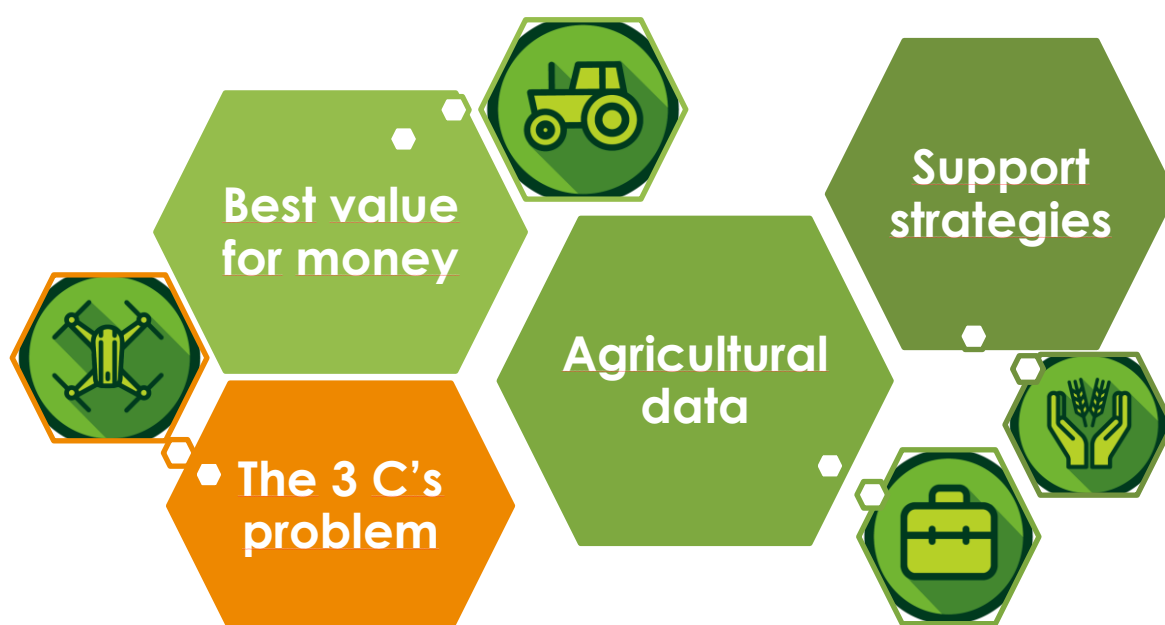


# Smart-AKIS

## Recommendations for mainstreaming Smart Farming in Europe



# Smart-AKIS Recommendations for Mainstreaming Smart Farming in Europe

## Why?

Response to the global food challenge of feeding more than 9 billion people in 2050 and the sustainability and competitiveness challenges of the European agricultural sector, demands a wider adoption of Smart Farming Technologies allowing for a more sustainable, resource efficient and more productive EU agriculture.

Adoption of Smart Farming technologies allows for increases in the sustainability, resource efficiency and yield of agricultural production. However, a number of technological, social, regulatory and economic factors have hindered the widespread adoption of these technologies, both in large but also in small and medium scale farms.

## Who?

Smart-AKIS is the Thematic Network focusing on Smart Farming running from 2016 to 2018. During this time, Smart-AKIS has researched farmers' interests and needs vis a vis Smart Farming, has disseminated Smart Farming technologies through an online platform, and has animated more than 900 stakeholders in 7 EU countries for the generation of multi-actor collaboration projects. You can read the Network's activity in [www.smart-akis.com](http://www.smart-akis.com).

This has allowed us to pool together a wealth of information and insights, leading to a number of recommendations for increasing the adoption of Smart Farming in Europe.

## What?

Recommendations are drawn in three domains :

- Enhancing innovation-driven agricultural research within the EIP-AGRI ecosystem.
- Future research in Smart Farming.
- Recommendations for Mainstreaming Smart Farming, addressing potential solutions to overcome technical economic and social barriers identified.

Following a multi-actor approach, the recommendations target different groups displayed with the following icons:



Farmers



Industry



Research



Advisors/  
Innovation Brokers



Policy-makers

## How?

The whole set of Recommendations are described in a publication available in Smart-AKIS website. The Fact-sheets sum up recommendations with dissemination purposes. All in all, you will find 14 Fact-sheets, including this introductory one.

