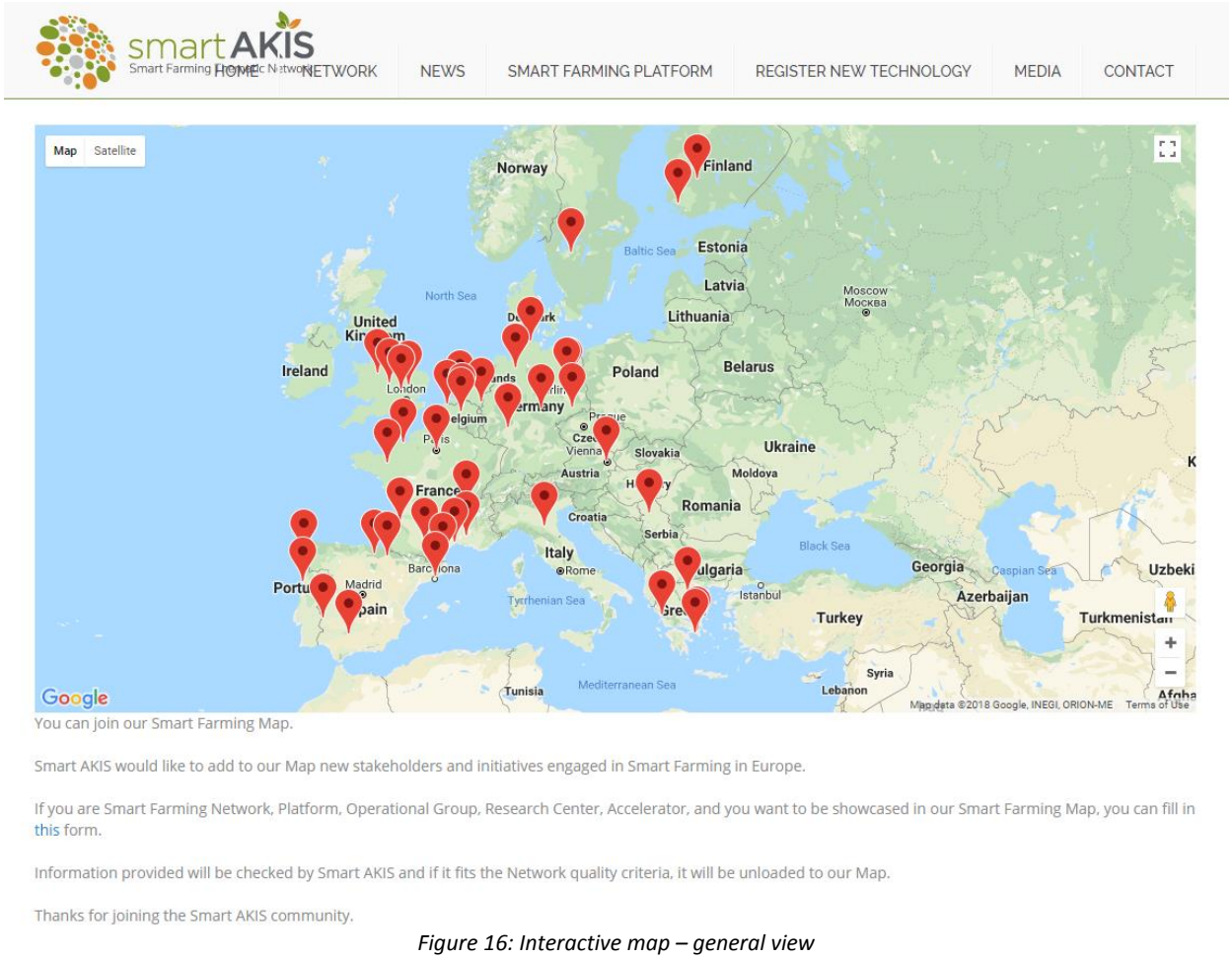


Figure 15: Extended and compact mode for technology presentation

3.1.5 Interactive map for innovation actors gathering

During project activities, consortia realize that a lot of multipliers might be involved in Smart-AKIS projects, but there is no suitable place for such activity. Consequently, we decided to establish an interactive map, which will represent the innovative actors. The aim of the mapping is to promote the cooperation of multi-actor innovation processes on Smart Farming, providing potential innovators information on existing initiatives and expertise in Europe.



You can join our Smart Farming Map.

Smart AKIS would like to add to our Map new stakeholders and initiatives engaged in Smart Farming in Europe.

If you are Smart Farming Network, Platform, Operational Group, Research Center, Accelerator, and you want to be showcased in our Smart Farming Map, you can fill in this form.

Information provided will be checked by Smart AKIS and if it fits the Network quality criteria, it will be unloaded to our Map.

Thanks for joining the Smart AKIS community.

