



FAIRshare

DIGITAL TOOLS FOR FARM ADVISORS



Deliverable 7.7: Final Report on Policy implementation and Final Conference Report

Authors: Raquel Caetano Ferreira (Teagasc), Rui Almeida (CONSULAI) and Vanja Biševac (CEMA)

Contributions from: all partners; EUFRAS and Copa-Cogeca

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Contact	Raquel Caetano Ferreira (Raquel.Ferreira@teagasc.ie)

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1	28/08/2023	Teagasc; Consulai; CEMA	Raquel Caetano Ferreira; Rui Almeida; Vanja Biševac
2	25/10/2023	CEMA, Consulai	Almeida; Vanja Biševac, Copa Cogeca and EUFRAS

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Executive summary

Policy recommendations are seen as a tool to convince policy makers that the issue highlighted by research is important, and the recommended course of action will be beneficial to society in some respect if action is taken. FAIRshare produced policy recommendations report, drafted together by a multi-actor group of partners, including project's main achievements and findings leading to relevant policy guidelines for policy makers consideration as to better enable and empower advisors and farmers in the digital age.

This report, as an outcome of the Task 7.7. Policy recommendations and final report, comprises the project's main achievements highlighted in sections 2.1-2.8:

- a) Creation of a digital platform (Permanent Networking Facility);
- b) Identification of Good practices;
- c) The interface between DA and the advisory & farming communities;
- d) Development of DAT pilots and User Cases;
- e) Development of roadmaps, dynamic action plan and business plan towards the improved use of digital advisory tools and services (DATS) by the farm advisory community;
- f) Implementation of digital advisory tool adoption business cases;
- g) Communication and dissemination of FAIRshare;
- h) Multi Actor Approach.

Additionally, links to relevant public deliverables have been provided, while all other reports are available on the project's website.

Main achievements have been translated into the set of policy recommendations, following the principle of identified issue, accompanied policy recommendations and expected impact if policy is implemented in practice, listed in section 3.1-3.6:

- a) Trust and data sharing, standardization and interoperability for efficient information gathering and exchange;
- b) Connectivity;
- c) Demonstrate and share the knowledge;
- d) Financial support for investing in new/existing digital technologies and services.

In addition, this report presents the outcomes of the project's final conference held on 2-3 October in Thessaloniki (section 4). References are listed in section 5.



1. Introduction

The FAIRshare project, an EU-funded initiative focused on improving the uptake of digital technologies in agriculture, has made significant progress in promoting the adoption of digital tools among farmers' advisors across Europe. The creation of a Permanent Networking Facility (PNF), establishing an open inventory of advisory tools that counts with 300 plus DATS (Digital Advisory Tools and Services) as well as a catalogue of examples of training programmes which support users. Over the course of its five-year lifespan, the project has developed and implemented a range of User Cases, which have demonstrated the potential of digital technologies to improve farming practices and boost agricultural productivity.

The User Cases represent real-life scenarios in which digital tools were used to solve problems and improve outcomes in agriculture. They cover a range of topics, from precision farming and crop management to livestock breeding and farm management. Each User Case was developed in collaboration with farmers, researchers, and industry stakeholders to ensure that it addressed real-world needs and was grounded in practical applications. Moreover, a strong training component was developed and put in place. Countries in which User Cases have been implemented: Portugal, Spain, France, Italy, Belgium, the Netherlands, Germany, United Kingdom, Ireland, Denmark, Finland, Lithuania, Latvia, Serbia, Poland, Croatia, Slovenia, Austria and Hungary.

One of the key achievements of the FAIRshare project has been the development of interoperable digital solutions that can be easily adopted by farmers and other stakeholders. The User Cases have demonstrated the value of interoperability in enabling seamless data exchange and improving decision-making processes in agriculture. By creating a shared framework for data exchange, the FAIRshare project has laid the foundation for a more connected and efficient agricultural sector.

