

D3.3. Overall Smart-AKIS Report



smartAKIS
Smart Farming Thematic Network



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Abstract

The present report collates all individual regional Smart-AKIS reports prepared by the Regional Innovation Hubs of the project. This deliverable, together with the two Transnational Workshops held in Pamplona (November 2017) and Novi Sad (March 2018) are the basis for the development of the Smart-AKIS recommendations and Policy Briefs reported in Deliverables 3.6 and 3.7 respectively.

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1. Executive Summary

The present report collates the seven individual Smart-AKIS Reports (D3.2) prepared by the Smart-AKIS Regional Innovation Hubs as a result of the three Regional Innovation Workshops of Work Package 3, Task 3.2: Generation of interactive and multi-actor innovation at regional/national level on Smart Farming Technology.

The report consists of the following Chapters:

- **Chapter 2** introduces the rationale of the workshops,
- **Chapter 3** presents the Multi-actor innovation process followed by partners in the Regional Innovation Hubs, including the communication strategy followed, the target groups involved and the Smart Farming Technologies presented at the workshops.
- **Chapter 4** presents the highlights of the findings in the Regional Innovation Hubs as well as the strategies that Regional Innovation Hub partners will follow to capitalize and mainstream the lessons learnt and the outcomes of Smart-AKIS in their regions.

The recommendations made by Hub partners in their individual D3.2 reports have been thoroughly analysed, and together with the inputs gathered in both Transnational Workshops (Pamplona, November 2017 and Novi Sad, March 2018) and the wealth of project's results from other WPs, they have been used for issuing the recommendations for the adoption of smart farming technology in Europe (Deliverable 3.6).

2. Introduction

2.1. Background to the Regional Innovation Workshops

Smart-AKIS is a Thematic Network funded by the Horizon 2020 Programme of the European Commission. The project has followed the EIP-Agri “multi-actor approach” for making research results available to practitioners as well as for capturing grassroots level ideas and needs across Europe in the field of Smart Farming Technologies (SFT). The project has followed an interactive innovation model, engaging with different stakeholders within and outside the project, widening from regional/national to European level: i) interactive innovation multi-actor Regional Innovation Workshops (RIW), which has allowed for the direct dissemination of SFT solutions and the capture of grassroots-level innovations and needs in the Regional Innovation Hubs; ii) two transnational workshops, allowing for the generation of targeted exchanges, dissemination of practical SFT solutions and cross-fertilisation and cross-border collaborations in SFT innovations; iii) the Smart Farming Community Platform, allowing for a broad stakeholder outreach and crowdsourcing of stakeholders’ needs and innovations at the widest EU level.

The conceptual framework used by Smart-AKIS for interactive innovation in the Regional Innovation Hubs is presented in the figure below (Figure 2.1). Top-down, it has resulted in the deployment of SFT solutions with high use potential in a given Hub as selected by project partners according to technical (WP1) and social (WP2) criteria as well as the specificities of the regional/national cropping systems (WP3). Bottom-up, it has allowed validating the grassroots-level needs identified in WP2 as well as capturing new needs and ideas. A central tool for interactive innovation in Smart-AKIS has been the RIWs in the Regional Innovation Hubs, which have brought together research, extension, industry and farmers within and outside the project.

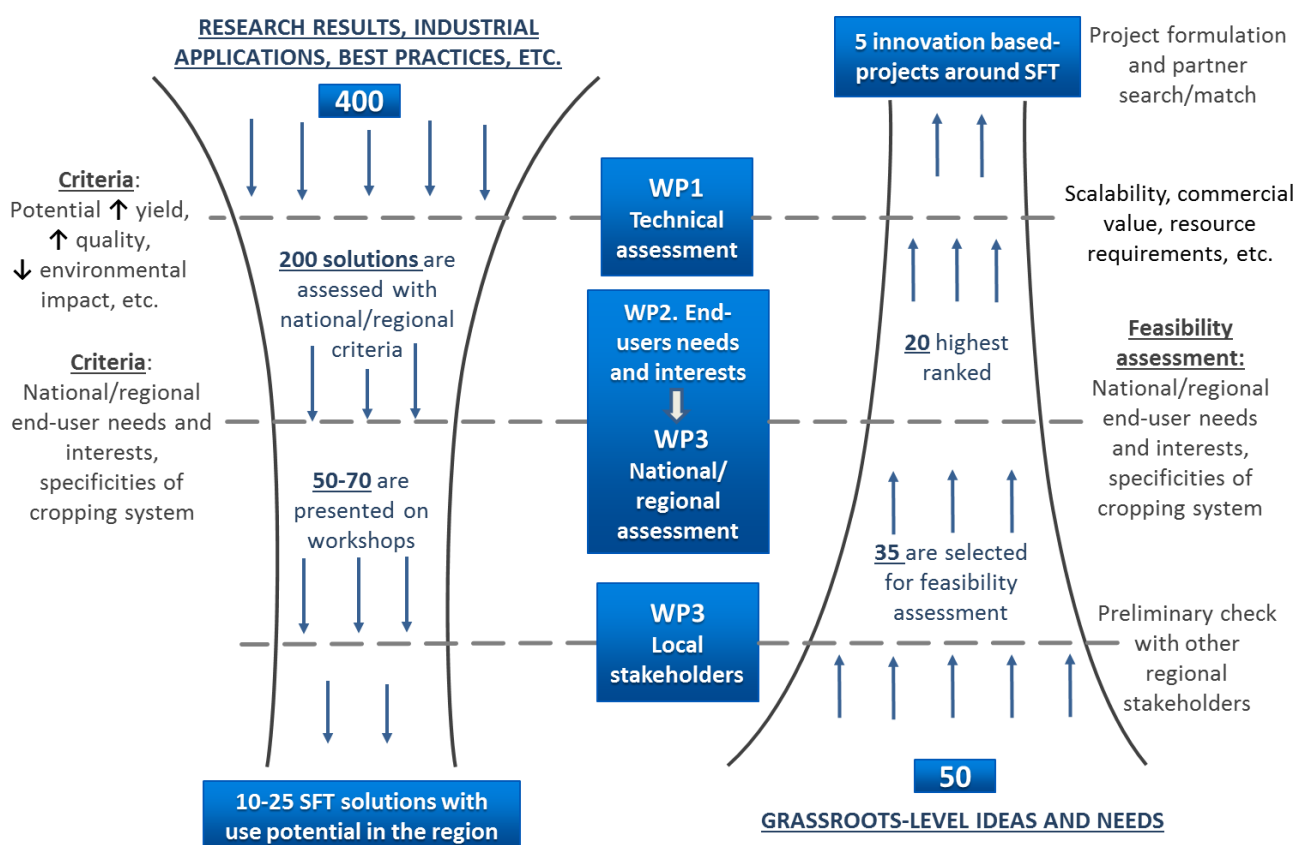


Figure 2.1. Interactive innovation in Regional Innovation Hubs.

Left: top-down dissemination of direct applicable SFT solutions; **right:** bottom-up capturing grassroots-level ideas.

2.2. Objectives of the Regional Innovation Workshops

Based on the overall objectives of Smart-AKIS, the specific objectives of the RIWs were to:

- Give feedback to the SFT solution providers to facilitate their innovations to reach the market by the localization to specific regional conditions or different uses or other innovative approaches.
- Provide inputs to researchers for the definition of commercialization strategies for research based SFT not available on the market yet.
- Generate innovative uses for available SFT solutions with grassroots level ideas and farmers' needs.
- Foster the development of new or evolved SFT solutions taking into consideration grassroots level ideas and farmers' needs.

2.3. Methodology of the Regional Innovation Workshops

In order for the results and findings of the RIWs to be balanced and comparable, INI, task 3.2 leader, drafted the "Smart-AKIS Innovation Workshops Guidelines", which were adapted by Smart-AKIS Hub partners for organizing their RIWs on the basis of their regional/national context as well as their own resources for stakeholder engagement and RIW organization. The three RIWs were linked following a logical sequence with the overall aim of achieving the RIWs specific objectives so that the Smart-AKIS outcomes could be reached. The approach followed ensured a sufficient stakeholder support base, with farmers being at the centre. Figure 2.2 shows the logical sequence of the RIWs as well as their link with the Transnational Innovation Workshops.

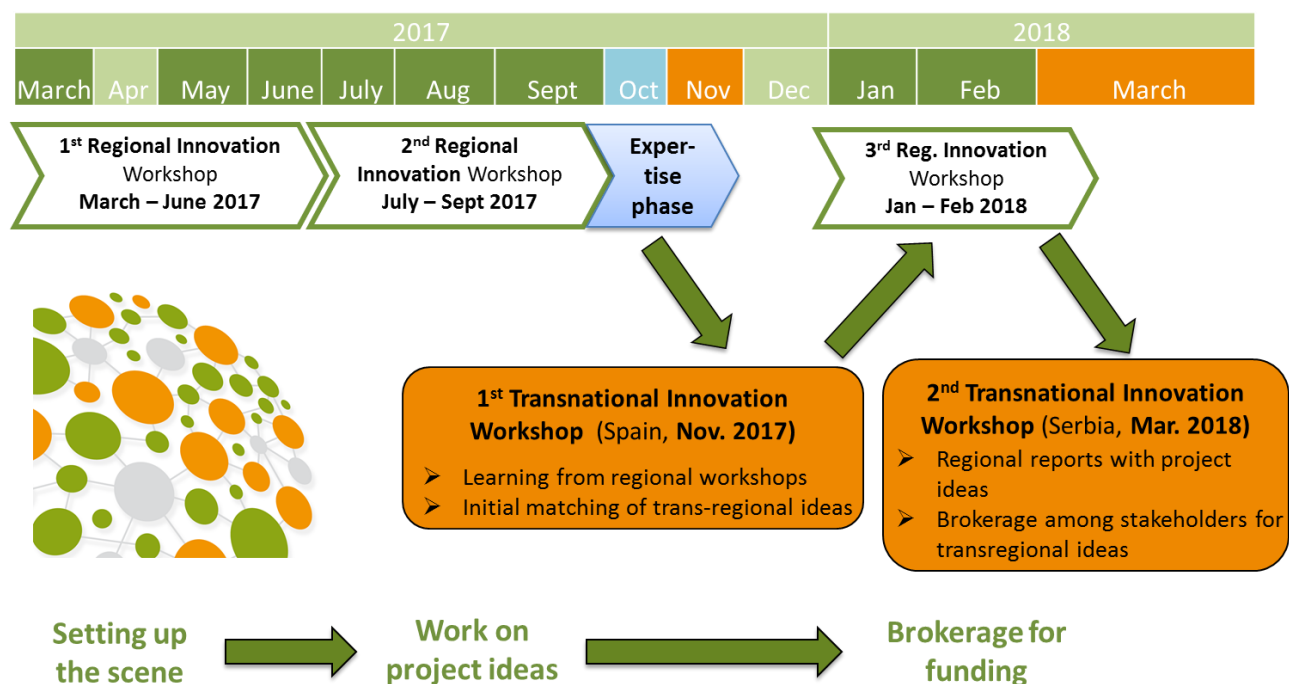


Figure 2.2. Logical sequence of the RIWs and their link with the Transnational Workshops.

Table 2.2 shows the approach followed in each RIW. The RIWs allowed for the **presentation of SFT solutions** with high use potential, selected from those assessed in WP1 according to the regional/national cropping systems, the results gathered in WP2 and the geographical and thematic scope of the research/extension partners. User's needs identified in the WP2 surveys were validated and new grassroots level needs and innovations were captured following the framework described in Figure 2.1. The RIWs allowed for empowering the potential innovators themselves (farmers, small business owners, advisory services) resulting in the **generation of trans-disciplinary innovation-based collaborative projects**, for which funding sources were presented in the last RIW. Funding sources explored by Regional Innovation Hubs encompassed public (H2020,

EARDF RDP, ERDF OP, national or regional public innovation funding programmes, etc) and private capital (venture capital, crowdfunding platforms, etc).