# Enhancing innovation-driven agricultural research

## Facilitating the multi-actor approach



- Increase **FARMERS' DIRECT PARTICIPATION** as partners in projects facilitating their access to funding, such as budgets for project proposal preparation.
- Facilitate the participation of farmers in Networks and projects by hands-on **DEMONSTRATIONS**: field visits, cross-visits, demonstration farms and small networks of end-users, at the local and regional AKIS scale.
- Reinforce the key intermediary role of **ADVISORY SERVICES**, and other interface and intermediary bodies acting as facilitators and brokers for cooperation and innovation.
- Encourage the integration of **TRAINING** activities aimed at farmers in Networks and projects.

## Structuring the EIP-AGRI ecosystem



- Promote the further **COORDINATION** of Thematic Networks, among them but also with other multi-actor projects that focus on cross-cutting issues, especially those focusing on demonstration farms, peer-to-peer exchanges, advisory services, AKIS, etc.
- Set up permanent **EXCHANGE MECHANISMS AND CHANNELS** among Thematic Networks, the SCAR AKIS Strategic Working Group, DG Agri and EIP-AGRI Service-Point, where EIP-AGRI Service Point can play a central role in the diffusion of information.
- Evolve the **EIP-AGRI PLATFORM** as a one-stop shop knowledge platform, avoiding the duplication of platforms by Networks and projects.
- Increase the budget devoted in Rural Development Programmes (RDPs) for **OPERATIONAL GROUPS** and further promote the inclusion of funding for cross-border Operational Groups.
- Create a new funding measures (under EARDF 2<sup>nd</sup> Pillar or Horizon Europe), for **CROSS-BORDER OPERATIONAL GROUPS**, as mini-projects for co-creation, joint development and demonstration, with reduced red tape for farmers and advisors following challenge-based approaches.
- Empower National Rural Networks (NRN) and National Contact Points (NCP) as **FOCAL POINTS** of EIP-AGRI at national level, for the further coordination of the ecosystem.

## Promoting synergies between EU programmes



- Disseminate a **MAPPING OF AVAILABLE FUNDS/PROGRAMMES** from farmers' point of view.
- Facilitate **SYNERGIES** between EIP-AGRI funding scheme (H2020, EARDF), European Territorial Cooperation (INTERREG) and Erasmus+ programme.
- Simplify access to R&I funding through **REDUCING/REMOVING RED TAPE**.
- Promote the further inclusion of innovative **FINANCIAL INSTRUMENTS**.
- Close the gap between agricultural research and rural development by closer links between the **EIP-AGRI AND EUROPEAN NETWORK FOR RURAL DEVELOPMENT (ENRD)** in order to fully deploy the Smart Villages Act.

# Future research in Smart Farming

## Overall recommendations for future research



- Close the knowledge gap between measuring the status of crop and soils for users to make **PRACTICAL DECISIONS** in farming.
- Update/Tailor measuring tools to be applied for **DIFFERENT CROPPING SYSTEMS**.
- Support research on **REACTIVE TECHNOLOGIES**: Variable Rate fertilization, pesticide, seeding and tillage.
- Develop **ROBOTS** for weeding, precision spraying and selective harvesting.
- Foster research on technologies directly improving **SUSTAINABILITY**: e.g. biodiversity, soil compaction.
- Develop and mainstream technologies suitable for **SMALL FARMS**.
- Develop technical solutions and mechanisms for stakeholders to collaborate in all issues related to **DATA COLLECTION, STANDARDIZATION AND MANAGEMENT**.

## Specific topics for future research



### New affordable Sensors for:

- Measurement of the soil properties used in Decision Support.
- Measurement of soil thermal & moisture content for effective irrigation.
- Crop protection and crop status in general (yield potential, growth rates, stress...).
- Other applications: underground measurement, exploration of roots, tubers, precision inclination sensors for autonomous GPS positioning.