Figure 16: Interactive map – general view

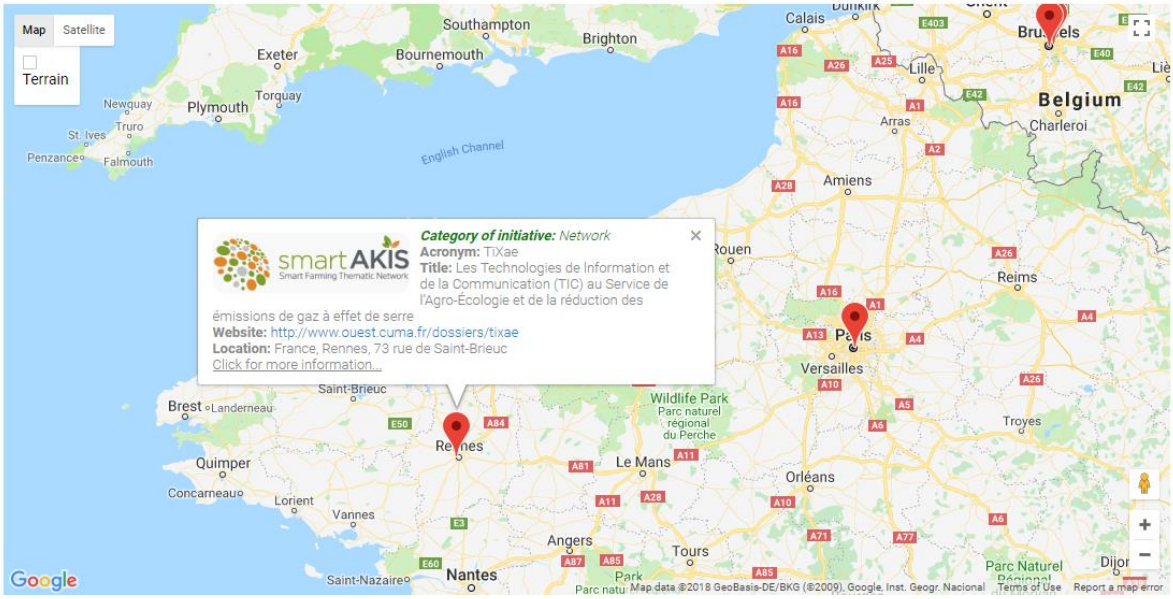


Figure 17: Interactive map – presentation of one network

The map is being fed by data from an online survey, which was developed in the same style as the one for technologies collection. Following pictures present the questionnaire:

Figure 18: Interactive questionnaire (1/3)

After providing a valid email address, one receives a personalized email with unique link to his/her questionnaire. This was done so the respondent can later access the survey and change the data.

Figure 19: Interactive questionnaire (2/3)

In order to be in compliance with GDPR rules, an introductory text is displayed prior the survey questions:

Figure 20: Interactive questionnaire (3/3)

There are two groups of questions:

1. General information:
    - Name of proposer
    - Email of proposer
    - Organization
2. Information about initiative
    - Title of initiative
    - Acronym (if any)
    - Category of initiative
    - State
    - City
    - Address
    - Description of the initiative
    - Objectives
    - Timeframe (if the initiative is not permanent)
    - Email of contact person for the initiative
    - Website
    - Would you like to be updated on Smart AKIS through our website: Yes/No

After submission, a personalized thank you mail is send. At the same time, the notification is sent to ACTA representative, who is in charge for quality check of the submitted answers.

3.1.6 Video tutorial

Since Smart-AKIS is a project aiming at connecting two very different sectors (traditional farming community and IT sector), we tried to establish the best bridge possible. One of the solutions to bridge this sectors is a video tutorial. The video was created by BIOS and translated by all hub members.

The tutorial can be reached at this link.

3.2 Features for moderators (consortium members)

3.2.1 Performance monitoring

The version published in M09 of the project provided just three simple features for moderators: i) to moderate (approve/reject) messages; ii) to finish registration of the innovation brokers and iii) coordinator had a possibility to approve/reject technologies. As time passed, the consortium realized that Smart-AKIS was potentially losing some opportunities due to low level of KPIs monitoring. Therefore, BIOS developed an additional service for consortium partners that allowed them to monitor parameters in real time. The list of implemented KPIs is presented below:

1. No. of registered users.
2. No. of sessions on a given time period by users.
3. No. of technologies fed.
4. No. of viewings of technologies: access to the mock-up card.

5. No. of assessments of a given technology on the three questions.
6. Top 25 searched words in the free search field
7. Top 25 technologies viewed.
8. Top 25 technologies assessed by each of the 3 questions (innovation, interest and referral) to be exploited by category of user and country of origin and type of SFT.
9. Ranking of cropping systems searched
10. Ranking of total area cultivated searched
11. Ranking of SFT type searched
12. Ranking of SFT with the effects on searched
13. Ranking of TRL searched
14. Ranking of crop type searched
15. No. of messages on board
16. Top 25 messages
17. No. of quick surveys developed

*all indicators are presented in following ranges:

- ✓ total
- ✓ per country
- ✓ per category of users (farmers, researchers…)
- ✓ per selected time frame

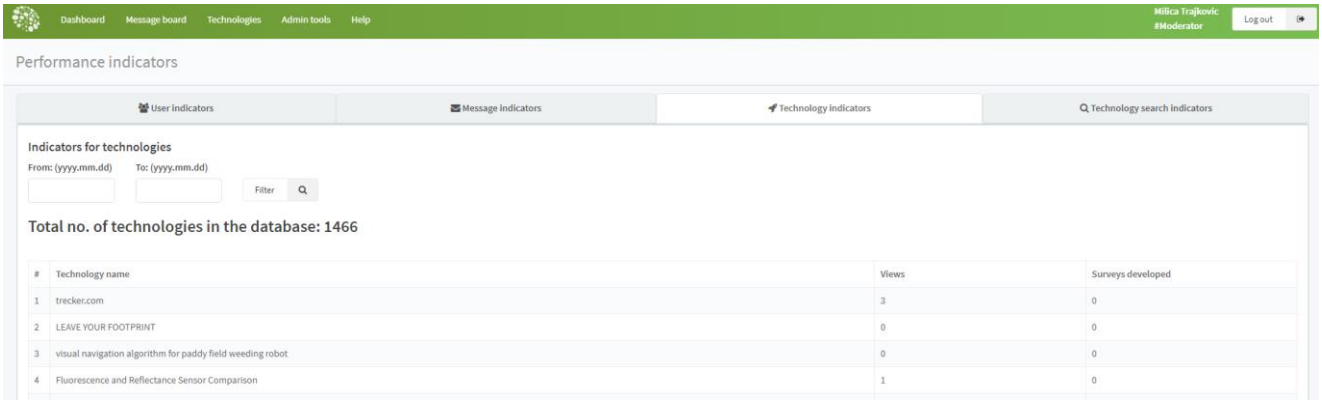


Figure 21: Performance monitoring board

3.2.2 Platform translation

During Regional Innovation Workshops (WP3) we realized that the translation of the website is not enough and that the translation of the platform would have bigger impact on farmers' community. Therefore, BIOS initiated the translations of the platform. The process had two phases – during the first we extracted all static text that can be found on the platforms (e.g. welcome text, short survey, etc.). The extracted text we distributed to regional hubs and asked for translation to national languages. In parallel, we developed a system for translation of texts that might be changed during the time – technology description. The following picture presents that interface:

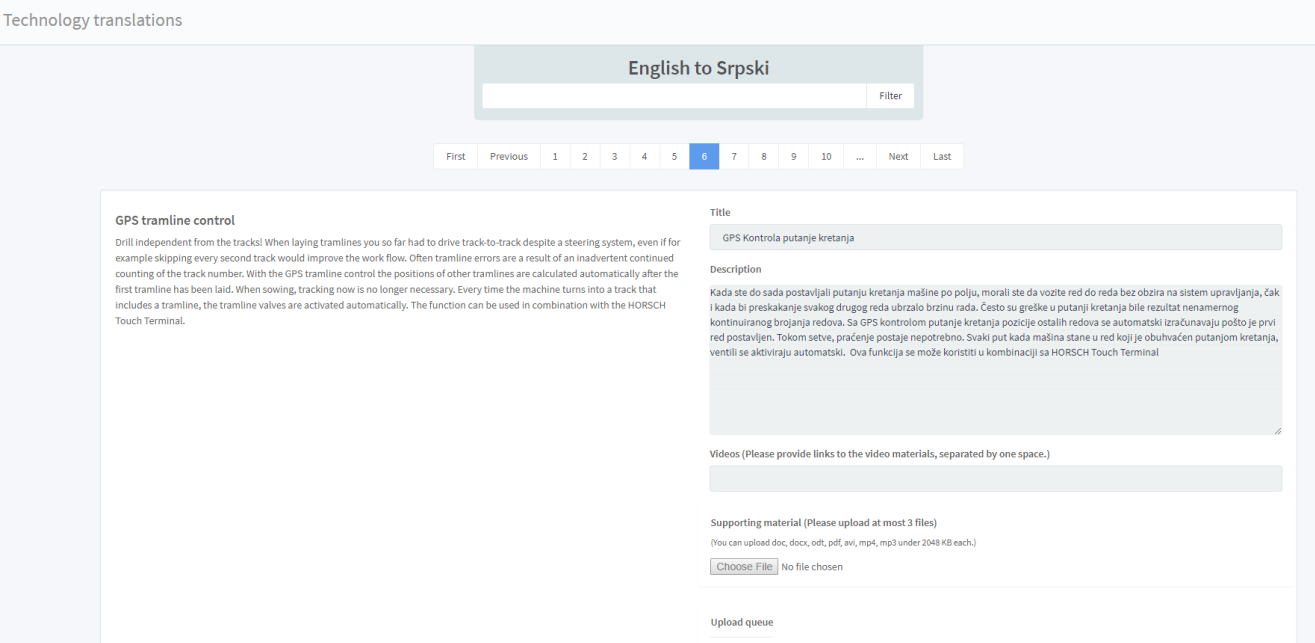


Figure 22: Interface for translation of technology cards

Special attention was dedicated to upload of files in different languages and their adequate presentation in English language (default) and in national language.

3.2.3 Notification system

Alerting system for all moderators has been established. Moderators in all countries were selected. They received an email in the following cases:

- ✓ new innovation broker registered
- ✓ new message on Message Board
- ✓ new technology

In case of a new innovation broker registration, the moderator of the country of origin will be informed. In case of new message – the administrator of the country of origin of the sender will be informed. In case the country of origin is not one of the consortium members, and the language is English, the coordinator of the project will be informed. In case new technology survey submission, the coordinator will be informed.

3.3 Technical characteristics

The Smart-AKIS platform is based on enterprise scale, open source technologies. Main technologies that were used during development stage were not changed; just additional services, features and options were added. In addition, important changes were made in the database, so it become in compliance with new GDPR regulation from May 2018.

For back end data storage, we use PostgreSQL relational database management system. The PostgreSQL RDBMS is used both for storage of various kinds of information from the platform middleware and for storage of information imported from survey platforms. The platform used to collect survey data is LimeSurvey. Limesurvey is a system that offers JSON based RPC API that allows live online synchronization.

LimeSurvey is a free and open source on-line survey tool written in PHP based on a MySQL, SQLite, PostgreSQL or MSSQL database, distributed under the GNU General Public License. It is a web server-based

software that allows users using a web interface to develop and publish on-line surveys, collect responses, create statistics, and export the resulting data to other applications.

Middleware is built using Enterprise JavaBeans 3.0 and WildFly 10 application server as the host. Enterprise JavaBeans encapsulate business logic of the system. They connect to the RDBMS for data storage and retrieval and offer functionalities to external clients using RESTful web services and JSON format.

The platform supports various kind of client devices like desktop and laptop computers, tablets and smartphones. Web application accessed by the clients is responsive - it provides optimal viewing experience depending on the device used to access the platform. Web tier design is based on Bootstrap framework. Communication with the platform middleware and web application control is developed using AngularJS JavaScript Model-View-Controller framework that supports exchange of JSON data through RESTful web services implemented on middleware.