Table 2.2. Approach followed in each of the three RIWs.

RIW	Approach
RIW1: SETTING UP THE SCENE	<ul style="list-style-type: none"> • Presentation of Smart-AKIS Network and services. • Presentation of the method and goals of the 3 RIWs Innovation Process. • Presentation and demonstration of selected SFTs. • Contrasting of Needs & Ideas identified in WP2.
RIW2: WORK ON PROJECT IDEAS	<ul style="list-style-type: none"> • Thematic Open Innovation Sessions (Work Groups) by challenge/idea: <ul style="list-style-type: none"> - Inspirational round-table. - Group work on market uptake, transfer and innovation ideas. - Cross-fertilisation of SFT based Project Ideas.
RIW3: BROKERAGE FOR FUNDING	<ul style="list-style-type: none"> • Presentation of sources of funding. • Pitching of validated Project Ideas. • Speed Dating of Project Ideas for matching Promoters and actors. • Working Groups for structuration of Projects.

2.3. Expected results

The main results expected from the RIWs are: i) the deployment of SFT solutions with high use potential in a given Hub and ii) the capture of grassroots-level needs and ideas. A number of Key Performance Indicators (KPIs) were set in the Smart-AKIS DoA in relation to these objectives (Table 2.3).

Table 2.3. Key Performance Indicators set in the Smart-AKIS DoA.

KPI	Target per Hub	Project Target
Nº of stakeholders participating in RIWs	100	700
Nº of SFT solutions presented in RIWs	Non specified	50-70
Nº of SFT solutions adopted by practitioners	5-20	50-70
Nº of grassroots-levels ideas captured	20	140
Nº of multi-actor collaborations funded	5	35
Nº of multi-actor cross-border collaborations and/or exchanges started	-	10

- **Nº of stakeholders participating in RIWs:** a target of 100 stakeholders participating in the three RIWs was set, aiming at a balanced representation of each group (farmers, innovation brokers and advisers, researchers, SFT providers including companies, SMEs, spin-offs, start-ups).
- **Nº of SFT solutions presented in RIWs:** following the assessment by Hub partners of at least 200 SFT solutions fed in the Inventory, a target of 50-70 SFTs were to be presented in RIWs. SFTs were presented by different means: on-field presentations, end-users testimonials, interactive presentations (videos, etc.), power point presentations, promotional material (posters, flyers and other kind of promotional and dissemination materials from companies and researchers).
- **Nº of SFT solutions adopted by practitioners:** a target of 5-20 SFT solutions adopted by practitioners in each Regional Innovation Hub has been set. This KPI will be evaluated at the end of the project, through a questionnaire addressed to RIWs participants.
- **Nº of grassroots-levels needs and ideas captured:** a target of 20 grassroots level ideas captured per Regional Innovation Hub was set. As the RIWs started, partners identified the need for breaking down this KPI into different indicators:

1. particular needs for research in relation to SFT, which have been uploaded to the EIP-Agri website following the EIP-Agri “needs for research” template and have also been presented in the individual D3.2;
2. ideas for alternative uses of SFTs, which have been presented in the individual D3.2;
3. project ideas emerged in the RIWs, which could result in multi-actor collaborations (next KPI). These ideas have been presented in the individual D3.2 and are compiled in section 4.6, tables 4.1-4.7. Some of these ideas have also been uploaded to the EIP-Agri website following the EIP-Agri “project ideas” template. The three categories of multi-actor projects identified, taking also into consideration the “adoption” of SFTs are presented in Table 2.3.

Table 2.3. Categories of collaborative and individual projects, as emerged in the frame of the RIWs.

Category of projects	Description
INNOVATION	Development/adaptation of SFT solutions in response to practitioner’s needs and ideas
TECHNOLOGY TRANSFER	Transfer/demonstration of research based SFTs (linked to the adoption of SFTs goal).
MARKET UPTAKE	Smaller projects between providers and a number of users, allowing stakeholders to optimise and select appropriate SFT solutions (linked to the adoption of SFTs goal).

- **Nº of multi-actor collaborations funded:** from the project ideas emerged in the RIWs, a target of 5 multi-actor collaborations funded by the end of the project was set per each Regional Innovation Hub. This KPI has proven extremely difficult to reach due to the resistance of actors attending the workshops in starting exchanges due to confidentiality issues and the timetable of regional/national funding programmes and other financial instruments, which has not always matched the initiation of the contacts. This KPI also proved difficult to measure, as the questionnaire sent to all RIWs participants across the seven Hubs, had a rather low response rate. This KPI will be evaluated after the end of the project and the results presented in the last evaluation meeting.
- **Nº of multi-actor cross-border collaborations and/or exchanges started:** a target figure of 10 multi-actor cross-border collaborations and/or exchanges was set in the DoA. The methodology followed for the promotion of these cross-border collaborations and/or exchanges is presented elsewhere (D3.5). This KPI was measured through a questionnaire sent to all participants to the 2nd Transnational Workshop in Novi Sad. Given the time needed to the establishment of multi-actor cross-border exchanges, this KPI will be evaluated again after the end of the project and the results presented in the last evaluation meeting.

2.4. Findings & recommendations:

The RIWs also allowed Regional Innovation Hubs’ partners to gather valuable insights related to:

- The interest shown by the farmer community on pre-selected SFTs, leading to the identification of those SFTs closer to be widely adopted
- Potential future SFT research topics and areas taking into consideration farmers’ needs and project ideas
- confirmation on the needs, opportunities, project ideas and factors hindering SFT adoption at regional level identified from WP2
- Recommendations on how to improve the framework conditions for further adoption of smart farming at regional level in terms of regulation, funding, intermediation services, etc.
- Findings on what worked and what did not in terms of the method and approach carried out for promoting a multi-actor project generation process generally, and specifically in the smart farming field.

These “findings” have come to complement the outcomes of other project’s Work Packages, enriching the overall project results and allowing Smart-AKIS to issue a set of recommendations for fostering the adoption of Smart Farming Technologies in Europe. These recommendations are presented in D3.6.

3. Multi-actor Innovation Process

3.1. Dates and location of Regional Innovation Workshops

The RIWs took place in the seven Smart-AKIS Innovation Hubs between March 2017 and March 2018. Table 3.1 presents the dates and location of the three RIWs as well as the partners involved in each Regional Innovation Hub. Whenever considered suitable by the Hub partner and due to its special format, the 3rd RIW consisted of a joint meeting, individual meetings with potentially interested actors or videoconference.

Table 3.1. Dates and location of the three Regional Innovation Workshops.

Country	Partners	RIW1	RIW2	RIW3
France	CUMA Ouest, ACTA	Les culturelles, Reims. 15/06/2017	Salon au champ. 31/08/2017	Videoconference. 1/03/2018
Germany	DLG, ZALF	DLG International Crop Production Center, Bernburg. 30/05/2017	LfL Research Station Grub, Poing. 24/10/2017	Leipzig. 6/03/2018
Greece	AUA	Giannitsa. 29/05/2017	Nikea. 25/10/2017	Athens. 20/02/2018
Netherlands	WUR, Delphy	Ede. 09/03/2017	Wageningen. 13/12/2017	*
Serbia	BioSense	Novi Sad. 14/03/2017	Novi Sad. 17/05/2017	Novi Sad. 1/03/2018
Spain	INTIA	INTIASA, Villava. 16/03/2017	Evena, Olite. 3/10/2017	INTIASA, Villava. 7/03/2018
UK	DTA	North Suffolk. 10/05/2017	Cranfield University. 14/09/2017	Kings Lynn. 22/03/2018

**In the Dutch RIW2 the funding opportunities were covered and ideas for new projects were selected. Based on these ideas and funding opportunities, Hub partners worked from December 2017 to March 2018 with farmers and SFT companies on 5 proposals which will be submitted to regional funding programmes on the second half of 2018.*

3.2. Communication strategy

Partners used different channels to communicate and call for the Regional Workshops, namely announcement on the partners' own websites and Social Media accounts, publication of posts on newsletters, presentation of the RIWs at other events, personal communication (phone, e-mail) as well as through other organizations (national trade associations of agricultural machinery, such as AXEMA). Registration was conducted through Google forms, "Eventbrite" or personal communication.

The communication strategy of individual Regional Innovation Hubs was supported at the project level by the Dissemination Manager (INI), posting news on the project's website and Social Media accounts as soon as the date, location, agenda and registration was open for each of the Regional Innovation Workshops. The workshops were tweeted live whenever possible and posts on the project's website and Social Media were uploaded upon workshop finalization. The intensive communication strategy allowed for increasing awareness of the project and the workshops in the Regional Innovation Hubs, overcoming initial Key Performance Indicators in terms of total number of participants.

3.3. Participation of target groups

Apart from farmers and users (cooperatives, irrigation communities, etc.), main target group of the Smart-AKIS project was to involve other stakeholders too. Regional Hubs also invited other key actors in the Smart Farming

sector, in order to account for all interests and views for fostering the adoption of SFTs in the Regional Hubs. Table 3.2 presents the total number and type of participants taking part in the Regional Innovation Workshops of the Hubs.

Invited actors covered all target groups in the SFT value chain:

- **SFT providers** for presentation of the latest technology developments, targeting mainly SMEs and local start-ups;
- **Researchers**, for bringing in new ideas and methods and capturing users' and SFT companies' needs;
- **Advisors**, in order to make sure farmers' needs were broadly represented and innovations could be disseminated; and
- **Policy makers/public authorities**, in order to be aware of the innovations and the users' needs for adaptation of policies and regulation. In the last RIW, funding bodies were also invited in order for them to present the available public funding.

Table 3.2. Total number and type of actors taking part in the Regional Innovation Workshops across the 7 Hubs

Country	Participants					
	Users	SFT companies	Research	Advisors	Others (policy, funding)	total
France	19	16	25	10	0	70
Germany	28	45	49	18	2	142
Greece	72	23	20	6	8	129
Netherlands	39	28	7	15	5	94
Serbia	47	17	14	10	11	99
Spain	65	73	18	30	41	227
UK	62	55	20	16	26	179
TOTAL	332	257	153	105	93	940

Hub partners closely followed the guidelines for the organization of RIWs as prepared by WP3 leader and co-leader ("Guidelines for the organization of RIWs"). This allowed for obtaining homogeneous figures and information from across the Hubs, which has greatly facilitated the production of this Deliverable and D3.6.

3.4. Selection of Smart Farming Technologies

Regional farmers' needs as identified by WP2 survey were the starting point for the selection of the SFTs to be presented in the RIWs for all Regional Innovation Hubs. Partners also made use of their knowledge on the regional/national challenges and cropping systems in order to select the most suitable SFTs to present at the RIWs. The tables below show the SFTs presented in each Regional Innovation Hub.

Table 3.3. SFTs presented in the French Innovation Hub.

Nº	Name of SFT	SFT Category	Cropping system	Purpose
1	Autotrac – John Deere (automatic guidance system)	Product	Arable, Vineyards, Grassland	<ul style="list-style-type: none"> Guidance / controlled traffic
2	Dynatrac - Laforge	Product	Arable, Vineyards, Grassland	<ul style="list-style-type: none"> Guidance / controlled traffic
3	TECNOMA – precision spraying	Product	Arable, Vineyards	<ul style="list-style-type: none"> Variable rate technology
4	KUHN – precision spraying	Product	Arable, Vineyards	<ul style="list-style-type: none"> Variable rate technology
5	LEMKEN – precision spraying	Product	Arable, Vineyards	<ul style="list-style-type: none"> Variable rate technology
6	Oz – Naio Technologies (weed control)	Product	Arable, Vineyards	<ul style="list-style-type: none"> Robot or smart machine
7	Carbon Bee	Product	Vineyards	<ul style="list-style-type: none"> Mapping/recording Reacting/Variable rate technology

Table 3.4. SFTs presented in the German Innovation Hub.