### Imagery: New cameras and indexes for:

- Assessment of ripening of edible products and quality of fruit.
- Early disease detection for targeted chemical application.
- Weed recognition in arable crops.
- Correlation of crop imaging with soil features.
- Wildlife and nature interactions: active bird scaring, census of deer and rabbits, flood areas, etc.

### VRA and autonomous systems

- Maps considering NDVI index for spraying.
- More flexible switch between nozzle types considering spatial application.
- Variable Rate Fertilisation with biological-based fertilisers.
- Drones for crop protection and robots for weed control and selective harvesting.

### Smart Farming systems integration

- Integrated and autonomous systems that aid in-field operations and data analysis
- GPS location management systems for harvest easing traceability.
- Implement a system-based approach: consideration of the whole technology-plant-soil system.
- 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.
- Development of Artificial Intelligence and auto learning in devices for capturing information-
- Better localised and timelier weather forecast systems.
- Models based on imagery and sensors for effective irrigation, yield potential and forecast models.

## Mainstreaming Smart Farming

### Overview

Smart-AKIS has grouped the recommendations for mainstreaming Smart Farming into four blocks, addressing the main barriers of an economic, technical, cultural and social nature, linked to the Smart Farming adoption in Europe:

- Block 1: Value for Money of Smart Farming Technologies.
- Block 2: The 3 Cs problem: connectivity, complexity & compatibility.
- Block 3: Agricultural Data.
- Block 4: Smart Farming support strategies.

All in all, 10 general recommendations are made for the 4 blocks. Each of them is broken down in turn into specific recommendations aimed at different target groups.

### Recommendations

<b>Block 1: Value for money</b>	R1. Demonstrate Smart Farming's benefits
	R2. Improve Smart Farming funding
	R3. Innovate on business models
<b>Block 2: The 3 Cs problem: connectivity, complexity &amp; compatibility</b>	R4. Ensure rural broadband connectivity
	R5. Develop user friendly solutions
	R6. Promote interoperability standards
<b>Block 3: Agricultural Data fueling growth</b>	R7. Promote a transparent framework for agricultural data
	R8. Spur growth from agricultural data
<b>Block 4: Smart Farming support strategies</b>	R9. Mainstream Smart Farming into Education & Training
	R10. Strengthen the AKIS role for the digital era



Farmers



Industry



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Policy-makers

**“Ultimately, Smart Farming Technologies are another tool, not an end in themselves, supporting farmers in the agricultural process, based upon the agronomist science principles and knowledge.”**

# Mainstreaming Smart Farming:

## B1.R1.Demonstrate Smart Farming's benefits

### Why?

High **INVESTMENT COSTS** remains one of the largest barriers for the widest adoption of Smart Farming. There is a perception that the value for money is uncertain. Farmers and advisors demand **EMPIRICAL BASED EVIDENCE** about the economic benefits in yield performance and on a more efficient use of inputs by the means of in-field evidence and demonstration from impartial actors.

The perception about the usefulness for farmers of Smart Farming technologies is almost exclusively based on the economic performance, overlooking the **ENVIRONMENTAL IMPACT** or the improvement of **WORK CONDITIONS**.

### Recommendations



- Promote **INDEPENDENT ORGANIZATIONS** for conducting benchmarking studies of Smart Farming technologies, including cost/benefit analysis calculations.
- Disseminate easy to understand and use **DATABASES, REPOSITORIES AND RESOURCES**, with audio-visual materials and practical information about Smart Farming uses and benefits.
- Support **DEMAND-SIDE POLICIES WITH STRICTER ENVIRONMENTAL AND FOOD SAFETY REGULATIONS**, as Smart Farming technologies will ease regulatory compliance.

### Recommendations



- Develop **DECISION SUPPORT TOOLS** and services by advisors and agronomists in order to support investment decisions based upon performance, as well as for accompanying users in the setup and maximum use of purchased equipment. Implement feedback systems to collect and **SHARE INFORMATION ON THE ECONOMIC PROFITABILITY** of new technologies.
- Disseminate and demonstrate **SUCCESSFUL BUSINESS CASES** as good practices at the farm level by testimonials from early adopters, peer-to-peer exchanges and demonstration.
- Promote **FARM CLUSTERS OR COMMUNITIES FOR DATA COLLECTION**, allowing for trials and demos with field-scale and long-term experiments for benchmarking of data between farms.