In addition to its technical achievements, the FAIRshare project has significant outcomes that can impact on policy in agriculture. The project has contributed to the development of guidelines and best practices for data sharing, privacy, and security in agriculture, and has raised awareness of the potential benefits of digital technologies among policymakers and stakeholders. The EU Data Act is key measure for making more data available for use in line with EU rules and values. However, for many farmers and the general public access to data will not change the way they live or farm without the development of services which are designed to serve a broader public interest. These services include education and training, but also supports for design of projects and programs so that the broader public interest is served and that the benefit of digitalisation is available to all and shared across society. Of its nature, agriculture is at constant risk of failing to share the benefits of digitalisation among its stakeholders particularly isolated and smaller farm advisor firms and farmers. For farmers who have no digital skills or direct engagement with digital services, efforts must be made to include and use of their up and

downstream data and to deliver and demonstrate benefits to them through systems which demonstrate value and support decision making. For advisors, developers and public organisations have a broader responsibility and role to fill in ensuring a just transition towards digitalisation of sustainable agriculture generally. Filling skills gaps, developing and supporting the use of innovative tools and services and actively explaining, encouraging and motivating their use with all farmers and in all situations. What we have seen in the FAIRshare project that advisors and their organisations are aware of their role and responsibility and willing to respond to this challenge where some small funding and structured support is provided.

Looking ahead, the innovations and results of the FAIRshare project are expected to have a lasting impact on the agricultural sector in Europe and beyond. The User Cases demonstrate the potential of digital technologies to drive productivity, efficiency, and sustainability in agriculture, and highlight the importance of collaboration and interoperability in achieving these goals.

FAIRshare project has demonstrated the potential of digital technologies to transform the agricultural sector and improve outcomes for farmers and stakeholders. Through its User Cases and collaborative approach, the project has laid the foundation for a more connected and efficient agricultural sector, and its results and innovations are expected to have a lasting impact on the future of agriculture in Europe and beyond.

2. Project's main achievements

This chapter summarizes the project main outcomes and achievements, as identified by the project partners based on the output of different work packages during the 5 years of implementation.

2.1. Creation of a digital platform (Permanent Networking Facility)

FAIRshare's ultimate objective is to enable and help advisors to bridge the digital divide that exists amongst them in different domains, levels of digitization, adaptation and different geographical regions. In order to achieve this goal, WP1's responsibility was to facilitate and enable the sharing of tools, knowledge and experience that already exists within the farm advisory community.

A digital platform ([Permanent Networking Facility - PNF](#)) to be used by the farming community, and specifically agricultural advisors, was developed in WP1 with the standpoint to create a portal/inventory for the acquisition, exchange and dissemination of Digital Advisory Tools and Services (DATS). The web-based search engine (Figure 1) consists of three main components. These components are separated by functionality. The first component is related to the front-end application and the second represents the static data i.e. part of text extracted from within documents (snippets), name of DATS, etc. This data was created by analysing the DATS available in the Inventory, and other domain-relevant documents. Finally, the third component is related to the software part, which processes information coming from the first and the second component.

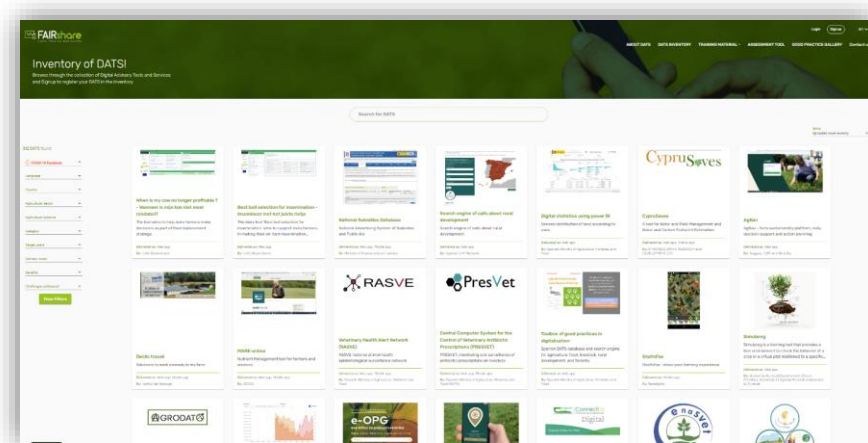


Figure 1. A digital platform ([Permanent Networking Facility - PNF](#)) developed under FAIRshare to be used by the farming community, and specifically agricultural advisors.