Nº	Name of SFT	SFT Category	Cropping system	Purpose
1	365Farmnet	Product	Arable, Tree, Vegetables, Vineyards, Grassland	<ul style="list-style-type: none"> Farm management information system
2	MyJohnDeere	Product	Arable, Tree, Vegetables, Vineyards, Grassland	<ul style="list-style-type: none"> Farm management information system
3	Agricircle	Product	Arable, Tree, Vegetables, Vineyards, Grassland	<ul style="list-style-type: none"> Farm management information system
4	DKE Data Hub	Development	Arable, Tree, Vegetables, Vineyards, Grassland	<ul style="list-style-type: none"> Farm management information system
5	CNH Farming Platform	Product	Arable, Tree, Vegetables, Vineyards, Grassland	<ul style="list-style-type: none"> Farm management information system
6	Isaria	Product	Arable, Grassland	<ul style="list-style-type: none"> Mapping/recording Reacting/Variable rate technology
7	NEXT farming	Product	Arable	<ul style="list-style-type: none"> Mapping/recording Reacting/Variable rate technology

				<ul style="list-style-type: none"> • Farm management information system
8	Rauch variable rate Fertilizer Spreader	Product	Arable, Grassland	<ul style="list-style-type: none"> • Reacting/Variable rate technology
9	Amazone variable rate Fertilizer Spreader	Product	Arable, Grassland	<ul style="list-style-type: none"> • Reacting/Variable rate technology
10	YARA N-Sensor and Image IT	Product	Arable	<ul style="list-style-type: none"> • Mapping/recording • Reacting/Variable rate technology
11	Fliegl Manure Sensing	Product	Arable, Grassland	<ul style="list-style-type: none"> • Mapping/recording • Reacting/Variable rate technology
12	Kuhn Multispray	Product	Arable, Vegetables, Vineyards	<ul style="list-style-type: none"> • Reacting/Variable rate technology
13	BASF Maglis Leaf Analysis	Product	Arable, Vegetables	<ul style="list-style-type: none"> • Reacting/Variable rate technology
14	ENAS Fraunhofer Institute Biodegradable Microsensors	Research	Arable, Tree, Vegetables, Vineyards, Grassland	<ul style="list-style-type: none"> • Mapping/recording • Reacting/Variable rate technology
15	Agra2b	Product	Arable	<ul style="list-style-type: none"> • Market tool
16	Vantage	Products	Arable, Grassland	<ul style="list-style-type: none"> • Mapping/recording • Reacting/Variable rate technology • Guidance/Controlled Traffic
17	Zunhammer Van Control	Product	Arable, Grassland	<ul style="list-style-type: none"> • Mapping/recording • Reacting/Variable rate technology

Table 3.5. SFTs presented in the Greek Innovation Hub.

Nº	Name of SFT	SFT Category	Cropping system	Purpose
1.	“Modern precision agriculture technologies by Trimble”. TractorGPS	Product	Arable, Tree, Vegetables, Vineyards, Grassland	<ul style="list-style-type: none"> • Mapping/recording • Variable rate technology • Guidance/Controlled Traffic
2.	“Precision agriculture services non-telescopic means”. ECODEVELOPMENT SA	Research result	Arable, Tree, Vegetables, Vineyards Grassland	<ul style="list-style-type: none"> • Mapping/recording • Farm management information system
3.	“Applications for agricultural optimization” AGENSO	Product	Arable, Tree, Vegetables, Vineyards, Grassland	<ul style="list-style-type: none"> • Mapping/recording • Reacting/Variable rate technology • Farm management information system • Robot or smart machine

4.	“Precision agriculture and ergonomic technologies” KONDELLIS SA	Product	Arable, Tree, Vegetables, Vineyards, Grassland	<ul style="list-style-type: none"> • Guidance/Controlled Traffic
5.	“APOLLO application” DRAXIS	Product, Research result	Arable, Tree, Vegetables, Vineyards	<ul style="list-style-type: none"> • Farm management information system
6.	“Agrostis: Company’s products and services presentation” AGROSTIS	Product, Research result	Tree, Vegetables,	<ul style="list-style-type: none"> • Reacting/Variable rate technology • Farm management information system • Robot or smart machine
7.	“New technologies in the preparation of the spraying liquid and management procedure of the empty plastic plant-protection products “ ESYF	Research result	Arable, Tree, Vegetables, Vineyards	<ul style="list-style-type: none"> • Farm management information system
8.	“Smart monitoring of stored goods using Internet of Things technologies “ Centaur Analytics	Product	Arable, Tree, Vegetables, Vineyards	<ul style="list-style-type: none"> • Robot or smart machine
9.	“Apps for agricultural production optimization” AGENSO	Product	Arable, Tree, Vegetables, Vineyards, Grassland	<ul style="list-style-type: none"> • Mapping/recording • Reacting/Variable rate technology • Farm management information system • Robot or smart machine
10.	“Modern precision agriculture technologies by Trimble” TractorGPS	Product	Arable, Tree, Vegetables, Vineyards, Grassland	<ul style="list-style-type: none"> • Mapping/recording • Variable rate technology • Guidance/Controlled Traffic
11.	“Integrated platform for agricultural advisory services “ DRAXIS	Research result	Arable, Tree, Vegetables, Vineyards	<ul style="list-style-type: none"> • Farm management information system
12.	“Development of a variable rate fertilization system for cereals“. Agile Agriculture Technologies	Product	Arable, Tree, Vegetables, Vineyards, Grassland	<ul style="list-style-type: none"> • Robot or smart machine
13.	“Innovation & new technologies in agricultural production – AGRENIO app“. MATRIX INFORMATION TECHNOLOGIES	Product	Tree, Vegetables, Vineyards	<ul style="list-style-type: none"> • Farm management information system

Table 3.6. SFTs presented in the Netherlands Innovation Hub.

Nº	Name of SFT	SFT Category	Cropping system	Purpose
1	Management software for precision agriculture Homburg	<ul style="list-style-type: none"> Product 	<ul style="list-style-type: none"> Arable Vegetables Grassland 	<ul style="list-style-type: none"> Mapping/recording Reacting/Variable rate technology Guidance/Controlled Traffic Farm management information system
2	Apps for Agri, weather and soil data	<ul style="list-style-type: none"> Product 	<ul style="list-style-type: none"> Open field crops in general 	<ul style="list-style-type: none"> Farm management information system
3	MagGrow spraying technique	<ul style="list-style-type: none"> Product 	<ul style="list-style-type: none"> Open field crops in general 	<ul style="list-style-type: none"> Spraying with low doses and with minimal drift
4	Management software Dacom	<ul style="list-style-type: none"> Product 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> Farm management information system
5	Precision spraying, WUR	<ul style="list-style-type: none"> Research results 	<ul style="list-style-type: none"> Arable and vegetable crops 	<ul style="list-style-type: none"> Variable rate technology
6	Hyperspectral imaging, Airinov	<ul style="list-style-type: none"> Product 	<ul style="list-style-type: none"> Arable crops 	<ul style="list-style-type: none"> Mapping Variable rate technology
7	Task map generator	<ul style="list-style-type: none"> Innovation product 	<ul style="list-style-type: none"> All field crops 	<ul style="list-style-type: none"> Mapping Variable rate technology
8	IoT for irrigation management	<ul style="list-style-type: none"> Innovation product 	<ul style="list-style-type: none"> All field crops 	<ul style="list-style-type: none"> Recording Farm management information system
9	Precision spraying	<ul style="list-style-type: none"> Innovation product 	<ul style="list-style-type: none"> Arable and vegetable crops 	<ul style="list-style-type: none"> Precision spraying/Variable rate technology for pesticides
10	Cloud farming	<ul style="list-style-type: none"> Innovation product 	<ul style="list-style-type: none"> Open field crops in general 	<ul style="list-style-type: none"> Farm management information system
11	Data management	<ul style="list-style-type: none"> Product 	<ul style="list-style-type: none"> Open field crops in general 	<ul style="list-style-type: none"> Farm management information system Variable rate application

Table 3.7. SFTs presented in the Serbian Innovation Hub.

Nº	Name of SFT	SFT Category	Cropping system	Purpose
1	IrrigNET	Product	Arable, Tree, Vegetables, Vineyards	• Farm management information system
2	Calibration free microwave soil moisture sensor	Research result	Arable, Tree, Vegetables, Vineyards	• Mapping/recording
3	Remotely Operated Mobile Robotics System for Irrigation and Management of Natural Resources in Smart Farming	Research result	Arable	• Robot or smart machine
4	AgroDrone, Velaware	Product	Arable, Tree, Vegetables, Vineyards	• Mapping/recording
5	Agriculture Remote Aerial Sensing, Logit	Product	Arable, Tree, Vegetables, Vineyards	• Mapping/recording
6	Advisory platform for small farms based on earth observation - APOLLO	Project	Arable, Tree, Vegetables, Vineyards, Grassland	• Mapping/recording
7	Optical Methods for plant health status	Research result	Arable, Tree, Vegetables, Vineyards, Grassland	• Mapping/recording
8	AlertNET	Product	Arable, Tree, Vineyards	• Farm management information system
9	TrapNET	Product	Arable, Tree, Vegetables, Vineyards,	• Farm management information system
10	BoxNET	Product	Arable, Tree, Vegetables, Vineyards, Grassland	• Farm management information system
11	Crops mapping using electro-magnetic probe	Research result	Arable, Tree, Vegetables, Vineyards,	• Mapping/recording
12	Selection of adequate seeds	Research result	Arable	• -
13	DroneAgro toolbox – IN2	Product	Arable, Tree, Vegetables, Vineyards, Grassland	• Mapping/recording
14	BioSense Institute (description of all 5 groups of technologies)	Products / research results	Arable, Tree, Vegetables, Vineyards, Grassland	• -
15	South Hansa – presentations of solutions available in Serbia (Crop Recording, Disease	Products	Arable, Tree, Vegetables, Vineyards, Grassland	• -

Nº	Name of SFT	SFT Category	Cropping system	Purpose
	management, TerraSen and Irrigation management)			

Table 3.8. SFTs presented in the Spanish Innovation Hub.

Nº	Name of SFT	SFT Category	Cropping system	Purpose
1	NDVI use in nitrates measurement in spinach	Research result (producer testimony)	Vegetables	Reacting/Variable rate technology
2	GPS for grape harvesters management	Product (producer testimony)	vineyards	Farm management information system
3	GPS and section controlled sprayer	Product (producer testimony)	Arable & vegetables	Reacting/Variable rate technology
4	Fertilizers VRT trough harvest maps	Product (producer testimony)	Arable	Reacting/Variable rate technology
5	Fertilizers VRT trough drones and NDVI	Product (producer testimony)	Arable & vegetables	Reacting/Variable rate technology
6	Grapes quality zoning trough images and NDVI index	Research result (producer testimony)	vineyards	Farm management information system
7	Spider WebGis platform	Product	Arable & vegetables	Mapping/recording
8	Dron images and humidity sensors	Product	Arable & vegetables	Mapping/recording
9	E-Vineyard platform	Product	vineyards	Farm management information system
10	Robocrop Gardford	Product	Arable & vegetables	Robot or smart machine
11	Farmsight	Product	Arable & vegetables	Farm management information system
12	VRT fertilizer agronurb	Product	Arable & vegetables	Reacting/Variable rate technology
13	SIGAgroasesor	Product	Arable & vegetables	Farm management information system
14	VRT fertilizer VICON	Product	Arable & vegetables	Reacting/Variable rate technology

15	Irrigation remote control	Product (producer testimony)	Arable & vegetables	Farm management information system
16	Irrigation trough humidity sensors BRIOAGRO	Product	Arable & vegetables	Reacting/Variable rate technology
17	Irrigation remote control KUNAK	Product	Arable & vegetables	Farm management information system
18	Humidity sensors LabFerrer	Product	Arable & vegetables	Reacting/Variable rate technology

Table 3.9. SFTs presented in the UK Innovation Hub.