### Recommendations



- Conduct independent and neutral research as well as the demonstration of solutions with a wide **NUMBER OF FARMERS AND ADVISORS** covering a variety of soils and crops.
- Improve the **MARKETING AND COMMUNICATION EFFORTS** by industry, bridging the gap in terms of language, culture and expectations with the farmer and advisor community, using more pedagogically sound and interactive communication tools.

### How?

- The [Smart-AKIS Platform](#) model looks efficient to outreach and disseminate practical information for end-users.
- Independent organizations such as [Institut Français du Vin et de la Vigne \(IFV\)](#), which will be the official French body for certification of sprayers for vineyards, can be encouraged.
- Demonstration is key in the digital field, such as [Bayer](#) digital farming demonstration farms in Belgium and Germany, [Digifermes](#) demonstration farms in France and [Digital Farm](#) in Serbia.

# Mainstreaming Smart Farming:

## B1.R2. Improve Smart Farming funding

### Why?

Funding Smart Farming investments remains a challenge in terms of available subsidies and financial instruments specifically tailored for investments in these technologies that entail a **HIGHER RISK** than other well-established machinery and equipment purchase or leasing.

### Recommendations



- Make grants programmes **SIMPLER AND SMARTER**. Make application procedures easy to understand, reduce the red tape involved and make use of the automation of data captured by Smart Farming technologies linked to sensors, satellite imagery, etc in the application and reporting of grants.
- A better **SYNERGY OF INSTRUMENTS** within the existing funding framework at EU and national levels: EARDF, ERDF, financial instruments (FI-COMPASS), Innovative Public Procurement schemes, etc. A mapping of available funding sources and programmes aiming at the different stages of the R&I continuum to the market uptake support, could allow identifying gaps, duplicities, and complementarities.
- Develop **INNOVATIVE FINANCIAL AND FUNDING INSTRUMENTS** specific for investments in Smart Farming, such as tax deduction bonus, financial technology loans or grants programmes allowing for soft investments on external services support and the development or access to data platforms or databases.
- Turn the **COMMON AGRICULTURAL POLICY** (CAP) into an opportunity. CAP is considered as the biggest opportunity to make EU's Agriculture **SMARTER AND GREENER**. This demands to follow a holistic approach on the planning of measures, considering these principles:
  1. Promotion of solutions that are farmers-centred and that reward farmers;
  2. Simplicity in the aid programmes management;
  3. Making the upmost use of Smart Farming Technologies and IT capabilities and
  4. Ultimate goal of greening or increasing the achievement of environmental impact goals of EU Agriculture whilst maintaining it competitive.

### How?

- [RECAP](#) project aims to develop an improved remote monitoring of CAP obligations and to supplement the in-field inspections procedures eliminating several of the burdens linked to the Cross Compliance Scheme. RECAP also offers farmers a tool supporting them to comply with regulations imposed by the CAP, providing personalised information for simplifying the interpretation of complex regulations, and early alerts on potential non-conformities.



# Mainstreaming Smart Farming:

## B1.R3. Innovate on business models

### Why?

The Smart Farming and Digital Agriculture field is a relatively new business sector, with a strong link to the so-called Digital Economy, where new, innovative and disruptive **BUSINESS MODELS** are tested in the market.

There is no set up business models for the Smart Farming market, where different models co-exist promoted by multinational agricultural equipment and solutions providers and fledgling start-ups alike.

### Recommendations



- o Increase **TRANSPARENCY AND FAIR CONTRACTING SCHEMES** by agricultural industry and retailers, as a means to build trust and fully exploit the possibility of the agricultural data economy potential.
- o Foster collaboration among industry players, beyond interoperability and standardisation prerequisites for the delivery of joint services. **AGRICULTURAL SERVICES AGGREGATORS** or consultants, mixing the solutions and technologies from different providers for the delivery of single and tailored services.
- o Assess servitization as a fitting model for end-users through the means of further platform services provided by multinational or grouping of companies. **SMART FARMING AS A SERVICE** might be confirmed as a market trend.
- o Increase innovation on **BUSINESS MODELS AND ON PRICE MODELLING** schemes might ease farmers' buy-up of such services, such as free-of-charge try out periods for users, pay as you use services, etc.
- o Acknowledge and **GIVE VALUE TO FARMERS' KNOWLEDGE**, expertise and data shared with companies for the development of new technologies, services and solutions through fair collaboration agreements.