Continued communication and dissemination activities of the project's partners encouraged stakeholders to add more DATS into the inventory, therefore the PNF presently has 300 plus DATS and a catalogue of examples of training programmes which support users.

Before the end of the project, DATS providers were encouraged to update their data on the platform, so it remains updated after the end of the project. To ensure the inventory leaves on a communication strategy will be put in practice through social media, as well as communicating the platform with new projects.

Further reading:

[D1.1: Report on methodology and standards](#)

[D1.2: Web-based semantic search engine](#)

2.2. Identification of Good practices

A multi-actor co-design approach, involving different FAIRshare partners and each country's stakeholder FAIRshare network, identified the criteria for the identification and selection of **Good Practice** across Europe. This approach ensures that the most relevant and potentially impactful Good Practices are chosen. Cognisant that there is no superior 'best' practice capable of responding to all challenges, needs and contexts, an emphasis in the MA process was placed instead on the ways in which DATS can be subjectively perceived as 'good' by actors working in different conditions and farming systems and how they can thus become embedded in different cultural contexts.

The objective of was to present the central deliberations underpinning the identification of 'Good Practices' in an attempt to balance the goals of:

- a) Identifying consistent criteria for recognising Good Practices across different contexts/countries and;
- b) Illuminating practices that are 'good' in ways that are actor and context specific, but which may nonetheless be transferable/adapted for transferability to other contexts.

The framework developed firstly enables partners to understand the meaning and importance of Good Practices by following the capitalization cycle (Figure 2) understood as a process flow that allows to first identify existing practices as 'good' and then to use them to create tangible "capital" of knowledge and improved performance.



Figure 2. The Capitalization Cycle.

The nine Principles for Digital Development were presented as further elements that should be considered when evaluating digital advisory tools. Thereafter depicting the framing process of who, why, what, where, and how assists in capturing the needs of end-users.

Hot Topics are suggested by the ENRD (European Network for Rural Development) as particularly useful to thematically organise Good Practices. Hot Topics were identified via relevant literature as well as from workshop outputs from project partners. In total seven parent Hot Topic categories captured the key themes related to Good Practices.

As a way to exploit Good Practices, their stories will be shared through social media. These storyboards and videos will also be shared with other projects.

Further reading:

[D2.1: Framework for the identification of good practices](#)

[D2.2: Practical method and recording template for collecting good practices](#)

2.3. The interface between DA and the advisory & farming communities

The aim of this section is to identify how Digital Advisory Tools and Services (DATS) have become an effective and embedded extension tool in the farmer/advisor professional interface. There are many and diverse factors that influence the farmers behaviour, according to Mills et al. 2017 (Figure 3).