Nº	Name of SFT	SFT Category	Cropping system	Purpose
1	Outfield - aerial imagery and analysis	Product	Tree crops (initially)	Mapping/quantifying flowers
2	AgriVue - drone based images and analysis	Product	Arable and Vegetable	Plan nutrition, herbicide, drainage/cultivation
3	Crop Angel drone	In development particularly for legislation	Arable and vegetable	Spot treatment with pesticide
4	HexCam - drone based imagery	Product	Arable, vegetable, environmental	aerial imaging, surveying, mapping and inspection solutions
5	Hummingbird Technologies	Product	Arable, vegetable	Aerial imagery analysis for crop management
6	RTK Framing – auto-guidance correction	Product	Arable, vegetable	Provide auto-guidance to +/- 20mm year-on-year
7	Omnia Precision Agronomy – agronomic solutions from data analysis	Product	Arable, vegetable, grassland	precision farming system using Multi-Dimensional Data Analysis
8	National Institute of Agricultural Botany - research	Research	Arable, Vegetable, Grassland	Overview of measurement and analysis for farming decisions
9	Cranfield University: -partner in Crop Health and Protection (CHAP) and Agricultural Engineering Precision (Agri-EPI) centres	Research	Arable, Vegetable, Grassland	Overview of 2 (of 4) of UK's AgriTech Strategy research centres
10	Soil-for-life	Product/Research	Arable, Vegetable, Grassland	Commercial/research knowledge exchange based "toolkit" for farmers to improve soil health, yield and agricultural sustainability
11	Delta-T-Devices – precision irrigation	Product	Arable, Vegetables, Trees	Sensors and systems for monitoring soil

				moisture for irrigation control
12	Precision Decisions – supplier of STs for variable rate	Products	Arable, Vegetable	Supplier of hardware, sensors, software for farmers to use FMIS and VR
13	Soil Moisture Sense	Product	Arable, Vegetable	Remote soil moisture and climate monitoring for decision support
14	Controlled Farming Europe	Product (membership knowledge network)	Arable, Vegetable Grassland	Support for members using or establishing permanent trackway CTF systems.

3.5. Sources of funding for Project Ideas

Partners in the Regional Hubs have identified and described the sources of funding at regional and national levels for the funding of multi-actor collaborative projects in SFT.

Grants and open calls

Table 3.10. Grants and open calls identified by the French Innovation Hub.

Nº	Name of grant (and link)	Funding body	Geographical scope	Eligible projects*	Eligible beneficiaries	Eligible expenses	Aid intensity (%)	Coming deadlines	Other info
1	Technological research for the competitiveness and sustainability of the production sectors: http://agriculture.gouv.fr/developpement-agricole-et-rural-appels-projets	French Ministry of Agriculture (CasDAR: agricultural and rural development)	National	<i>Collaborative R&D&I projects Proof of concept</i>	Research Bodies Association Advisors Private companies	300k€ per project (salary, equipment...)	80%	March 2019	
2	Innovation and partnership http://agriculture.gouv.fr/developpement-agricole-et-rural-appels-projets	French Ministry of Agriculture (CasDAR: agricultural and rural)	National	<i>Collaborative R&D&I projects Proof of concept</i>	Research Bodies Association Advisors Private companies	500 k€ per project (salary, equipment...)	80%	November 2018 and April 2019	2 steps evaluation

		development)							
3	Scientific and technological innovations to accompany the ecological transition http://www.agence-nationale-recherche.fr/fileadmin/documents/2017/Plan-d-action-ANR-2018.pdf	ANR – French funding agency for research	National	<i>Collaborative R&D&I projects</i>	Research Bodies Association Advisors Private companies	From 15 k€ to no limit	100% public partners 35-50% for private partners	November 2018 / April 2019	2 steps evaluation
4	Several calls (technologies, agriculture, environment, bioeconomy) http://www.ademe.fr/actualites/appels-a-projets	ADEME - Agency for the Environment and Energy Management	National / regional	<i>Collaborative R&D&I projects Proof of concept</i>	Research Bodies Association Advisors Private companies	Variant	35-50%	several	
5	Ecophyto call: innovative and efficient projects to decrease pesticides use. http://agriculture.gouv.fr/sites/minagri/files/20160526_appel_a_projets_national_ecophyto_ii.pdf	French Ministry of Agriculture	National	<i>Collaborative R&D&I projects Proof of concept</i>	Research Bodies Association Advisors Private companies				Action 1.2 and action 4

Table 3.11. Grants and open calls identified by the German Innovation Hub.

Nº	Name of grant (and link)	Funding body	Geographical scope	Eligible projects*	Eligible beneficiaries	Eligible expenses	Aid intensity (%)	Other info
	EIP Agri	EU	Regional on level of federal states	Operational groups of min. 2 farmers with focus on agricultural developments	Operational groups and sub-contractors	Personnel costs. Sub-contractor costs. Publications.	Depending on status of SME. Up to 100% for research institutions	
	Programm zur Innovationsförderung	Ministry of Food and Agriculture	National	Individual funding of experimental development groups for different scopes	Individual partners. Industry,	Personnel costs. Sub-contractor costs.	Depending on status of SME. Up to 100% for	Link

				in plant/animal/management developments	Research, Farmers	Publications	research institutions	
	Deutsche Innovationspartnerschaft Agrar	Ministry of Food and Agriculture	National	Individual funding of experimental development groups for different scopes in plant/animal/management developments	Individual partners. Industry, Research, Farmers	Personnel costs. Sub-contractor costs. Publications	Depending on status of SME. Up to 100% for research institutions	Link
	Landwirtschaftliche Rentenbank	Ministry of Food and Agriculture	National	Individual funding of experimental development groups for different scopes in plant/animal/management developments	Individual partners. Industry, Research, Farmers	Personnel costs. Sub-contractor costs. Publications	Depending on status of SME. Up to 100% for research institutions	Link

Table 3.12. Grants and open calls identified by the Greek Innovation Hub.

Nº	Name of grant (and link)	Funding body	Geographical scope	Eligible projects*	Eligible beneficiaries	Eligible expenses	Aid intensity (%)	Coming deadlines
	Measure 16	Ministry of Rural Development and Food	Regional National International	• Operational Groups Calls	Individuals, research institutes, NGOs, Innovation brokers		Up to 90% (including Measure 4)	Multiple - all year round
	Measure 4	Ministry of Rural Development and Food	National	• Investment grant for equipment modernisation	Farmers or groups of farmers, SMEs	The purchase or lease-purchase of new machinery and equipment, general costs, water metering costs etc.	€150,000 excluding VAT, by part-financing of eligible costs up to 50%	Open until 31st December 2020
	RIS3	European Regional Development Fund	Regional National	• Operational Groups Calls	Support of R&I Structural Funds			Not applicable

		(ERDF) and the European Social Fund (ESF)- 13 Prefectures of Greece		under RDPs	Managing Authorities, policy-makers and regional development professionals			
	Prima	European Union through Horizon 2020	International	<ul style="list-style-type: none"> • General individual and collaborative R&D&I projects • agri-food specific R&D&I grants programmes 	R&I activities			17.04.2018 15.09.2018
	EUREKA	European Union	Regional International	<ul style="list-style-type: none"> • General individual and collaborative R&D&I projects • agri-food specific R&D&I grants programmes 	SMEs, small and large industry, research institutes and universities	Rules applying to each EU country	First prize 6,000 Euros & promotional support	Open all year 23.04.2018 30.04.2018 30.05.2018
	Eurostars	EUREKA and European Commission	Regional International	<ul style="list-style-type: none"> • General individual and collaborative R&D&I projects • agri-food specific R&D&I grants programmes 	Research-performing SMEs	Rules applying to each EU country	1.7M € average project cost	13.09.2018
	IoF 2020-internal calls	EU through Horizon 2020	Regional International	<ul style="list-style-type: none"> • General individual and 				

				collaborative R&D&I projects <ul style="list-style-type: none"> • agri-food specific R&D&I grants programmes 				
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Table 3.14. Grants and open calls identified by the Dutch Innovation Hub.

Nº	Name of grant (and link)	Funding body	Geographical scope	Eligible projects*	Eligible beneficiaries	Eligible expenses	Aid intensity (%)	Coming deadlines
	https://www.pop3subsidie.nl/	Government	regional	Training and demonstrations	Farmers	Labour, investment, communication cost, materials needed	70-80	several
	https://www.pop3subsidie.nl/	Government	Regional	Cooperation for innovation	Farmers and SME's	Labour, investment, communication cost, materials needed	35-70	several
	https://www.pop3subsidie.nl/	Government	Regional	Operational groups	Farmers and advisors	Labour, investment, communication cost, materials needed	70-80	several
	https://www.pop3subsidie.nl/	Government	Regional	Investments in specific machinery and equipment	Farmers	Machinery and equipment	40	several

Table 3.15. Grants and open calls identified by the Serbian Innovation Hub.

Nº	Name of grant (and link)	Funding body	Geographical scope	Eligible projects*	Eligible beneficiaries	Eligible expenses	Aid intensity (%)	Coming deadlines
1	IPARD https://ec.europa.eu/agricul	European commission - Instrument for	National	Investment grant for equipment modernisation	Agricultural holdings from Serbia	<ul style="list-style-type: none"> • Construction works • Craft works 	Up to 70%	<ul style="list-style-type: none"> • 28.05.2018. • August

	ture/enlargement/assistance/ipard_enhttps://ipard.cors/index-l.html	Pre-Accession Assistance in Rural Development.				<ul style="list-style-type: none"> Equipment and machinery 		2018
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Table 3.16. Grants and open calls identified by the Spanish Innovation Hub.

Nº	Name of grant (and link)	Funding body	Geographical scope	Eligible projects*	Eligible beneficiaries	Eligible expenses	Aid intensity (%)	Coming deadlines
1	Operational Groups	Ministry of Agriculture	National	Operational groups (GO)	Farmers, Companies, RTOs	Any kind of expenses	Up to 100%	April-May 2018
2	PDR	Gobierno Navarra	Regional	Rural development, demonstrative projects	Farmers, Companies, RTOs	Any kind of expenses	90%	2019
3	I+D+i	Gobierno Navarra	Regional	R&D&I projects	Companies, RTOs	Any kind of expenses	100%-OPI Variable-companies	2019

Table 3.17. Grants and open calls identified by the UK Innovation Hub.

Nº	Name of grant (and link)	Funding body	Geographical scope	Eligible projects*	Eligible beneficiaries	Eligible expenses	Aid intensity (%)	Coming deadlines	Other info
1	Various calls www.gov.uk/government/organisations/innovate-uk including AgriTech Catalyst four AgriTech Centres, and Knowledge Transfer Partnerships See also https://www.gov.uk/government/publications/innovate-uk-delivery-plan-2017-to-2018	Innovate UK (Government agency)	UK and international involving certain developing countries	Must be business led, involve at least 2 partners and can include academic research. Various calls;	Businesses (SME and large), research organisations. Covers TRLs 3-7 only	Staff, equipment, travel and subsistence, project management	Variable depending upon closeness to market, size of business	Variable	Popular but needs to be followed to catch specific

	and https://apply-for-innovation-funding.service.gov.uk/competition/search			including agri-food, open (all tech sectors), developmental			etc. Average figure of 50%		c calls.
2	Charitable supporting of agricultural engineering research and students etc www.dbt.org.uk See also www.afcp.org.uk/	Douglas Bomford Trust (a member of the AgriFood Charities Partnership)	UK and international e.g. PhD studies in UK	To individuals and organisations for e.g. studentships, university chairs, study visits, etc.	Organisations and individuals. UK connection, long commitment to engineering applied to agriculture and similar.	Travel, university fees, subsistence, etc.	Variable; prefers part-funding,	Ongoing	
3	Various e.g. Industrial Partnership Awards and “Stand-Alone” LINK https://bbsrc.ukri.org/funding/filter	Biotechnology and Biological Research Council (BBSRC)	Mainly UK; some developing country links.	Variety of grants to help promote fundamental research (may have been BBSRC funded) towards commercialisation	UK company (or major UK links), collaborate with minimum 1 business and 1 academic partner.		No more than 50% of project costs.	25 Sept 2018	
4	European funding – still open for business! Organised through Enterprise Europe Network www.enterprise-europe.co.uk -Horizon 2020	EC. Open to UK until end 2020 but negotiated	Various	Various	Most, SMEs, large businesses, academic and		Up to 100%	Various	

-European Innovation Council Pilot (including SME Instrument and Fast Track to Innovation)	settlement after then.			research organisations.				
-Eurostars								

Financial instruments

Table 3.18. Financial instruments identified by the French Innovation Hub.