### Recommendations



- o Support **COLLABORATIVE INVESTMENT SCHEMES**, following the Collaborative Economy paradigm, allowing collaborative investment decisions by farmers and advisors, sharing risks and investment costs and maximizing the use of the technologies.

### How?

- Transparency and fair contracting schemes have taken a big step forward thanks to the recent [EU Code of Conduct on agricultural data sharing by contractual agreement](#) , endorsed by the industry and the farmers community, highly lauded as a necessary step in that direction. The Code of Conduct should be widely disseminated by the different actors involved in order to reach its full potential.
- There are successful collaborative investments methods already established in Europe, that might be used for adoption of Smart Farming technologies, such as the French [CUMA](#), or other type of cooperatives sharing equipment, machinery or processes, and/or local knowledge centres owned/controlled by farmers.



## Mainstreaming Smart Farming: B2.R4. Ensure rural broadband connectivity

### Why?

The so-called 3 Cs problem is referred to Connectivity, Complexity and Compatibility issues. Overcoming these barriers is a cornerstone for the widest adoption of Smart Farming technologies, where policy-makers and industry players are the ones called to act considering end-users perceptions and needs.

**CONNECTIVITY:** Smart Farming technologies are heavily dependent on a steady and high quality access to internet connection considering the number of communication nodes (sensors equipment, laptops, tablets, vehicles, etc.) and the Big Data managed, stored and exploited. In spite of current public and private investments on the delivery of broadband connectivity to EU rural areas, there is still ample room for improvement.

### Recommendations



- o Increase **PUBLIC INVESTMENTS OR PUBLIC-PRIVATE PARTNERSHIPS**, ensuring broadband connectivity all over EU rural and agricultural areas.
- o Promote **ALTERNATIVE SOLUTIONS**, such as for the use of a combination of wired (fibre cable) and wireless solutions to extend the range of connectivity in remote areas.
- o A **CROSSCHECK OF NATIONAL INITIATIVES FOR RURAL CONNECTIVITY** must be coordinated and harmonization must be sought as much as possible to minimize the number of technologies to be used.

### Recommendations



- o Increase research on **WIRELESS TECHNOLOGIES** of communication data in rural areas, and offline operability, such as LoRa/LoRAWAN technology for long range, low power wireless communication platforms, Sigfox or Neul, using different radio bands.

### How?

- [Connecting Europe Facility](#) (CEF), the [Investment Plan for Europe](#), ESIF and ERDF have allowed relevant investments ensuring rural broadband connectivity, by the pooling of EU and national resources and private funds.

## Mainstreaming Smart Farming: B2.R5. Develop user-friendly solutions

### Why?

**COMPLEXITY:** Farmers and advisors report the complexity in the set-up, running and maintenance of Smart Farming solutions as a relevant hindrance. Usability of equipment and platforms can be improved for starters.

The current deployment of a given commercial solution into a real-life farm setting turns out many times as a time-consuming and discouraging exercise, where many unforeseen technical problems and glitches come up leading to tinkering efforts by farmers and retailers alike.

### Recommendations



- Adopt **USER EXPERIENCE (UX)** tools in the definition and design of the interfaces of new solutions and platforms, putting the simplicity and usability by the end-user at the forefront.
- Make easier the **TRANSLATION OF RAW DATA INTO INTELLIGENCE**. A support on the decision-making by farmers and advisors is the final goal of many smart farming solutions. Turning data into intelligence is the key, which leads to the necessary display of data and information into actionable and easy to understand pieces of intelligence supporting the farmers' decisions. Ultimately, Smart Farming Technologies are another tool, not an end in themselves, supporting farmers in the agricultural process, based upon the agronomist science principles and knowledge.
- Promote **PLUG & PLAY** approaches in the industrial design of new pieces of equipment, machinery, sensors and networks, easing the set-up and deployment of new solutions, as well as the capacity to upgrade/replace existing components and machinery with new solutions, ensuring the compatibility between old and newer equipment and systems.
- Improve the existing **TRAINING AND TUTORIAL TOOLS** and platforms allowing training users in the set up and running of new equipment and solutions. A better combination of interactive and digital tools should be made available through training podcasts, infographics, the use of digital screens, short video clips, etc.
- Improve communication on the engagement activities carried out by the industry with farmers and advisers in the **TESTING OF NEW SOLUTIONS** before going to market on a wide range of farms with different production types, crops, topography, spatial variability, etc., allowing adapting the solutions at the biggest number of real life settings possible.