During the life of the project, Smart-AKIS platform was linked with AgroSense platform – a digital platform that provides support to farmers and agricultural companies in monitoring the growth of crops and planning of the agricultural activities. More about this synergy can be read in chapter 4, but the technical perspective is presented on the picture below:

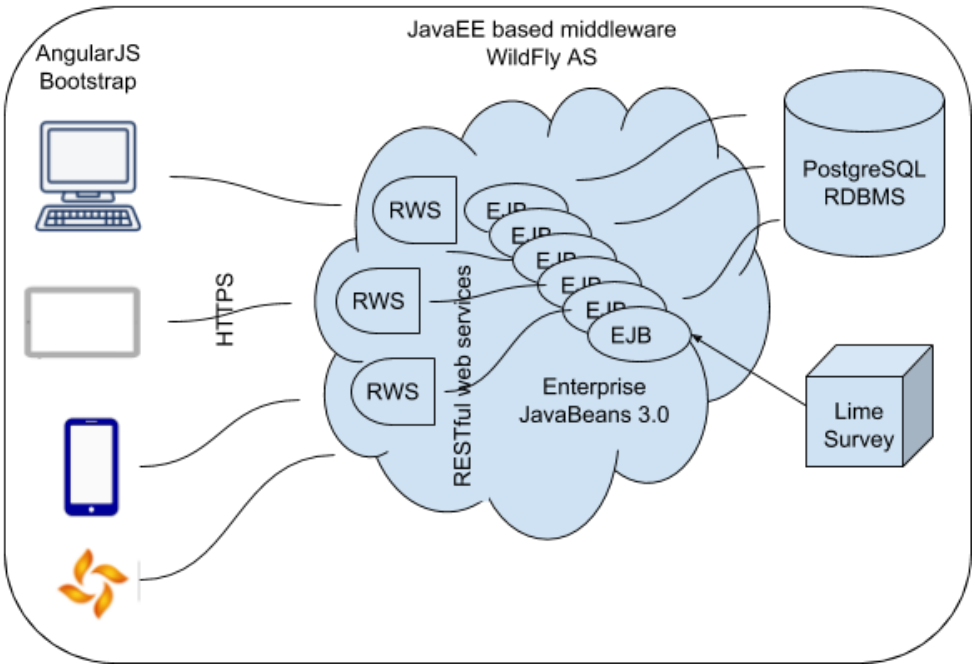


Figure 23: Smart-AKIS platform architecture

In the above described architecture of the system, clients are completely decoupled from server components. Their communication is service based, implemented using RESTful web services (Representational State Transfer) and JSON (JavaScript Object Notation) format. Client server communication is encrypted using registered SSL certificate and secured using session-based authentication using session token.

Mechanisms used for communication between the Smart-AKIS platform and LimeSurvey server again include exchange of JSON documents, but with different underlying protocol - LimeSurvey offers RPC (Remote Procedure Call) based access to its internal data and structure.

3.3.1 Use-case diagrams and workflow

Use-case method was used to define interactions between external actors and the system. The first step was to define main groups of users (from the system's perspective). Three different groups of users were identified:

a) Administrators (have full access rights in the system and are able to manage users and assign rights) – BIOS team
b) Content manager (responsible for approving/rejecting new technologies and general content on the platform) – project coordinator AUA in collaboration with CERTH
c) Moderators (users that are able to monitor main KPIs on the platform and translate the content on their own languages) – each consortia partner
d) End users:
   - Farmers
   - Providers of SFT technologies
   - Innovation brokers
   - Researchers

For Smart-AKIS platform, we have identified six main use cases:

UC ID	User role	Use Case Title	Use Case Description
1	Administrator	Administer system	The administrator may add/delete users and manage their authorization level in Smart-AKIS Platform.
2	Administrator Content manager Moderators End users (registered)	Login	Authorized users have to login before performing specific actions
3	Content manager	Manage content	Content manager may approve or reject farm descriptions (farm cards) before publishing. Moderators need to moderate and approve every message before they are published on the message board.
4	End users (unregistered)	Register	Users are registered using very simple form with a small amount of data that is defined in project documents. There are two big groups of users that may register online – farmers, researchers and SFT providers are part of the first group and the post-registration approval by platform moderators is not needed. On the other hand, if a user wishes to be registered as an innovation broker, a check and approval by system moderator is needed. After the approval, that type of users may access additional privileges. System administrators and moderators are pre-registered and cannot be registered using described form.
5	All	Take a survey	Smart-AKIS platform foresees two types of surveys – one that targets technologies and the other that is focused on farmer's needs. Technology related surveys are based on LimeSurvey server and they are taken by innovation brokers. Farmer surveys are short surveys implemented inside Smart AKIS platform. Information from LimeSurvey server is synchronized with the platform database and it is used for technology cards creation.

			Information entered by farmers in short surveys is used to pop up technology cards that best match farmer's interests.
6	All	Browse Technology Cards	Technology cards are shown to users one by one. Each card presents one technology by displaying various KPIs, Technology Readiness Level and other significant information. Project materials predefine the information that is shown at cards. When a card is shown, a user is prompted to answer three short multiple-choice questions. Data collected from surveys is used to pick cards that are closest to user's interest and show them first on the list. Nevertheless, user still has the possibility to search the database with filters. There are two sets of criteria, basic criteria and those used for detailed search (they are shown on demand).
7	Administrator Content manager Moderators End users Unregistered users	View the search results	All users may navigate within the search results, which may be presented in different ways, according to the needs of the user.
8	Registered users	Read and post messages	All registered actors can post messages to messaging board. They may leave some of their contact details, if they wish. The usage of various languages is enabled. Users may also see already posted messages and filter them using language and country criteria. If a user wishes to contact the other user that posted the message, one can do it by using a reply button. In that case, user writes the private message and gives its email, and the system sends the mail to the user that posted the original message, putting the given mail to the field. After that, users communicate directly using their emails.