Nº	Name of programme (and link)	Funding body	Geographical scope	Instrument category*	Eligible beneficiaries	Financial aid support	Coming deadlines
1	Regional Innovation Partnerships http://www.bpifrance.fr/A-la-une/Actualites/Partenariats-regionaux-d-innovation-PRI-financer-les-projets-innovants-19055	BPI FRANCE Investment funds	National, regional, local	Loan and grants	SMEs, start-up	From 200 k€ to 5 M€	whenever

Table 3.19. Financial instruments identified by the Greek Innovation Hub.

Nº	Name of programme (and link)	Funding body	Geographical scope	Instrument category*	Eligible beneficiaries	Financial aid support	Coming deadlines
	The egg (https://www.theegg.gr/el)	Eurobank and The Hellenic Initiative	National	Acceleration/incubation service for start-up	Everyone who has a smart business idea, aged 18-49 with a degree from an accredited university	Loan up to €12,500	23.04.2018
	ORANGE GROVE (https://orangegrove.eu/)	The Netherlands Embassy in Athens	National	Acceleration/incubation service for start-up	OG Startups	Up to €15.000 each quarter	-
	ACEin (https://acein.aueb.gr/en/)		Local	Acceleration/incubation service for start-up	Researchers and potential young entrepreneurs	-	18.04.2018 – 23.04.2018
	Business Angels Europe (http://www.businessangelseurop)		Regional	Leading business angel networks	Business angel networks and groups	-	17.04.2018 – 28.11.2018

	e.com/SitePages/default.aspx)			and groups across Europe			
	NBG Business Seeds	National Bank of Greece	National	Equity (seed capital), loans, warranties	Start-up, SMEs, services, Spin-off, Spin-out	Prizes: First € 20,000 Second € 10,000 Third € 6,000 Fourth € 4,000	Will be announced
	act4Greece program	National Bank of Greece	National	Equity (seed capital), loans, warranties	Support for innovative entrepreneurship through crowdfunding.	-	-

Table 3.20. Financial instruments identified by the Dutch Innovation Hub.

Nº	Name of programme (and link)	Funding body	Geographical scope	Instrument category*	Eligible beneficiaries	Financial aid support	Coming deadlines
	MIT: SME innovation support Cooperation for R&D	RVO (Governmental organisation for Dutch entrepreneurs)	National, & regional	Innovation support	SME's	35% of eligible costs	Per province 1 or 2 deadlines per year
	MIT: SME innovation support 'Kennismouchers'	RVO	Regional	Knowledge voucher	SME's	50	Per province 1 or 2 deadlines per year
	MIT: SME innovation support	RVO	Regional	Feasibility study	SME's	40	Per province 1 or 2 deadlines per year
	Eurostars	https://www.eurostars-eureka.eu/	International	R&D investment subsidy	R&D performing SME's	50	13-9-2018

Table 3.21. Financial instruments identified by the Serbian Innovation Hub.

Nº	Name of programme (and link)	Funding body	Geographic scope	Instrument category*	Eligible beneficiaries	Financial aid support	Coming deadlines
1	KATANA https://katanaproject.eu/ https://katanareward.opencircleproject.com/	EC (through BioSense Institute)	International	Crowdfunding platform	SMEs	2000€ travel voucher. 100.000€ prize for 10 winning consortia	Finished
2	DIATOMIC https://diatomic.eu/	EC (through BioSense Institute)	International	Incubation service for start-up	SMEs, Mid-caps and Competence centres	Up to 200.000€ per project	15.06.2018.
3	IoF2020 https://www.iof2020.eu/opencall	EC (through BioSense Institute)	International	Acceleration/incubation service for, spin-off and entrepreneurs on agri-food sector	IoT technology providers, service integrators, end-users	Up to 500.000€ per project/consortia	30.09.2018.
4	Development Found of Vojvodina http://www.rfapv.rs/	Government of AP Vojvodina	Local	loans	Agricultural households	800€ - 42000€ (in RSD)	Constantly opened
5	Guarantee Fund of the Autonomous Province of Vojvodina http://garfond.rs/%D0%BA%D0%BE%D0%BD%D0%BA%D1%83%D1%80%D1%81%D0%B8/	Government of AP Vojvodina	Local	warranties	SMEs, agricultural cooperative, entrepreneurs in the field of agriculture – all operation in Vojvodina	3000€ - 150.000€	Constantly opened

Table 3.22. Financial instruments identified by the Spanish Innovation Hub.

Nº	Name of programme (and link)	Funding body	Geographical scope	Instrument category*	Eligible beneficiaries	Financial aid support	Coming deadlines
1	ORIZONT	SODENA	regional	Acceleration service	Companies	Up to 110.000€ credits	Open
2	Financial instruments	Caixa Bank	-	Financial	Farmers, Companies,	Variable, credits	Open

				Instruments	RTOs		
3	Financial instruments	Caja rural	-	Financial Instruments	Farmers, Companies, RTOs	Variable, credits	Open

Table 3.23. Financial instruments identified by the UK Innovation Hub.

Nº	Name of programme (and link)	Funding body	Geographical scope	Instrument category*	Eligible beneficiaries	Financial aid support	Coming deadlines
	R&D Tax Credits www.gov.uk/guidance/corporation-tax-research-and-development-rd-relief	HM Revenue and Customs	National,	Tax credits to offset against business expenditure on R&D related staff, equipment and expenses.	UK Businesses, large and small, working on innovative projects in science and technology.	Based on UK Corporate tax rate varied on company size etc.	Annually via submission of business tax returns
	Business Angels https://angliacapitalgroup.co.uk/	Anglia Capital Group	East Anglia	Angel Investors in start-ups and early growth businesses with innovative, technologies.	Innovative business. (Not just agri-tech sector)	Case by case	

Other instruments and tools for supporting multi-actor collaboration

Table 3.24. Other funding instruments identified by the French Innovation Hub.

Nº	Name of programme (and link)	Promoter body	Geographical scope	Eligible collaborations*	Eligible beneficiaries	Eligible expenses	Aid intensity (%)	Coming deadlines
1	Experiments, methods and tools for agriculture http://www.franceagrimer.fr/Aides/Appel-a-projets-	FranceAgri Mer	National	Experimental programmes from advisory services, technical institutes, agricultural departments or farmers associations	<ul style="list-style-type: none"> • Agricultural institutes • Education • Associations • Advisors • Private 	300k€ per project (salary, equipment...)	50-80%	October 2018

	Experimentation-Methodes-et-Outils				companies			
2	Operational groups	Regions	Regional				90-100%	

Table 3.25. Other funding instruments identified by the UK Innovation Hub.

Nº	Name of programme (and link)	Promoter body	Geographical scope	Eligible collaborations*	Eligible beneficiaries	Eligible expenses (if any)	Aid intensity (%)	Coming deadlines (if any)
1	Commercial and academic collaboration	Medium/large companies e.g. John Deere	National, international	Of benefit to major commercial partner	Case-by-case	Case-by-case	Case-by-case	

Table 3.26. Other funding instruments identified by the Spanish Innovation Hub.

Nº	Name of programme (and link)	Promoter body	Geographical scope	Eligible collaborations*	Eligible beneficiaries	Eligible expenses (if any)	Aid intensity (%)	Coming deadlines (if any)
1	Experimental Programme	INTIA	regional	Own experimental programme from advisory service	Coops	Durable goods and services	100%	Open
2		Orvalaiz	Regional	Agreements with farmer coops	Farmers	Durable goods	Up to 100%	Open
3		AN	Regional	Agreements with farmer coops	Farmers	Durable goods	Up to 100%	Open

3.6. Evaluation of the workshops by participants

Participants were asked about the interest of the RIWs for them, with an average mark of 4/5 across all three RIWs and Regional Innovation Hubs. Whereas the RIWs were found more interesting and relevant in Southern European countries (>4), such as Greece, Spain and Serbia, slightly lower marks (around 3.5) were given by participants in Northern Europe, such as Netherlands and Germany. Whereas this is most likely due to the Smart Farming field being more widespread in these regions, participants in the UK were overall more satisfied than their German counterparts, with marks over 4.

Participants in the RIWs were asked to provide open remarks with regards to the RIWs. Most feedback was related to the following three key points:

1. Farmers need to get more involved in exchanges with the industry, advisors and research.
2. Practical demonstration of SFTs is needed through field visits or the set-up of demo-farms.
3. More events and workshops of the like are needed for increasing knowledge exchange among stakeholders, start collaborations and listen to other end-users' ideas.

4. Outcomes and findings of the RIWs

Partners in the seven Regional Innovation Hubs have individually analysed the outcomes of the RIWs. This section summarizes these findings as the starting point for the issuing of recommendations, which are presented in Deliverable 3.6. This section also presents an account of the Key Performance Indicators of WP3.

4.1. Key Performance Indicators

Partners in the seven Regional Innovation Hubs have measured the Key Performance Indicators as stated in the Smart-AKIS DoA (Table 4.1.)

Table 4.1. Key Performance Indicators of the RIWs across all Regional Innovation Hubs.

Key Performance Indicator	France	Germany	Greece	Netherlands	Serbia	Spain	UK	Total	Target
Nº of stakeholders participating in RIWs (section 3.3)	70	142	129	94	99	227	179	940	700
Nº of SFT solutions presented in RIWs (section 3.4)	30	17	20	11	15	18	14	125	50-70
Nº of SFT solutions adopted by practitioners	TBC							TBC	50-70
Nº of grassroots-levels needs and ideas captured	74							74	140
Needs for research (EIP-Agri website)	3	8	1	4	3	2	3	24	NA
Alternative uses for SFTs (section 4.4)	34							34	NA
Project ideas captured (section 4.5)	4	1	9	6	5	7	5	37	NA
Initiation of multi-actor innovation collaborations	2	1	2	3	2	3	3	16	35
Initiation of multi-actor cross-border collaborations and exchanges	16							16	10

4.2 Identification of barriers and incentives for adoption of SFTs

Partners presented in their individual D3.2 reports the economic, technical/technological, social, ethical and other framework barriers (legal/regulatory, tech transfer, training, demonstration, etc.) mentioned in the workshops. Partners also identified, whenever possible, any economic, financial, regulatory, organisational, etc. incentives that could help overcome these barriers. This section presents an overview of the barriers and incentives. More details are presented in D.3.4. "Report on the 1st Transnational Smart-AKIS Workshop".

Economic barriers

- ✓ Value for money is uncertain as generally SFT involve high investment costs.
- ✓ Lack of information on economic benefits (gross margin) from the use of SFTs on different farming systems.
- ✓ Lack of tailored/innovative financial/funding instruments specific to SFT.
- ✓ Abusive contracts related to contract length or exclusivity by some SFT providers.
- ✓ Missing clear communication of added values.

Technical barriers

- ✓ Complexity in the set up and running of agricultural equipment and SFT solutions.
- ✓ Lack of adaptation of current equipment, tech and solutions to context: size of farms, production types, topography, spatial variability, etc.
- ✓ Lack of compatibility among systems and data formats.
- ✓ Some technical limitations in terms of battery lifespan on some agricultural equipment (drones, sensors systems).
- ✓ Connectivity, specifically for the transfer of big data volumes and GPS RTK and 5G coverage, with large white areas in some territories.
- ✓ Reliability and accuracy of data collected through sensors and imagery.