### How?

- Usability is key for adopting of new technologies by farmers. The use of tutorials, videos and other interactive and audiovisual materials can help farmers grasping use of new programmes, platforms and equipment. New training models can be encouraged, such as serious gaming methods. The upcoming [GATES game](#) will be the first ever serious game developed having in mind the Smart Farming training needs for farmers, students, advisors and retailers.

## Mainstreaming Smart Farming: B2.R6. Promote interoperability standards

### Why?

**COMPATIBILITY:** One of the fiercest demands of users is the improvement on the compatibility and interoperability of solutions and data systems. Farmers demand advances in digital communication standards leading to a leaner integration of different technologies and solutions into existing equipment, machinery and sensors with farm management systems in the farm.

Nonetheless, the integration of sophisticated equipment and solutions with older equipment might also lead to incompatibility dead-ends, only surmountable by equipment replacement strategies.

### Recommendations



- o Increase the visibility and outreach of **STANDARDISATION INITIATIVES** within the industry. The back up by policy-makers and authorities of such industry-led initiatives can only increase their outreach and social endorsement.
- o Increase the **ACCURACY AND RELIABILITY OF DATA**. Standards should be developed for interoperability and compatibility allowing exploiting data from different sources and equipment, allowing for translation of data into actionable intelligence.

### How?

- Further dissemination is called for the initiative promoted by the [Agricultural Industry Electronics Foundation](#) (AEF) and [AgGateway Global Network](#) for the [standards for smart, interoperable farm machines](#), in the fields of Farm Management Information Systems (FMIS, wireless in-field communication, high-speed ISOBUS, electric drives and camera systems). AEF has joined forces with AgGateway to make the standard for data exchange future-proof and adapt it to the needs of Digital Farming. Both AEF and AgGateway are active in developing sector-specific standards and guidelines; the value of their cooperation lies in pooling different areas of expertise and knowledge, allowing covering the entire landscape of Digital Farming.

## Mainstreaming Smart Farming: B3.R7. A transparent framework for agricultural data

### Why?

Agricultural Data arises as one of the main hot topics in the new agricultural digital economy, in terms of privacy, protection, data attribution or ownership, ownership, usability, storage, security, sharing and exploitation. Even though coined as the biggest driver for productivity gains, challenges remain in terms of **REGULATION AND THE RIGHTS OF FARMERS** in this field, which seem to have resulted in transparency and trust issues between the farmer and advisor community and the industry.

Farmers' personal data is fully protected by the General Data Protection regulation, while equipment data is also protected by the industrial providers. Agricultural Data, defined as that related to the agricultural production, including farm data and all types of data generated within the farming process is legally owned by the farmer or data originator, who can decide to share it or not with providers, advisors or researchers.

Yet, in real practice, farmers are seldom aware about applicable rights, and controversy arises when farmers' primary data is computed or aggregated with other farmers' data. There is a need to assure people that it is safe to release their data to different instances. To that end, the **BUILDING OF TRUST BETWEEN FARMERS, AGRICULTURAL RETAILERS AND OPERATORS** should be encouraged, through a transparent framework and rules.