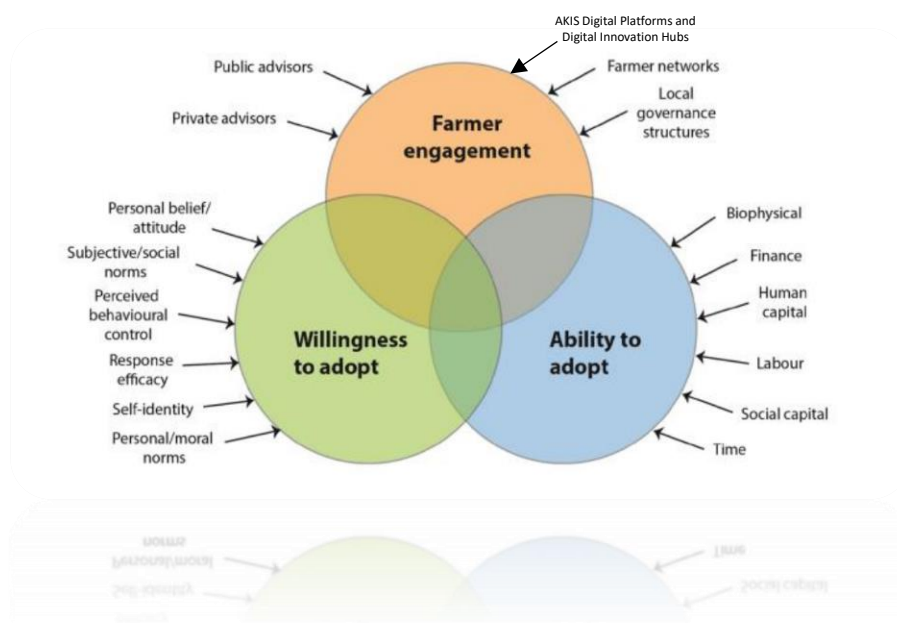


Figure 3. Factors influencing farmer behaviour (modified after Mills et al., 2017).

Hence, it is important to understand the advisor-farmer engagement activities as well as motivating factors and barriers for farmers and advisors in adopting digital advisory technologies. To achieve this goal we sent farmers and advisors surveys aiming to:

- Understand what is working and what is not working in the field of digital advisory tools and services on the end-user side;
- Understand the motivations for the adoption of digital advisory technologies;
- Identify the digital advisory technology “entry” factors that both farmers and adviser consider when assessing digital advisory technology – capital cost/ongoing costs/knowledge and training costs;
- Assess the baseline knowledge among survey responses of perceived „benefits” of using the digital advisory technologies and of their attitudes to perceived risks of using it;

- Capture details on the communication methods used to raise the knowledge of the benefits of digital advisory technologies;
- Understand incentivising factors that influence digital advisory uptake, use and impact;
- Understand barriers in the adoption of digital advisory technologies, but also explore tools, which receive a widespread use.

The surveys were sent to a large population of farmers and advisors aiming to inform on the adoption of digital advisory among different farming sectors (livestock, field crops, horticulture etc.), different farm sizes, and education levels of end-users as well as across a broad age spectrum.

Main conclusions:

The sample analysis of more than 1.000 survey answers from both farmers and advisors shows that:

1. Farmers and advisors have strong trust relations, with farmers relying heavily on advisors in their decision making process.
2. Farmers are used to receive expert and personalized advice; they have come to expect this and DATS should be a useful add-on to the delivery services but not a replacement.
3. Farmers and advisors agree on the benefits they expect from the use of digital advisory tools and services (DATS).
4. However DATS benefits are not necessarily easily understandable especially for farmers, posing a barrier to their adoption.
5. In practice, learning and investment costs need to decrease for DATS to become more attractive for advisors and farmers.
6. Infrastructure issues, like connectivity, availability of automated data and data interoperability are unsolved issues, which slow the dispersion of digital advisory tools and services.
7. Advisors do not have a reference source for their digital tools. They rely on their company/organization, on other advisors, or the internet to identify and discover suitable tools for service provision.
8. There are no recognized best practice tools and services for agricultural use. There is, however a wide diversity of individual experiences, which are not collected in one place.
9. Farmers get their DATS from advisors or other farmers.
10. Advisors recognize their need to receive training in the provision of digital advisory services (from communication, to methodology, to content). However they would like to receive this training offline and in person.

To support the uptake of digital tools in the agricultural sector, it is required to thoroughly understand how digital agriculture is advocated and animated in the interface

between the advisory and farming communities. Therefore, project partner INAGRO (Belgium) supported the set-up of 4 focus group discussions, one in each geographic area (West Europe, Central Europe, South-East Europe and North-East Europe, Figure 4) in the end of 2020.



Figure 4. Map of FAIRshare Regional Hubs.

The objective was to identify common “working-day” challenges faced by farmers across the different member states and to identify the digital advisory technologies which are best positioned to address them. Furthermore, the aim was to identify barriers for the

uptake of interesting technologies, and how these barriers could be removed. Also, possibilities to transfer the advocacy and animation approaches to other contexts were discussed and in response to the different needs, attention was paid to the potential of piggy-backing on existing approaches. In short, the solutions to remove barriers for uptake of digital tools are:

1. Organization of working groups, learning networks, peer to peer learning, trainings, tutorials, webinars and demonstration at farms.
2. Develop DATs that also work offline for a certain period, or at least the basic functions.
3. Development of tools in cocreation with the sector could take into account both the needs related to the daily work of farmers and advisors.
4. A (short) list with interesting/useful tools compiled by an independent advisor.
5. Direct online translation.
6. Development of an integrated platform or tools that communicate with each other.
7. Data sovereignty.