Technology transfer and social barriers

- ✓ Insufficient and/or inefficient support and communication between providers and farmers for SFT choice of appropriate scale and cost, due to different expectations and cultures.
- ✓ Collaboration among industry players for developing a holistic approach: users do not appreciate having different innovations from different companies.
- ✓ Lack of practical research and demonstration of added-value of SFT. Dissemination and demonstration of successful business cases (best practice farms) as good practices at the farm level (not individual SFT level), providing information on cost-benefit (e.g. Bayer digital farming demonstration farms in Belgium and Germany, or Digifermes demonstration farms in France).
- ✓ Lack of technical advice and support on the ground (other than commercial) leads to lengthy appropriation by users. Peer-to-peer collaboration.
- ✓ Change management and risk aversion: some farmers do not get access to sources of information on available SFTs and showcase resistance to change for the adoption of SFT.
- ✓ In other cases farmers are overwhelmed by the existing offer of SFTs and feel insecure on the speed of new innovations leading to technological obsolescence, which limits the development of investments in SFTs.
- ✓ Education and training is not updated in terms of SFTs use.
- ✓ Automation and robots social perception is somewhat contradictory, as it is assessed both as negative (linked to job losses) and positive (improvement of working conditions and reduction of work time).
- ✓ Independent assessment of the quality, conformity and added-value of SFT.

Barriers related to agricultural data

- ✓ Valorisation of data is top priority: more and more farm data are collected, how to use these data for improving management is a big question. New business models could be developed.
- ✓ Data ownership, security and sovereignty are issues of concern. Fear of monopolism of data with few data providers. Transparency.
- ✓ Mistrust or unbalance between the data provided by farmers and the intelligence received from provider. This questions the perceived usefulness of digital platforms.
- ✓ Improvement on the automated translation of data into operational and actionable information for proper decision making (Artificial Intelligence).
- ✓ Need for public-private platforms collating, amalgamating, sharing and exploiting agricultural data (e.g. French API-AGRO start-up) and neutral bodies for interpretation of aggregated data from multiple sources.

Regulatory barriers

- ✓ Existing regulatory barriers for autonomous machines and drones.

Economic incentives

- ✓ Decision support tools and services (extension and agronomic services) need to be put in place in order to support farmers' investments decisions based upon RoI, as well as for accompanying farmers in the setup and maximum use of purchased equipment and technologies.
- ✓ Programmes, grants, tax incentives, access to financial instruments for ag equipment purchase, or lease (technology loans).
- ✓ New grants programmes could be put in place allowing for soft investments on external services support and the development or access to data platforms or databases.
- ✓ Collaborative approaches (such as French CUMA) to be envisaged for supporting collaborative investment decisions.
- ✓ State subsidy for new technologies
- ✓ "Intelligent" financial support (new ways for subsidies)
- ✓ Farm cooperatives for adaption of new technologies
- ✓ "Digital bonus" for agriculture

Regulatory incentives

- ✓ Mobile connectivity (5G) nationwide also for farmers
- ✓ Broad band expansion in rural areas
- ✓ Providing access to geodata nationally
- ✓ Some current and upcoming environmental and food safety regulations are perceived as an opportunity for an increased adoption of SFTs as these technologies will ease regulatory compliance: nutrient inputs (N, P), systemic approach to food traceability, etc.
- ✓ Red-tape and paper work for subsidies management and compliance of administrative regulations becomes easier the more automated and integrated the processes and the collection of data.
- ✓ SFTs allow addressing the SOCIAL RESPONSIBILITY demands from consumers on more TRASPARENT and ENVIRONMENTALLY FRIENDLY food production systems in terms of water and carbon footprint, traceability of chemicals use, certification, etc.

Other incentives

- ✓ "Train the trainers" so that advisors are up-to-date in SFT. Subsequent information, support and training on SFTs by advisory and extension services to farmers. Lifelong learning.
- ✓ Easy to understand and use databases, repositories and resources, with audio-visual materials (videos, games, etc.), field testimonials, etc. (like Smart AKIS Smart Farming Platform and GATES serious game) for increasing skills on SFT both of farmers and advisors. Use of social media for dissemination.
- ✓ Impartial fact-checking, reliable, non-commercial and independent expert advice for accompanying farmers on their purchase decision, equipment set-up's quality and conformity: platforms (e.g. Smart Farming Platform) or advisory services (e.g. France, Greece, Serbia).
- ✓ Integration of SFTs on Education & Training agricultural curricula, including up-to-date equipment: SFTs to be integrated on top of basic knowledge about soil-plant-climate interactions, as SFTs are just another tool.
- ✓ Training to SFT providers for delivering a more pedagogically sound efficient training and tech support to farmers.
- ✓ Information and awareness campaigns aimed at agricultural journalists for communicating a positive image of technology in agriculture.

4.3. Interest on existing SFTs – most demanded SFTs

The sophistication, complexity and interest expressed on the SFTs presented on the RIWs reflect the maturity level of SFT adoption in each country as well as the participants attending. Some examples of SFT showcased in RIWs are: water irrigation sensors (Spain and Serbia), imagery and autoguidance systems for Variable Rate Application on seeding, irrigation, fertilization, spraying and weed control (Greece, Netherlands and Spain), nutrient management systems (based upon sensors and predictive tools for future nutrient demands) and cheap biodegradable micro-sensor for climate, soil, and water observation (Germany), innovative spraying techniques (based on magnetised spraying liquid) and specialised equipment such as autonomous weeders for onion and carrot crops (the Netherlands). RIW participants stated that the improvement of yield or other direct benefits shall be placed at the forefront of the SFT adoption strategy: **SFTs shall be considered a tool, not a goal.**

Farm management and Decision Support Tools

- Increasing efficiency in organizing processes (logistics, accounting,...) and inputs use, including human labour and fuel.
- Improving work conditions (ergonomics, comfort and safety)
- Improve logistics (water transportation)
- Detailed overview about current status of different farm sections and internal costs (husbandry, crops, energy,...)
- Meet regulations and simplify documentation through digital reporting systems: CC, crop protection regulations, organic certification, etc.
- Data collection and management for improved decision making
- Digital tools for improving decision support that are easy to use for farmers
- Field robots could be more efficient in small sites

Value chain organization

- Share information and data with stakeholders
- Tools for supporting trading in a transparent market: online tools for selling outputs not only buying inputs.
- Inter/cross-farm cooperation and digital billing of services
- Cooperatives for sharing machinery (CUMA) and data/information (data compatibility and ownership can be an issue).

Crop production and protection

- Knowing and managing soil and crop in-field spatial heterogeneity (also pests and weeds) for meeting local yield potentials
- Reduced environmental impacts (N-losses, eutrophication...) and protection of ecologically valuable areas through increased knowledge of crop status, soil nutrient contents and precise/controlled input application.
- Improved cropping systems by introduction of new crops, mixed-cropping, contour cropping.
- In-field identification of pests and weeds
- Self-guidance for complex farming operations like mechanical hoeing, sowing after strip-till and staggered seeding.
- Optimized application systems for reducing environmental impacts of spraying (losses, drift,...).
- Support in resistance management
- Irrigation efficiency and irrigation remote control. Satellite remote sensing in irrigation.
- Remote sensing and VRA with GPS in orchards.

4.4. Research needs and new uses of Smart Farming Technologies

Partners collected at RIWs the research needs related to SFT as expressed by participants. Potential new uses for existing equipment were also suggested at RIWs. This section presents an overview. Some individual research needs have been transferred to the EIP-Agri website following their templates.

Sensors

- ✓ Affordable soil quality sensors irrespective of the type of soil (sandy, silty, peaty, etc).
- ✓ Soil thermal & moisture measurement for effective irrigation.
- ✓ Sensors used for nutrient management also to be used for crop protection and crop status in general (growth rates, stress...).
- ✓ Practical sensors to “see” underground (e.g. of roots, tubers not just moisture profile).
- ✓ Alternative means of communication to internet connection for sensors and IoT systems.
- ✓ Microbiological testing for food safety to be transferred to soil health indicators.

Imagery

- ✓ Improvement with new functionalities the spectrum of cameras for more specific information, e.g. assessment of ripening of the edible products (e.g. peas, cherries) by image processing technique, early detection of disease in crops to allow for targeted chemical application, etc.
- ✓ Development of index to discriminate different grapes qualities.
- ✓ Correlation of crop imaging with soil data.
- ✓ Identification of weeds in arable crops.
- ✓ Recognition of soil structure features from exposed soil surfaces.
- ✓ Sat and drone imagery to be used for Wildlife and Nature interactions: active bird scaring, census of deer and rabbits, badger trails on livestock farms, 3D maps for flood volume areas, etc.

VRA and autonomous systems

- ✓ Precision inclination sensors that measure the incline or tilt angle should be used to improve the autonomous GPS positioning.
- ✓ Spatial application by GPS maps (drones and SAT) considering NDVI index for spraying.
- ✓ More flexible switch between nozzle types considering spatial application in the field.
- ✓ VRF with biological-based fertilisers.
- ✓ Holistic approach to Variable Rate Irrigation from water drilling to application.
- ✓ Use of drones for crop protection purposes: spraying.
- ✓ Autonomous robotic weed control systems with laser.

Smart Farming systems integration

- ✓ Systems that aid in-field operations and data analysis. Integrated and autonomous systems combining for example early disease detection sensors with on-machine response systems e.g. for blackgrass detection and immediate sprayer control.
- ✓ GPS location management system for harvest easing traceability.
- ✓ Need for a system-based approach: consideration of the whole technology-plant-soil system against one-shot solutions (fertilization/treatment based on individual symptoms).
- ✓ Data Hubs for farmers to share market relevant information (e.g. on prices for farm inputs, like US' Farmers Business Network) and combining compulsory information collected from government's monitoring systems.
- ✓ Integration of traceability and consumers requests.

Decision support tools

- ✓ Improvement on the automated translation of images and data into operational and actionable information for decision making.
- ✓ Artificial intelligence and auto learning in different devices and implements capturing information (data or images.)
- ✓ Weather forecast systems: Better localised and timelier forecasting.

- ✓ “Trial” of software prior to purchase.
- ✓ Modelling based upon imagery and sensors for soil moisture modelling to allow a more effective irrigation.
- ✓ Modelling based upon imagery and sensors for yield potential and forecast models combining fertilization processes.
- ✓ Modelling based upon imagery and sensors for pest and disease forecast modelling and mapping.
- ✓ Modelling based upon imagery and sensors for soil characterisation/zoning in vineyards.
- ✓ Modelling based upon imagery and sensors for early detection of pests for crop protection.
- ✓ Modelling based upon imagery and sensors for link soil microbiology maps to yield maps.

4.5. Multi-actor collaborations

The methodology followed in the RIWs allowed for the incipient formation of multi-actor collaborations in the Regional Innovation Hubs, which was one of the main objectives of Smart-AKIS. These potential collaborations are described in the tables 4.1-4.7 below. Some of these initial project ideas were presented at the 2nd Transnational Smart-AKIS Workshop in the form of posters (see D3.5 for details and section 4.6 below).

Table 4.1. Potential collaborations identified by the French Innovation Hub.