### Recommendations



- Boost dissemination of the newly **AGREED EU CODE OF CONDUCT** between company members from the signatories' industries association. Furthermore, the operationalisation of the guidelines through contractual agreements templates or models could also represent a step forward in the trust building between the industry and farmer communities.
- Increase the **TRANSPARENCY IN THE CONTRACTUAL AGREEMENTS** between farmers and industry providers is encouraged as a good practice, with easy to understand regulation of all aspects related to data management and the potential use given to the shared data for commercial or R&I purposes.
- Improve the **QUALITY OF GATHERED DATA**. Good calibration of machinery and automatic transfer of data from machinery to data management tools are a must for ensuring quality of data captured. Further research and self-regulation is proposed in order to ensure the data accuracy, safety and security, increasing the reliability of the data based new services and solutions and the trust of farmers reducing any kind of potential data misuse.

### How?

- The [EU Code of Conduct on agricultural data sharing by contractual agreement](#) promoted by a coalition of industry and farmer community representatives, including [CEMA](#), [COPA-COGECA](#), [CEETAR](#) and [CEJA](#) among others and the support and assistance from the European Commission. It proposes guidelines for the management of agreements between farmers and providers in the field of data attribution or ownership, data access, control and portability, data protection and transparency, data privacy and security and liability and intellectual rights.

## Mainstreaming Smart Farming: B3.R8. Spur growth from agricultural data

### Why?

Management and exploitation of agricultural data can lead to a boost of productivity in farms and to further innovation and refinement of smart farming technologies. This demands, though, the acknowledgment of the farmer and advisor community as owners of such data and their **EMPOWERMENT IN THE DATA ECONOMY**, leading to the emergence of new data sharing models where farmers can grasp how to extract value from their data and the benefits of sharing it.

### Recommendations



- o Promote **AGRICULTURAL OPEN DATA** policies, for disclosing and making available public and anonymised agricultural data.
- o Support the development of public-private **AGRICULTURAL DATA PLATFORMS**, allowing for ecosystems for the start-up of new services, following open innovation ecosystems.

### Recommendations



- o Further awareness raising, dissemination and training of farmers and advisors on the **EU CODE OF CONDUCT**, including new data sharing models like for instance models providing economic return for farmers willing to share their data with the industry or models based upon the use of collective data platforms for sharing and analysing data in CUMA, cooperatives or advisory agencies for the development of early warning systems.

### Recommendations



- o Build further bridges between the **IT AND THE AGTECH** entrepreneur and innovation support ecosystems in the framework of open innovation ecosystems.
- o Benefit from the capacities of **ARTIFICIAL INTELLIGENCE (AI)**, for the delivery of Decision Support Tools, by means of combining AgData interpretation and agronomic knowledge to produce recommendations and decision support intelligence.
- o Support and self-regulate, if necessary, the emergence of new expert support services in the new Data Economy, such as **LEGAL EXPERTS IN DATA MANAGEMENT**.

### Recommendations



- o Embrace the **OPEN DATA RESEARCH** principles widely at all levels of the Education, Training and Research ecosystem, by the sharing of public available data resulting from research.
- o Promote a new stable EU **RESEARCH INFRASTRUCTURE IN DIGITAL AGRICULTURE**, as done in other research areas in the Food and Agriculture research field.

### How?

- [API-AGRO](#) agricultural data platform in France is a public-private initiative, setting up an open platform of agricultural data for the delivery of new services.
- [Digital Innovation Hubs](#) promoted by the European Commission, bring into the fold end-users, farmers and advisors alike from the IT, and Agricultural field.
- Further dissemination is encouraged for initiatives such as Global Open Data for Agriculture and Nutrition initiative ([GODAN](#)) and the [Ag Data Alliance](#), also tackling the ethical management of agricultural data.

# Mainstreaming Smart Farming:

## B4.R9. Mainstream Smart Farming into Education & Training

### Why?

The unrelenting pace of innovation in Smart Farming Technologies makes it difficult to keep abreast on latest tech developments and innovation for farmers and advisors. The specialised and mass media are the main information sources about the latest developments in the field; however, end-users and advisors demand more and more access to information and training on the latest technologies, looking for evidence about the benefits resulting from their application.

Even though well-established technologies have already been integrated into Education and Training curricula and into the practical knowledge of advisors, acceleration on such mainstreaming efforts will become a necessity in future years, when some novel Smart Farming Technologies will become mature and widely adopted and other technologies will emerge and pose new challenges. Thus, an ongoing review of current curricula at all educational levels (higher education, vocational training and lifelong learning is encouraged in order to keep abreast with current and future farmers and agronomists demands.