Afterwards we endeavoured to discover Digital Advisory solutions to common day to day challenges faced by advisors though Europe. Subsequently, an analysis to the long list of common operational challenges faced by either farmers or their advisers, identified that in the different Hubs, even in different regions, the main problems were similar. The same happened with the list of possible solutions to overcome these barriers.

Finally, now that the main EU problems were identified, and solutions drafted, a communication and dissemination strategy, requiring all partner institutions collaboration, was put in place to share these solutions with the project's target groups. That report aims to come with suggestions for features that classify HITS, meaning that **HIT = DATS + I: High Impact Tools are Digital Advisory Tools and Systems with high Impact**. For that we have chosen, not only to describe the DATS, but also their impact. Impact can be measured by improved decisions, enabling better advice, better motivated action and encouraged change on a larger scale.

We mapped the characteristics that were used in WP1, WP2 and T3.1. We grouped these in: General information; Usability; Data Security; Benefits and Challenges: Environment & Nature, Business & Economy; Brokerage and Users. From these characteristics, we extracted the relevant ones for evidence based discussion in focus groups.

With these results, the focus groups could assess the impact of tools. From each FAIRshare Regional Hub we asked two representatives to score the relevance of each characteristic. The result of such scores was used for the focus group, to discuss issues like 'why did you score data management higher and environment and nature lower than average? Such showed that is possible to make a set of characteristics that overarches the definitions used in the previous tasks.

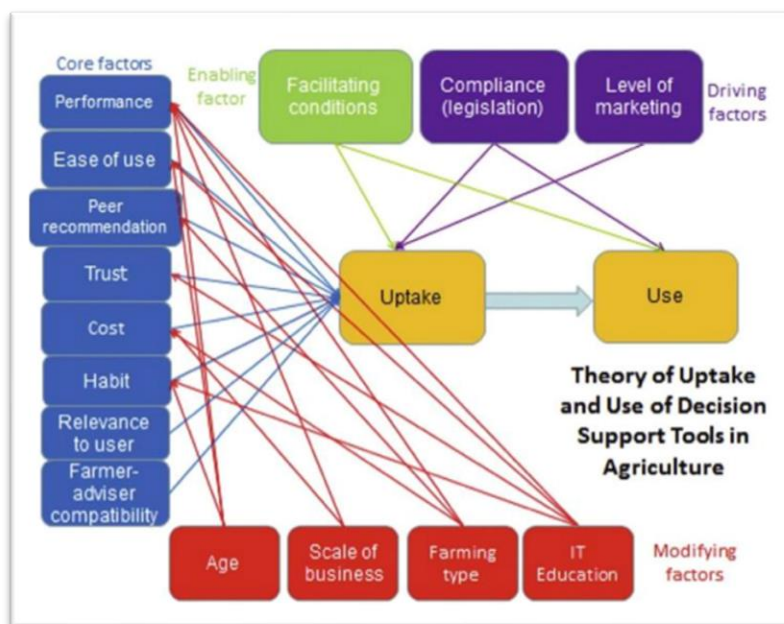


Figure 5. Factors influencing adoption of DAT tech by farmers and advisors (Rose et al., 2016).

The overarching objective was to better understand the interface between the advisory and farming communities through Digital Agriculture (DA). The result of all the work done in this section is to provide ideas and potential solutions to overcome barriers for the uptake of DA by farmers (Figure 5). Some examples are also given below in Table 1.

Table 1. Some examples of barriers and potential solutions for each barrier.