No.	Category of collaboration (Innovation, uptake or transfer: see definition in guidelines)	Related SFT	Cropping system	Short description of potential collaboration	Funding source matched with
1	Horizontal	GPS application	Arable crops	<p>GPS technology is the most common SFT. Nevertheless, though 50% of French farmers own a GPS, they do not optimize its use. This constraint could be explained by a lack of information on: investment choices, potential uses, settings and farmer's benefits.</p> <p>A multi sessions training should aim to:</p> <ul style="list-style-type: none"> ➤ Increase the adoption of GPS applications ➤ Match technology investment with farmer's needs ➤ Present several uses of GPS applications ➤ Describe the technology operation ➤ Understand how to set and use equipment ➤ Present quantified benefit related to these technologies 	Internal, cooperative, regional fund, ecophyto (action 4)
2	Horizontal	Spraying technologies	Vineyard	<p>Sprayers' performance and growers' practices are heterogeneous. Technologies and knowledge on Best Management Practices are evolving quickly. Then a good dissemination is necessary for:</p> <ul style="list-style-type: none"> ✓ Optimization of pesticide use through a better dissemination to advisers and growers. ✓ Dose adaptation to crop parameters (canopy) and sprayers performance ✓ Reduction of impact (drift, applicator exposure) ✓ Presentation of sprayers classification results based on sprayers' test bed (EVASPRAYVITI) ✓ Description of new technologies available to secure 	Ecophyto, regional funds, cooperative training...

				applications ✓ Demonstration of quantified benefits due to technology investment	
3	Transfer	Spraying technologies	Arable crops	During the RIWs, industrials presented new spraying system to farmers. However, spraying equipment are around 20 years old in France. Thus, French farmers do not want to invest in new spraying equipment. However, they would like to improve their old equipment with new spraying technologies (4 nozzles technology, nozzles cut-off...) Farmers want to have access to new technologies with a smaller investment. These adaptations should foster the adoption of Smart spraying technologies.	-
4	Horizontal	SFTs	all	Some public funds support farmer investing in new technologies improving environmental impacts. However, these helps, their amounts and their accesses differ substantially among regions. Nowadays, these supports represent long administrative procedures with a high selection pressure. The idea would be to work with regions (and Europe) to identify: <ul style="list-style-type: none"> - Existing procedure to fund some agricultural investments - solutions to simplify/clarify administrative procedures - relevant technologies and equipment to support 	PCAE

Table 4.2. Potential collaborations identified by the German Innovation Hub.

No.	Category of collaboration	Related SFT	Cropping system	Short description of potential collaboration	Funding source matched with
1	Project group	Biodegradable micro-sensors	Arable Vegetable Vineyards	<i>Plant protection is one of the most important topics when it comes to crop management. Forecast models can support decisions for sustainable pest management. Sensors for recording data are costly and depend on service to provide data. Observing crop stand microclimate should be cheap in hardware and management and therefore cover relevant crops and regions to deliver adequate data for pest infection modelling.</i> <i>Aim:</i> <ul style="list-style-type: none"> ➤ Develop cheap and biodegradable micro-sensors for 	None. Uploaded as project idea in the EIP-Agri website.

				microclimate observations. ➤ Develop data receivers to collect sensor data in the field ➤ Provide a data hub for providing data in a model friendly format	
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Table 4.3. Potential collaborations identified by the Greek Innovation Hub.

No.	Category of collaboration (Innovation, uptake or transfer: see definition in guidelines)	Related SFT	Cropping system	Short description of potential collaboration	Funding source matched with
1	<i>Innovation</i>	<i>A holistic approach to Variable Rate Irrigation (VRI) using Satellite Remote Sensing and Sensors</i>	<i>Arable Tree Vegetable s Vineyards Grassland s</i>	Create a complete irrigation system. A holistic approach to analyse and evolve a solution to the irrigation problem, which ensures every step, from water drilling to application. <i>(Farmer, Advisory Industry -Sensors and VRI, Software for VRI, Informative Platform)</i>	Measure 16, Primarily an OG can be assembled
2	<i>Innovation</i>	<i>Integrated System for table grape vineyard crop protection</i>	<i>Tree Vineyards</i>	The project will focus on the optimization of crop protection strategies in table grape vineyards in Peloponnese. <i>(Farmers' Cooperative -the end-user and the demo farm of the project, Industry -GNSS and satellite imagery, spraying technology, Research - spraying machinery inspection, satellite imagery, technological solutions for precision spraying)</i>	Measure 16, Ministry of Agriculture
3	<i>Technology transfer</i>	<i>Integrated Agriculture Advisory Services</i>	<i>Arable Tree Vegetable s Vineyards Grassland s</i>	The ultimate goal of this proposed project is to enhance farmers' knowledge by strengthening agricultural extension and advisory services within Greece. <i>(Farmers and Farmers' Associations, Research, Extension Services and Advisory, Industry)</i>	Measure 16, Ministry of Agriculture and the General Secretariat of Research & Development

					initiative «Research- Create- Innovate»
4	<i>Innovation</i>	<i>Satellite Remote Sensing in Irrigation</i>	<i>Arable Vegetable s Grassland s</i>	The main objectives of this project are to estimate the needs for irrigation water, check which farmers irrigate the most as well as control their irrigation practices through remote sensing. <i>(Research to enact the irrigation rules, Advisory services, Industry to provide the satellite data needed, Farmers)</i>	None. Uploaded as project idea in the EIP-Agri website.
5	<i>Innovation</i>	<i>A holistic approach to Variable Rate Irrigation (VRI)</i>	<i>Arable Orchards Vegetable s Vineyards Grassland s</i>	A holistic approach to analyse and evolve a solution to the irrigation problem, which ensures every step, from water drilling to application. <i>(Farmers, Agricultural cooperatives, Research and advisory services, Industry)</i>	None. Uploaded as project idea in the EIP-Agri website.
6	<i>Innovation</i>	<i>Variable Rate Fertilization with biological-based fertilizers</i>	<i>Tree Vineyards</i>	The goal of this project is to establish the right methodology and the standards according to which the optimum amount of bio-fertilizers will be applied at specific locations, different "Management zones", for specific crops. <i>(Farmer, Research, Industry, Advisory)</i>	None. Uploaded as project idea in the EIP-Agri website.
7	<i>Innovation</i>	<i>Spraying Drone</i>	<i>Arable Tree Vegetable s Vineyards</i>	The main objective of this project is to be able to proceed to aerial pesticides, herbicides, and fungicides spraying, with the use of drones. <i>(Farmer, Research, Industry, Advisory)</i>	None. Uploaded as project idea in the EIP-Agri website.
8	<i>Innovation</i>	<i>Modelling and prediction for infectious disease epidemiology</i>	<i>Arable Tree Vegetable s Vineyards</i>	The models for infectious epidemics should simulate spatial and temporal patterns of disease spread on a specific time basis for application at wider agricultural areas. <i>(Farmer, Research, Industry, Advisory)</i>	None. Uploaded as project idea in the EIP-Agri website.

9	<i>Innovation</i>	<i>Remote sensing and VRA with the use of GPS in orchards</i>	<i>Tree Vineyards</i>	Data can be collected for targeted individual trees or a portion of the orchard. The estimation of the tree row canopy is possible so that the appropriate amount of crop protection products can be applied. (Farmer, Research, Industry, Advisory)	None. Uploaded as project idea in the EIP-Agri website.
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Table 4.4. Potential collaborations identified by the Dutch Innovation Hub.

No.	Category of collaboration (Innovation, uptake or transfer: see definition in guidelines)	Related SFT	Cropping system	Short description of potential collaboration	Funding source matched with
1	<i>Innovation uptake</i>	<i>Hyperspectral imaging, site specific management</i>	<i>Open field crops</i>	More and more farmers acquire multispectral information about crop development. Handling of the data and transformation into prescription maps is rather complicated process. This process needs to be simplified for the convenience of farmers and advisors.	
2	<i>Innovation uptake</i>	<i>Several</i>	<i>Open field crops</i>	Many farmers hesitate to invest in SFT, because they do not know which kind or brand of SFT will be beneficial and fitting best to their farming situation and how to use these SFT's. To encourage farmers to learn about the benefits, they need to have practical information at easy low cost access related to their farm situation and actual practical problems to solve to improve farming. By courses, training, workshops, mutual exchange of knowledge and demonstration, this problem can be solved. This will give impulse to forward thinking farmers to invest soon in SFT.	
3	<i>Innovation</i>	<i>IoT, soil moisture sensors</i>	<i>Fruit and other permanent crops</i>	Smart irrigation. Ground water in large areas of South West of the Netherlands is not suited for irrigation because of high salinity. Tapwater sometimes is used for fruit crops, but is expensive. Smart irrigation, based on crop need, soil quality and crop development helps to optimize irrigation and reduce costs. This asks for a system using soil moisture sensors, measuring crop development, weather and climate data. The system can be further developed for other site specific measures like root cutting and fertigation.	
4	<i>Innovation uptake</i>	<i>Data</i>	<i>Open field</i>	International exchange and documentation around the top 10 SFT	

		<i>management</i>	<i>crops</i>	applications in European open field crops. Focus on technical and economic aspects of the selected SFT's	
5	<i>Innovation uptake</i>	<i>Soil moisture sensors, IoT, soil management</i>		Determine the optimal timing of soil preparation in spring with help of soil sensors (T and moisture content). Farmers should wait with soil preparation measures in spring until the field conditions are dry enough. For farmers with many different fields it is hard to monitor this 'by hand'. Sensors connected to internet could provide information about soil conditions and about the differences between all the field. In this way a farmer has a DSS for where to begin first.	
6	<i>Innovation</i>	<i>Site specific spraying in high resolution</i>		Biomass or plant specific treatment of pesticides. First spraying machines come on the market that can steer every single nozzle. How can this technique be used in a practical way, taking in account the different cropping systems (potatoes, sugar beets, cereals, etc.). How to make a prescription map for this application? What input is necessary to optimize the use?	

Table 4.5. Potential collaborations identified by the Serbian Innovation Hub.

No.	Category of collaboration (Innovation, uptake or transfer: see definition in guidelines)	Related SFT	Cropping system	Short description of potential collaboration	Funding source matched with
1	<i>Innovation</i>	<i>Soil moisture sensor</i>	<i>Arable</i>	Farmers who use sensors in their fields need to use different types of sensors for each crop type. The need for identification of soil moisture level brought farmers to think about one type of sensor that can be installed in their vineyard, orchard, and other fields, regardless on soil type. This issue will be addressed by research group of BioSense Institute. Presented in RIW3.	EC – H2020 programme
2	<i>Innovation</i>	<i>FMIS</i>	<i>Arable Tree Vegetables Vineyards</i>	Decision support tool that will allow farmers to calculate the economic benefit of specific seed variety usage and appropriate SFT adoption. Presented in RIW3.	EC – H2020 programme + national funds (Ministry of Agriculture)

No.	Category of collaboration (Innovation, uptake or transfer: see definition in guidelines)	Related SFT	Cropping system	Short description of potential collaboration	Funding source matched with
3	<i>Innovation/Market uptake</i>	<i>all</i>	-	SFT trainings to agricultural journalists - The idea behind this project is to organize comprehensive trainings regarding SFTs and their potential impact in agriculture to journalists who are following agricultural topics. The need for this idea comes from inadequate reporting and misleading articles regarding presented technologies, their adoption, how complex they are for implementation, and direct benefits that farmers gained. These trainings should be provided by research institutes (e.g. BioSense Institute) and SFT providers. The topics should be broad enough to cover all important aspects, but at the same time to be concise in order to keep journalists' attention and to assure the uptake of presented knowledge. The cross-border potential is very high due to already established connections. In addition, there is already developed plan for attracting more foreign journalists.	EC – H2020 programme + national funds (Ministry of Agriculture; Regional Ministry of Culture and Information)
4	<i>Innovation/Market uptake</i>	<i>FMIS</i>	<i>Arable Tree Vegetables Vineyards</i>	The goal of the project is to upgrade the currently existing platform, so it can absorb, and process drone data and provide advices to agricultural producers. For the beginning, the platform will be fully interoperable just with project partner's system (Agremo), but further upgrades and developments are foreseen. After second iteration, the platform will be compatible with main drone systems. Presented in RIW3.	National (next iteration: H2020 programme)
5	<i>Innovation</i>	<i>FMIS</i>	<i>Arable Tree Vegetables Vineyards</i>	The goal of this project is to get closer organic agricultural producers and end-user (buyers). The idea behind the project is to turn the smart phone into ultimate tool for running business – an instant messaging application for ordering and selling.	National (Development Fund of Vojvodina) In next iteration: H2020 programme

Table 4.6. Potential collaborations identified by the Spanish Innovation Hub.