Table 2: Use cases in Smart-AKIS platform

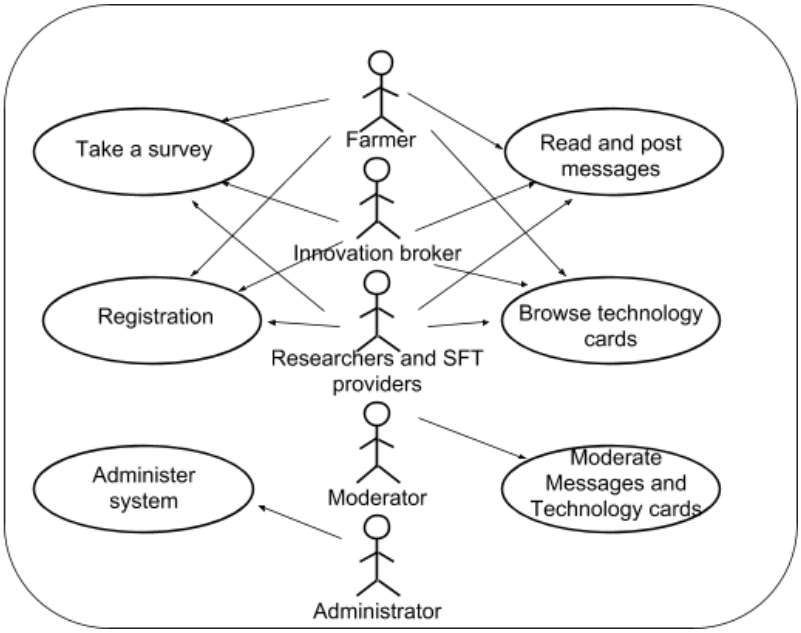


Figure 24: Smart-AKIS use-case diagram

3.4 Smart-AKIS in accordance with GDPR regulation

From the very beginning of the project, Smart-AKIS consortium paid attention on data protection and all related regulations. We conducted a group of actions, so the platform and entire system be in accordance with GDPR. The most important one was the change of Legal notice, privacy and cookie policies. New version can be reached here. The second change was implementation of the cookies notification and request for acceptance.

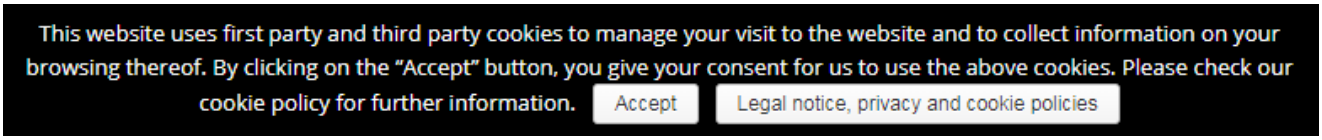


Figure 25: Cookies notification on the website

Consequently, we have implemented some changes in process for newsletter registration

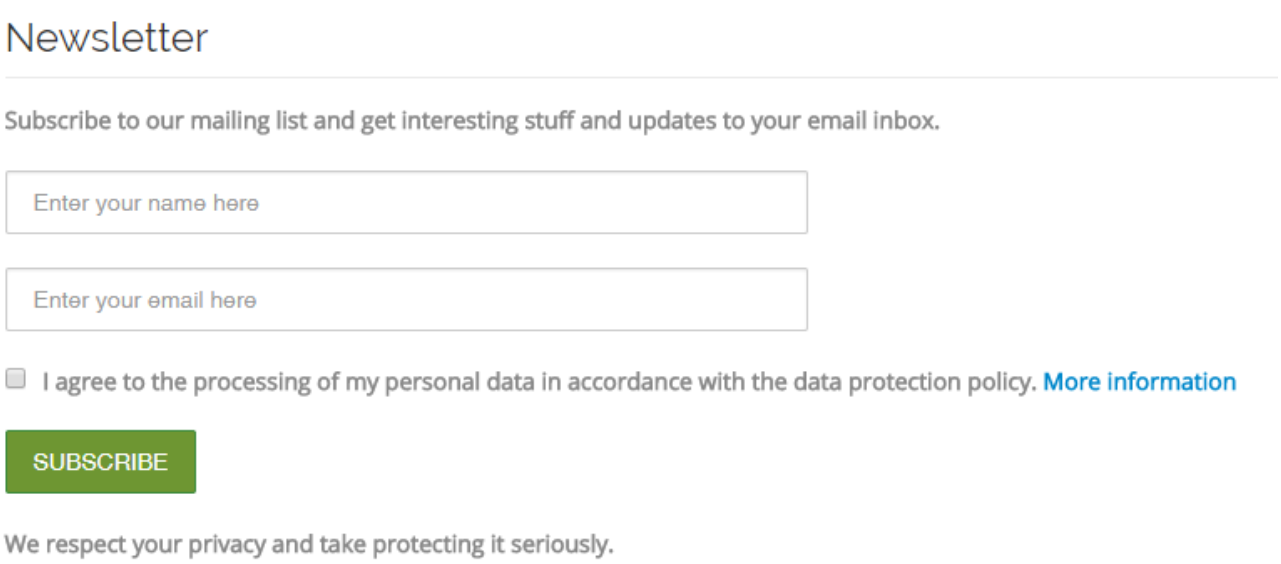


Figure 26: Registration for the newsletter

4. Smart-AKIS integrated in AgroSense application

Due to commitment of entire consortium, Smart-AKIS platform has been recognized as a meeting point between end-users of the smart farming technologies and IT experts (both from academia as well as from commercial companies). Except introducing farmers with IT solutions that might help them in their daily practices, Smart-AKIS platform has great potential to evolve into widely recognized source of information regarding state-of-the-art technologies for agricultural production and valuable asset to the decision-making bodies both locally as well as on European level.