Barriers	Potential Solutions
Poor internet connection	<ul style="list-style-type: none"> - DATS that are available and can work off with basic functions - Investing in infrastructure - Offer trainings
Poor skills, lack of skills and lack of training on the use of digital tools (both farmers and advisors)	<ul style="list-style-type: none"> - Establish: <ul style="list-style-type: none"> - Working groups - Learning networks
Lack of time or motivation to learn how to use DATS	<ul style="list-style-type: none"> - Foster on different types of motivation: <ul style="list-style-type: none"> - Improve information - Illustrate examples and benefits - Support networking - Provide support
Too many different tools – uncertainty around the most appropriate tools	<ul style="list-style-type: none"> - Promotion of DATS by trained advisors - Toolbox of checked DATS by independent experts - "Trusted" list of best performing tools
Language barriers	<ul style="list-style-type: none"> - Provide direct online translation - Use linguistic tools to help with translation such as Google Translate and DeepL

Further reading:

[D3.1: Factors influencing adoption of DA tech by farmers and advisors](#)

[D3.2: Typology and reference list of popular applications in DA](#)

[D3.3: Contextual Advocacy and Animation approaches](#)

[D3.4: DA solutions to common operational challenges faced by farmers](#)

[D3.5: Classification of high impact advisory tools](#)

[D3.6: Classification of high impact advisory tools](#)

2.4. Development of DAT pilots and User Cases

Given that FAIRshare was working with numerous multi-actor groups with very different backgrounds, it was necessary determining and defining relevant concepts so that partners talk the same language throughout the project. Hence, the adoption of a Living Lab (LL) approach with each user case (more info: <https://enoll.org>). The LL is a development in line with the move from linear, top-down to interactive innovation and ‘design thinking’ according to which innovation is designed “by users” – users become the innovators. There are multiple definitions for LLs, but proponents, more or less, agree that their characteristics include openness, innovation (experimentation and learning), co-creation (participation and user involvement) and real-life setting so as to develop products or services most valuable in certain social and cultural environments.

Another important aspect was how to deal with change management, i.e. the “*area of study that aims to facilitate the transition of individuals, teams or the whole organization by managing them.*” Three main theories are considered. First, Lewin’s theory of change comprising three stages: Unfreeze, Change/moving, Re-freeze is presented. Then Kotter’s model of organizational change, consisting of eight steps (accelerators) to be used to implement the process of change successfully is extensively discussed. Last but not least, an individual-target change framework, Hiatt’s Change Management Model – ADKAR is discussed. An attempt to ‘amalgamate’ the three change management models is also presented. The abovementioned theories are discussed step-by-step and their use in practice is illustrated. Furthermore, examples referring to organizational change management vis-à-vis digitization were given. The main aim was to identify the change management and innovation process issues, arising from novel or new digital tools and services in different farm advisory contexts through up to 30 User Cases, identified from partners, third parties and external entities.

In a User Case, a sectoral group of advisors, within an organisation, or a group of independent advisors within a region or a country, describes a challenge they face while delivering better support to farmers to get onto or progress along the digital age. Challenge is solved adopting and adapting one or more Digital Advisory Tools or Services (DATS), available or added to the FAIRshare inventory. Pilots, i.e., observations of DATS adoption, will be set up within these User Cases to develop a clear understanding of the issues affecting adoption in different User Case context, giving rise to valuable learnings on challenges to embedding DATS in different advisory and farming contexts.