No.	Category of collaboration	Related SFT	Cropping system	Short description of potential collaboration	Funding source matched with
1	<i>Transfer, Demonstration Day, Innovative farm</i>	<i>VRT machinery, drones, satellite images</i>	<i>Arable crops</i>	Demonstration of variable rate Nitrogen Fertilization technologies.	In the frame of an Interreg project
2	<i>Development project</i>	<i>WebGis platforms</i>	<i>Vineyards</i>	Development or adaptation of already existing platforms to collect information about the vineyards.	Regional Operational Groups call
3	<i>Research project</i>	<i>Use of images</i>	<i>Vineyards</i>	Development of index to discriminate different grapes qualities.	
4	<i>Research project</i>	<i>Nutritional sensors</i>	<i>Vineyards</i>	Development of an index to discriminate different nutritional needs in vineyards	
5	<i>Transfer, Demonstration farm</i>	<i>Use of images and VRT machinery</i>	<i>Arable crops</i>	Herbicide variable rate application in cereals, rapeseed and legumes	
6	<i>Research project</i>	<i>Images and software development</i>	<i>Arable crops</i>	Images interpretation and artificial intelligence. Improvement of weeds mapping and data interpretation in arable crops.	
7	<i>Development project</i>	<i>Remote control systems</i>	<i>Arable crops</i>	Interoperability between different elements of remote control systems and a Smart platform of collective water management	

Table 4.7. Potential collaborations identified by the UK Innovation Hub.

No.	Category of collaboration (Innovation, uptake or transfer: see definition in guidelines)	Related SFT	Cropping system	Short description of potential collaboration	Funding source matched with
1	<i>Socio-research</i>	<i>All</i>	<i>All</i>	Improve understanding and paths for effective and efficient Knowledge Exchange between SFT suppliers, users and advisors	Pending (Levy funded, Innovate UK, EU)
2	<i>Demonstration</i>	<i>Field</i>	<i>Arable,</i>	Demonstrate use of low power wide area network for appropriate	Following up

		<i>sensors</i>	<i>vegetable, tree</i>	sensors. Commercial LPWAN system provider keen to use research project as demonstrator. Technical/commercial found.	potential UK funding and collaboration e.g. Spain
3	<i>Demonstration</i>	<i>Imagery</i>	<i>Arable, vegetable tree</i>	Use information gathered from Smart AKIS farmer survey, innovation process and funding workshop to discuss with Smart-AKIS partner and prioritise project ideas and funding	Internal/VC/ Innovate UK / EC as appropriate
4	<i>Farming “hub”</i>	<i>all</i>	<i>Arable, vegetable</i>	Work with farms to benchmark, demonstrate and prepare cost-benefit for SFTs	AHDB just established “FarmBench”
5	<i>Not all given. Includes soil drainage,</i>	<i>Not given (various)</i>	<i>Not given</i>	The May 2018 workshop follow-up survey indicates that 9 attendees are discussing possible collaboration but still to finalise proposal and funding source	EC, Innovate UK, internal, BBSRC.

In order to measure the KPI “Initiation of multi-actor innovation collaborations” participants in RIWs were asked through an on-line survey on whether they had pursued contact with other RIW participants after the whole multi-actor innovation process had taken place in the regions. Results from **67 answers** are presented in the figures below.



Figure 4.1. Percentage of all participants that made contacts in the Workshops. Results are shown for the Hubs: France, Germany, Greece, Netherland, Serbia and UK.

The main areas of contact were precision farming machinery and VRT, sensors, irrigation, remote sensing, drones and FMIS.

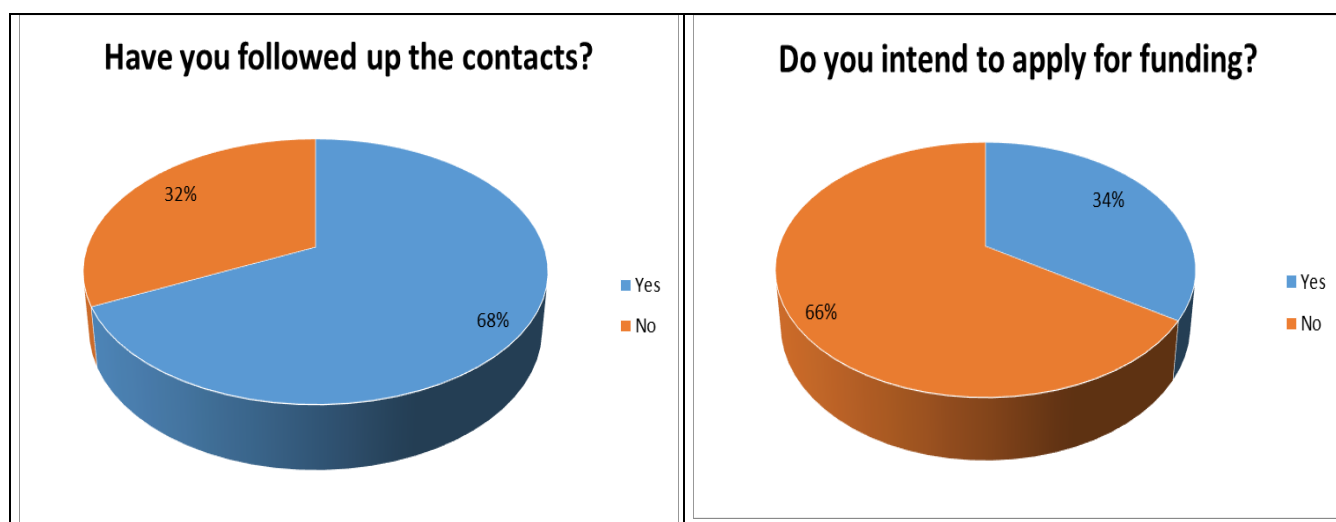


Figure 4.2. Percentage of all participants that followed up the contacts made in the Workshops (left) and percentage of participants that intend to apply for funding with the contacts made (right). Results are shown for the Hubs: France, Germany, Greece, Netherland, Serbia and UK.

The main sources for funding were regional, national and EU funding programmes (H2020, IoF2020 etc.).

Due to the time needed for the establishment of multi-actor collaborations, partners will closely follow the contact with regional stakeholders in order to report on potential collaborations after the end of the project. 85% of respondents gave their consent to be contacted again by Smart-AKIS in 1 year time.

Workshop participants were asked how Smart-AKIS could support them in the collaborations identified, as well as which activities could be put in place in their Regional Innovation Hub for capitalizing the work made in the frame of Smart-AKIS. Networking and exchange activities, dissemination of information, specific training and demonstration activities about SFTs were mentioned as the main tools to support them in the pursuing the collaborations identified as well as in capitalizing the results of Smart-AKIS at the Regional Innovation Hubs.

4.6. Cross-border multi-actor collaborations

The most relevant project ideas identified in the RIWs were presented at the 2nd Transnational Smart-AKIS Workshop, held in Novi Sad (Serbia) on 21-22 March 2018. As described elsewhere (D3.5), this event allowed for regional stakeholders and partners to exchange with each other in their areas of interest. In order to measure the KPI “Initiation of multi-actor cross-border collaborations and exchanges” a follow-up questionnaire was sent to participants to gather information on the consolidation of the contacts and the potential initiation of cross-border collaborations. All respondents expressed they had made contacts during the Transnational Workshop and 50% of them expressed that they had followed up those contacts after the workshop. Areas of contact were mainly VRT, sensors and irrigation. A quite large share of respondents (40%) confirmed their will to apply for funding together with their contacts in the near future, at the regional, national and EU level.

Networking activities, exchange with other actors, information & training activities were mentioned by workshop participants as the activities to be put in place in the Regional Innovation Hubs for capitalizing the work made in the frame of Smart-AKIS, as well as for supporting them in pursuing the collaborations emerged. Due to the time needed for the establishment of cross-border collaborations, partners will closely follow the contact with stakeholders in order to report on potential collaborations after the end of the project. All respondents gave their consent to be contacted again in 1 year time.

4.7. Sustainability and mainstreaming of Smart-AKIS in the Regional Innovation Hubs

Partners in the Regional Innovation Hubs have expressed their interest in mainstreaming the outcomes and methodology of Smart-AKIS into their regions, structures and working procedures.

Dissemination, knowledge transfer and uptake by research agendas

- ✓ **ACTA and FRCUMA (French Hub)** will disseminate Smart-AKIS results and recommendations to their own network (researchers, engineer, advisors and technicians) and other partners and initiatives (INRA, Agricultural chambers, OGs, NRN...). Participants involved in the innovation process in the French Innovation Hub will be informed about all partners’ activities regarding SFTs. French partners will keep fill in Smart-AKIS platform invite stakeholders to register on it.
- ✓ **AUA and CERTH (Greek Hub)** have informed other staff at the University and the research centre respectively. Communication with related stakeholders (farmers, institutes, technology providers and national organizations) has already been intensified. The Technology Cards are already disseminated in companies and stakeholders and this will continue in the next period.
- ✓ **Delphy and WR (Dutch Hub)** will look to connect the Smart-AKIS agenda to the Dutch innovation agenda in order to find opportunities for new projects, given the interest that national and regional Dutch policy officers have shown on the project.

Methodology uptake

- ✓ **ACTA and FRCUMA (French Hub)** will set up training sessions developed during Smart-AKIS. The cross fertilization methodology used in Smart-AKIS will be used in other multi-actor workshops.
- ✓ **DLG (German Hub)** will implement Smart-AKIS results and methodology in its day-to-day activities in order to foster sustainable farming systems using innovative ideas.
- ✓ **Delphy and WR (Dutch Hub)** will continue with the stakeholder interaction in the field of Smart Farming through the existing related networks such as NVTL (of which both partners are members) and FEDECOM, under which stakeholders are organised in The Netherlands.
- ✓ **INTIA (Spanish Hub)** will set up and implement a mid-term strategy for the support of technological innovation in Navarra, a strategy that should incorporate the fundamental elements learned in Smart-AKIS, such as: multi-actor collaboration (multi-actor workshops focused on technologies of interest to solve specific problems, with regional or national scope, through demonstrations, networks and projects), management and transfer of useful information for end users (platform, cards, DST, Itineraries, economic studies, etc.) and finally more institutional actions related to governance, also at the regional, national and European level (PDR programs, Innovation, RIS3, EIP, etc.).

New projects

- ✓ **ACTA and FRCUMA (French Hub)** will take into consideration Smart-AKIS recommendations and ideas to develop new national and European projects (Smart-AKIS 2.0, RT CASDAR, OG...) or to adapt initiatives already on process (Nefertiti, Innoseta...). Eventually, RIWs participants will be contacted for participating in new projects. ACTA will pay particular attention to economic aspects, interoperability, farmer autonomy, etc. in all new technology projects in which it will be involved.
- ✓ **AUA and CERTH (Greek Hub)** have been in close contact with the National Rural Development Network and RIS3 Managing Authorities of most prefectures of Greece in order to promote Smart Farming and prepare proposals for research projects on this sector.
- ✓ **Delphy and WUR (Dutch Hub)** will support the development of the project proposals identified in the RIWs through regional funding.

Platform

- ✓ The Smart-AKIS platform might be hosted in AUA's (**Greek Hub**) servers after approval by the administration.
- ✓ **BioSense (Serbian Hub)** has created AgroSense, a digital platform that provides free-of-charge support to farmers and agricultural companies in monitoring the growth of crops and planning of agricultural activities. Basic services available to users of AgroSense include, among others, the Smart-AKIS technology cards, through a direct connection between AgroSense and the Smart-AKIS platform. In this way, the information gathered in course of Smart-AKIS will be promoted through AgroSense and the Smart-AKIS platform will continue to be alive after the Smart-AKIS project ends.
- ✓ **All partners have engaged** to a lower or higher extent in the further promotion and use of the Smart AKIS platform as it will continue to develop and stays up-to-date with new SFTs developments in Europe.

Participants in the Regional Innovation Workshops as well as the 2nd Transnational Workshop highlighted the importance of pursuing with the networking and exchange activities among stakeholders started at the Regional Innovation Hubs. Other activities, such as dissemination of information, specific training and demonstration activities about SFTs were mentioned as the main tools to capitalize the results of Smart-AKIS at the Regional Innovation Hubs.



smartAKIS
Smart Farming Thematic Network



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