This potential was recognized and further reinforced by integration of the Smart-AKIS platform with a brand new platform for Digital Agriculture of the Republic of Serbia, named AgroSense. The Platform for Digital Agriculture of the Republic of Serbia has been initiated by BIOS in the course of strategic dedication of Serbian Government to boost the agricultural production in Serbia on two different levels. The main strategy towards the end-users (both small farmers as well as large households / agricultural companies) is to provide ready-to use information on the crops conditions. On the other hand, the platform can be used by government representatives. The statistical data about the users in anonymized and aggregated form, in compliance with GDPR and the agreement signed by the user during the registration, can assist them in establishment of successful agricultural strategy on national level and well-tailored plans for regional development. Additionally, the third group of users are extension services and companies that are focused on agricultural production.

AgroSense digital platform, through a single user profile, allows the access to the whole system: AgroSense web application intended for comfortable work on a PC and AgroSense Android application that turns a mobile phone into a new useful tool for farmers. AgroSense web application is designed for visualisation and in-depth analysis of data, while AgroSense Android application, besides giving instantaneous insight into all data, on the field, allows for a quick and easy input of data to the system.

Figure 27: AgroSense platform – home page

The main aim of the platform is to provide monitoring of crops and fields and planning activities by combining processed Sentinel pictures with meteorological data (historical data and forecasts) and on-the-ground information received through various measurements.

AgroSense platform covers several different sections:

- ✓ Diary of agricultural activities
- ✓ Weather forecast for the location of the parcel
- ✓ Satellite indices of crops that describe plant growth, photosynthesis intensity and the availability of water and nutrients
- ✓ Overview of soil analysis
- ✓ Overview of photographs of crops
- ✓ Information about smart technologies used in agriculture
- ✓ Latest information about the occurrence of pests and plant diseases

The very first step (after registration, which requires just an email address and is completely free of charge) is to create a parcel. That can be done by inserting the parcel number (from the official cadastre register of the Republic of Serbia) or by drawing.

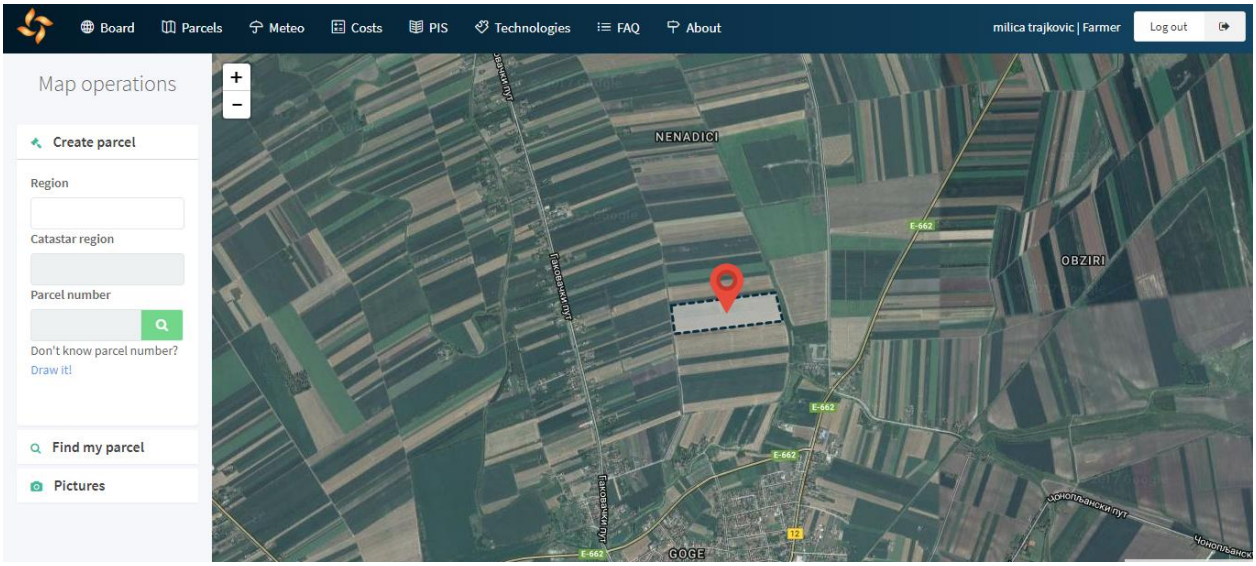


Figure 28: AgroSense platform – creating a parcel

Then, farmer needs to fill in the data about the parcel, such as the type of activity that is planned, type of crops, etc and the interesting world of AgroSense is ready to be discovered!
The first information that one can get is the weather data: temperature, pressure, precipitation, humidity, wind speed and direction and clouds.[1]

[1] Source of the weather forecast data is Norway meteo service - https://www.yr.no