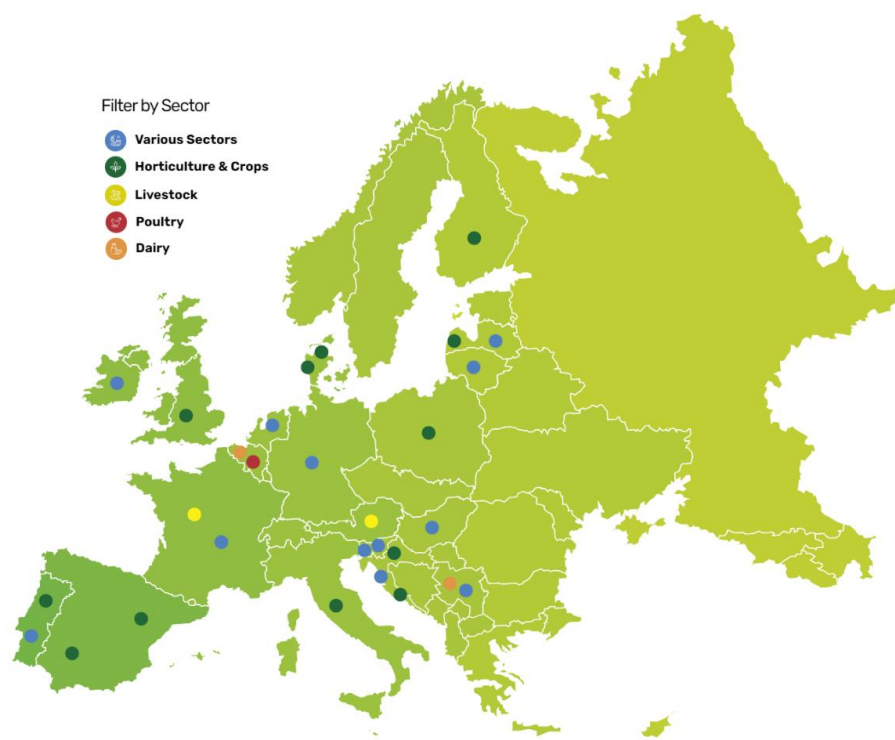


Figure 6. Overview of the FAIRshare 30 User Cases <https://www.h2020fairshare.eu/user-cases/>

These 30 User Cases (Figure 6) were a combination of those chosen in advance through project partners and third parties, and those chosen at a later date via subcontracting.

The 20 assigned User Cases have been described by the relevant project partners and third parties, who then decided and chose from or added to the inventory, the DATS they found most useful in supporting their farmer clients. The next 10 User Cases, were selected through a public procurement competition based in the criteria for the selection of these external ones.

Major outcomes:

- **In FAIRshare project the advisors choose a new approach.**

In the 20 pilot User Cases, the advisors choose a new approach. They all face challenges in different topics. In the project they identify a challenge they meet and they describe it in a User Case. Once they have defined what they want to achieve, they choose or add existing DATS in the [FAIRshare inventory](#) in that context and use them as a key factor in their User Case to improve, change or renew their advisory service. Development was planned in a Business Case, detailed in an action plan and broadened in a road map and then the

implementation was closely monitored. Support and training for User Case leaders were organised in parallel;

- **Knowledge Transfer between Advisors and Farmers: The most popular need identified.**

The challenges identified in the User Cases address a wide range of issues. The most popular is the need for knowledge transfer between advisors and farmers, each User Case following a different approach. Another frequent theme has to do with improving the handling of data. The topics of remote consulting, record keeping and technology use were also present;

- **Farming Sectors Identified in the 30 User Cases: a multi sector need is the most prominent.**

In many of the organizations the User Case addressed their own advisors' needs, to work across multiple sectors as their advisors are less specialized. A multi sector need was the most common amongst the 20 User Cases. Where the User Case addresses a need in one sector, the chosen sector was varied: dairy, poultry, citrus, with the most popular being dairy.

The [assessment tool](#) was developed to help farm advisors identify and select suitable DATS to help them address the needs and challenges that they face in their everyday work. The assessment tool allows farm advisors to compare different digital tools based on a uniform set of characteristics which can help them to select the most appropriate tool based on their needs, which are usability, data management, challenge, knowledge exchange and business.

It has been enhanced continuously throughout its development by gathering, incorporating and testing advisors' feedback and it has been translated into eleven languages with the aid of FAIRshare partners including Croatian, Dutch, English, French, German, Greek, Hungarian, Lithuanian, Portuguese, Slovenian and Spanish. It is integrated in the FAIRshare inventory of DATS (<https://fairshare-pnf.eu/assessment-tool>).

To ensure the work of UCs is shared and useful in the years to come, the different UCs will be shared on social media. UCs will be encouraged to write articles in their national languages to share these cases at national level.