### Recommendations



- Keep **UPDATING AGRICULTURAL STUDIES CURRICULA** in University and Schools, as well as in the Lifelong Learning offer aimed at advisors and agronomists, mainstreaming well-established and upcoming smart farming technologies.
- Mainstream into **EUROPEAN PROJECTS**, such as Thematic Networks and other multi-actor projects, an **EDUCATION & TRAINING STRAND**, in order to maximize their impact and facilitate the knowledge transfer.

### Recommendations



- Support all training and educational efforts with the latest **DIGITAL AND SOCIAL MEDIA CAPABILITIES** (videos, podcasts, Augmented Reality, Facebook, Twitter, serious games, etc) in order to disseminate the ongoing technology developments in the market
- Set up "**TRAIN THE TRAINERS**" approaches for Advisors, training advisors on the practical knowledge, use and cost-benefit of Smart Farming technologies
- Follow the **AGRONOMY FIRST PRINCIPLE** when integrating Smart Farming technologies into training and information, upon which technologies assessment has to take place against the agronomic benefits provided by a given technology.

### How?

- Public and private advisory services such as [Teagasc](#) and [Delphy](#) follow train the trainers approaches in order to ensure that all advisors get a minimum set of smart farming technology skills for advising the farmer community, backed up by specialized knowledge in the back-end of their services.



## Mainstreaming Smart Farming: B4.R10. Strengthen the AKIS role for the digital era

### Why?

**AGRICULTURAL KNOWLEDGE AND INNOVATION SYSTEMS (AKIS)** remain the open innovation ecosystem where Smart Farming mainstream is to take place following a multi-actor approach. Encompassing and revamping the roles of AKIS is necessary, looking for new avenues, tools and approaches for the delivery of more effective support services for Smart Farming adoption.

### Recommendations



- Assess and experiment on the **ROLE FOR ADVISORS** vis a vis Smart Farming adoption:
  - **FACILITATORS:** Advisors might play a facilitator role, connecting users with experts from industry, applied research, agricultural contractors and other actors, bringing together adopters and non-adopters for the assessment and transfer of technologies. Under this approach, advisors are seen as third party experts, carrying out comparative tests of similar technologies.
  - **SPECIALISTS:** Advisors might also follow a specialization approach, either by technologies applicable to different cultivation processes, or by areas of expertise (crop protection, smart irrigation, etc), allowing for advisors to gain practical knowledge on narrower and more specific knowledge fields.
- Promote **FIELD DEMONSTRATIONS**, jointly with industry, for the benefit of advisors and farmers: outdoor fairs, demonstration farms, field days, peer groups, etc. are efficient approaches for users to see implications, costs and usability of Smart Farming.
- Develop **COLLABORATIVE TOOLS** among farmers and advisors for the joint assessment of technologies, mediated by Advisors' independent role, allowing the dissemination of technical and economical transparent information to farmers.
- Support the decision making process of the farmer for the purchase of new technologies, based upon **QUALITY CHECKLISTS**, with the criteria that farmers should have in mind when assessing the available commercial offers.

### Recommendations



- **SMART FARMING FOR ALL:** Industry is encouraged to address all farmers as potential users of technologies. Democratisation of Smart Farming is a willful aspiration, as we consider that Smart Farming can benefit all kind of farmers irrespective of their digital savviness, farm size or risk and change aversion.
- Broaden up the participation of start-ups, applied research institutes and industry in **MULTI-ACTOR INITIATIVES**, such as Operational Groups or Demonstration Farms, contributing thus to the adaptation of technologies to farmers' real needs, especially those of small-holders.
- Formulate **APPLIED RESEARCH RESULTS IN EASILY TO UNDERSTAND LANGUAGE**, making visible the potential benefits of new technologies, facilitating the uptake of information by advisors.

### How?

- [NEFERTITI](#) is a Horizon 2020 project that establishes 10 interactive thematic networks and bring together regional clusters (hubs) of demonstration farms and the involved actors, specially advisory services in 17 countries. NEFERTITI focuses on creating added value from the exchange of knowledge, in order to boost innovation uptake and peer to peer learning.