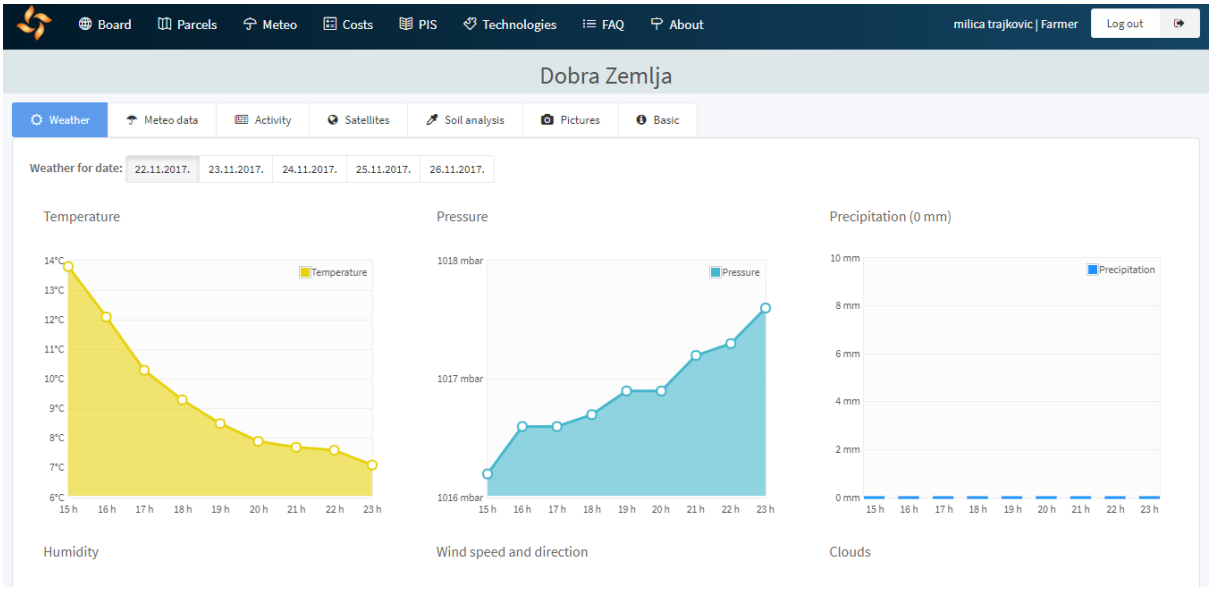


Figure 29: AgroSense platform – weather information

The next stop are meteorological data: temperature 2m above ground, temperature 5cm above ground, 5cm and 10cm below ground, wind speed, solar radiation, dew point, air pressure.[2]

The advanced algorithm processes the parcel specifications and suggests which smart farming technologies might be used. The algorithm takes into account all the inserted information, such as production stage or crop type and required agro-technical measures. On the other side, the algorithm goes through the Smart-AKIS knowledge reservoir and filters just technologies marked as TRL9. The reasoning behind this decision is that end-users (farmers) do not want to be informed about scientific research outcomes, but rather to have information about ready-to-use solutions, available on the market. As a result, the user of AgroSense platform receives the list of available and appropriate solutions for his/her farming practice.

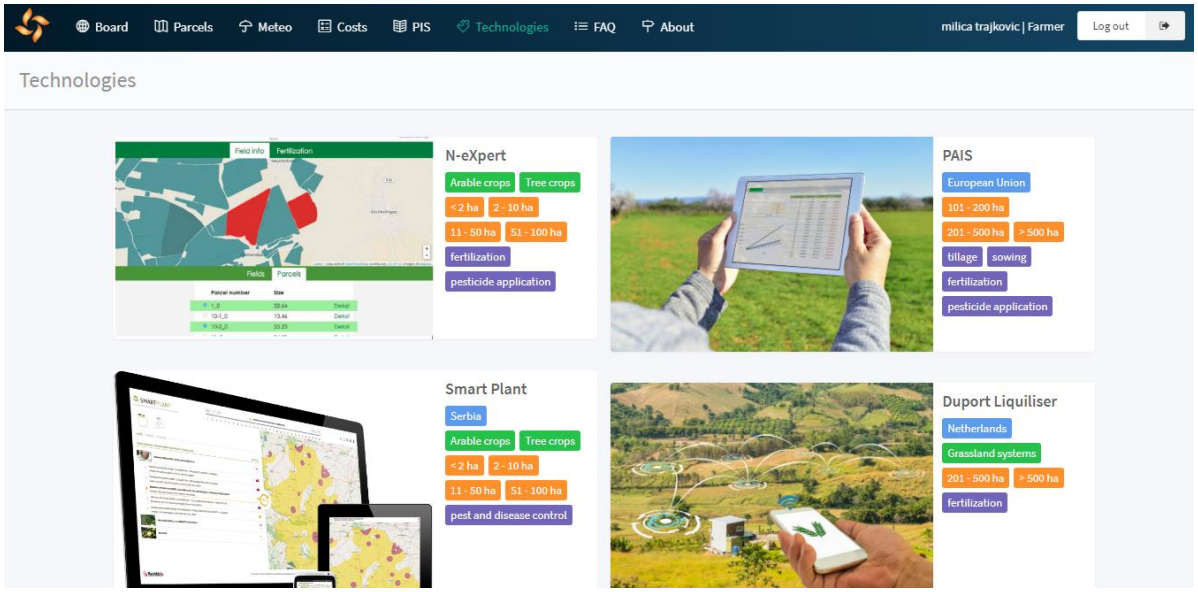


Figure 30: AgroSense platform – integration with Smart-AKIS SFTs

[2] Source of the weather data is Republic Hydrometeorological Service of Serbia - http://www.hidmet.gov.rs

Another segment of the platform, perceived to be extremely useful, is the finance management of the agricultural production. When all fields are precisely filled in, farmer has the entire overview on expenditures, gained profit and estimate financial investment for future activities.

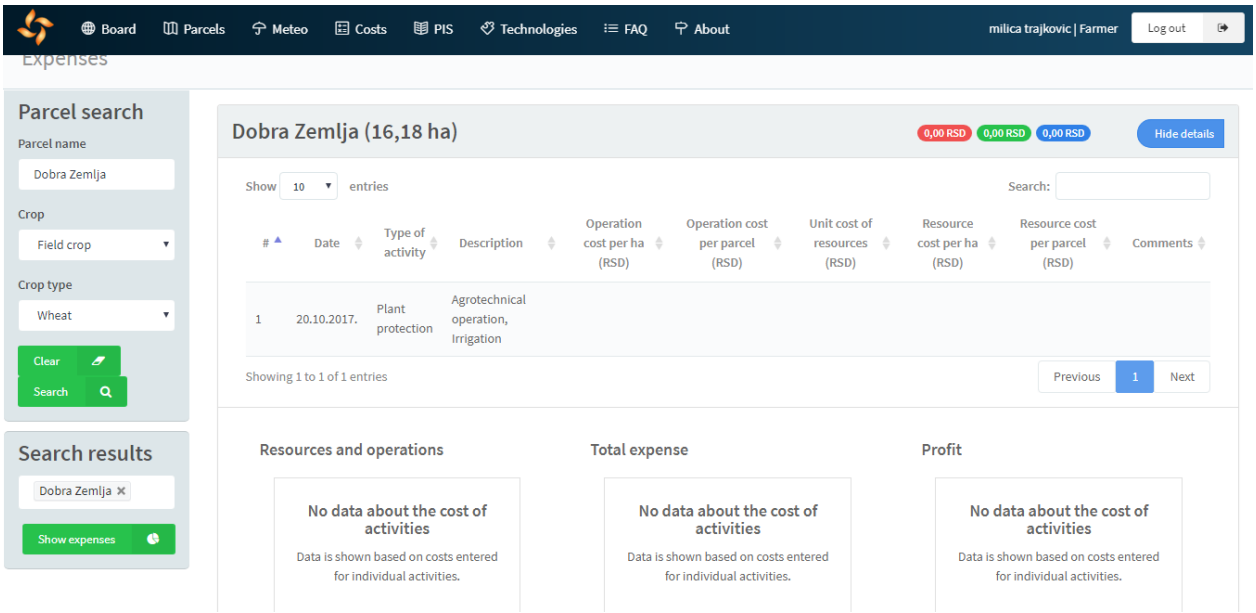


Figure 31: AgroSense platform – parcel financial management

AgroSense platform has been launched by the Prime Minister of the Republic of Serbia on the October 3rd 2017, as one of the strategic pillars that is aimed to enhance digital transformation process in Serbian agricultural sector and to foster IT sector to develop solutions that will be closer to the farmers. Head of the Vojvodina provincial government, Igor Mirovic, said that agriculture was "a key lever of economic development and, consequently, the Center for Digital Agriculture is the main tool for launching agriculture throughout Serbia".

Figure 32: AgroSense platform – opening ceremony

5. Conclusion

During the 30 months of the project, the interactive online platform was developed in close collaboration with project partners and end-users – farmers. After the platform was launched, the development process did not just transform into maintenance. BIOS continued to tightly monitor all platform stakeholders and collect their feedback and inputs. This activity generated a list of requests for the development team. All relevant requirements, that were estimated to be beneficial for the platform were implemented. Therefore, at the end of the M30, Smart-AKIS platform is a intuitive meeting-place between ICT solutions for agriculture and its end-users – farmers. Smart-AKIS team is very proud that platform was recognized as useful tool, so it was integrated into AgroSense application (preserving Smart-AKIS identity and acknowledgment). All described above influenced on the decision to open all collected data, so it can be re-used in various other purposes and sectors. To that end, every technology card has its own PDF and HTML documents, allowing other systems to read and use Smart-AKIS data.

6. Annex

PDF of the technology card

smart AKIS
Smart Farming Thematic Network
eip-agri
AGRICULTURE & INNOVATION
THIS PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME UNDER GRANT AGREEMENT N. 696294

Nutrition

Title	Nutrition
Title (native language)	english
Category	
Short summary for practitioners (Practice abstract) in English)	
Short summary for practitioners	
Website	http://photosynthetica.com/
Audiovisual material	
Links to other websites	
Additional comments	
Keywords	Agricultural production systems | Fertilisation and nutrients management | Soil management / functionality | Water management | Climate and climate change | Energy management
Additional keywords	analysis, innovation, nutrition, models, softwares
Geographical location (NUTS)	BG31
Other geographical location	Sofia, Bulgaria. EU
Cropping systems	
Field operations	Fertilization | Pesticide application | Weed control | Crop protection | Irrigation | Harvesting
SFT users	Farmer
Education level of users	
Farm size (ha)	

Company info

Company name	Photosynthetica LtD
Address	Hristo Smirnenski 23, Svoge, Bulgaria
Website	www.photosynthetica.com
Patent status	no patent

Effects of this SFT

Productivity (crop yield per ha)	No effect
Quality of product	No effect
Revenue profit farm income	No effect
Soil biodiversity	No effect
Biodiversity (other than soil)	No effect
Input costs	No effect
Variable costs	No effect
Post-harvest crop wastage	No effect
Energy use	No effect

CH4 (methane) emission	No effect
CO2 (carbon dioxide) emission	No effect
N2O (nitrous oxide) emission	No effect
NH3 (ammonia) emission	No effect
NO3 (nitrate) leaching	No effect
Fertilizer use	No effect
Pesticide use	No effect
Irrigation water use	No effect
Labor time	No effect
Stress or fatigue for farmer	No effect
Amount of heavy physical labour	No effect
Number and/or severity of personal injury accidents	No effect
Number and/or severity of accidents resulting in spills property damage incorrect application of fertiliser/pesticides etc.	No effect
Pesticide residue on product	No effect
Weed pressure	No effect
Pest pressure (insects etc.)	No effect
Disease pressure (bacterial fungal viral etc.)	No effect

Information related to how easy it is to start using the SFT

This SFT replaces a tool or technology that is currently used. The SFT is better than the current tool	no opinion
The SFT can be used without making major changes to the existing system	no opinion
The SFT does not require significant learning before the farmer can use it	no opinion
The SFT can be used in other useful ways than intended by the inventor	no opinion
The SFT has effects that can be directly observed by the farmer	no opinion
Using the SFT requires a large time investment by farmer	no opinion
The SFT produces information that can be interpreted directly	no opinion

View this technology on the Smart-AKIS platform

This factsheet was generated on 2018-Mar-05 10:32:59.

smartAKIS

Smart Farming Thematic Network

THIS PROJECT HAS RECEIVED FUNDING FROM THE **EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME** UNDER GRANT AGREEMENT N. 696294

SMART AKIS PARTNERS:

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