Further reading:

[D4.1: Framework for DAT pilots and User Cases](#)

[D4.2: Evaluation of Pilot DATS](#)

[D4.3: Learning from ongoing pilot adoptions of DATs](#)

[D4.4: DATS Assessment Tool template for Advisors](#)

2.5. Development of roadmaps, dynamic action plan and business plan towards the improved use of digital advisory tools and services (DATS) by the farm advisory community

The purpose was to develop roadmaps towards the improved use of digital advisory tools and services (DATS) by the farm advisory community. Road-mapping is a strategic co-creation process that brings together a diverse group of stakeholders. In accordance with this methodology, the ultimate goal is to create a common understanding of the best path forward for each UC. As a first step in this process, user cases identified the internal and external factors influencing the use of digital advisory tools, and used those as a basis to develop their vision to follow in next steps towards development of the roadmaps.

This comprised a two-step approach: first, training of the UC leaders on how to set up a workshop to identify the contextual factors for their user case and develop a vision for their UC, and then second, the multi-actor workshops itself led by the UC leaders.

To obtain a structured overview of the different context specific factors that potentially affect the adoption of DATS at UC level, we used a combination of a SWOT and a DESTEP analysis. A SWOT analysis is a well-known strategic planning tool to discover strengths and weaknesses of an individual, group or organization (internal factors), and to identify both potential opportunities and threats (external factors). DESTEP is a model that is often used when making an external analysis of an organization in order to support strategic decision-making.

The most frequently mentioned strengths are *DATS availability*, *Data accuracy*, *Time saving*, while common weaknesses are *Data reliability*, *Data security*, *Lack of user knowledge and motivation*. In terms of external factors *Accessibility*, *Existing infrastructure and Level of digital competence* appear many times as opportunities, although the *Lack of relevant digital skills* appear as threat as well, alongside with other common factors such as *Interoperability* or *Age of farmers*.

This was followed by a Visioning exercise, in which UC participants reflected on where they want to be in 5 years. This involves several steps, in which participants first identify key themes, after which they integrate these themes into a single vision statement. Linked to this, several specific milestones are identified towards reaching the proposed vision.

In a second phase, the two-step approach was repeated, organizing a training followed by a workshop at UC level, with focus on how to set up a business and action plan.

Commonly used and easily understandable tools such as the Business Model Canvas and Value Proposition Canvas, from the business studies environment were adopted to design this workshop while elements of such tools were used selectively to aid UCs to rapidly and effectively plan their activities without getting caught up in academic exercises that do not relate to their “real world” situation.

Based on the UC reports, the majority of UCs have been able to **identify and articulate their value Proposition**, which forms the basis for a **Business Plan**. To a slightly lesser degree, most UCs were able to elaborate on an initial Action Plan, with several clear Objectives. An awareness of the challenges faced by agricultural actors was evident in almost every UC, and the UC Workshops served to link discrete problems with digital solutions. While certain UCs noted the difficulty of identifying customers and distinguishing between product functions which met the pains of, and created gains for, their clients, we consider these comments to be a positive start and something of a flag for future action. First, the workshop format dealt with ordinary and basic business language for business planning and strategy, so it served as an introduction to necessary terms and concepts that will be needed in the future. Simply put, if it is unclear who the customer is, this is a necessary discussion to be had. Secondly, DATS are designed to resolve the “pains” of the customer and must be able to show some tangible gain. Again, if this is not clear for digital tool providers and/or advisors, then we understand that the workshop will help to begin the process towards more clarity and put more emphasis on meeting the needs of digital tool users. In spite of acknowledging such challenges, the UCs did report back with very interesting observations on products and services, pain relievers and gains, thus suggesting that the concepts did in fact start to take hold to produce introspection and results.

The output of this workshop, action plans for specific objectives identified, were translated in visually strong images, the so-called roadmaps. The training materials to identify contextual factors, develop a vision and prepare a business and action plan will be shared with universities and other education institutes using the standards FAIRshare dissemination and communication channels, so that the methodology can be further shared.

Further reading:

[D5.1 Vision at macro level towards enhanced DA](#)

[D5.2: Factors influencing use of DATS and UCs](#)

[D5.3: Identification of the strategic direction in advisory services UCs](#)

[D5.4: Creating the business plan and dynamic action plan](#)

2.6. Implementation of digital advisory tool adoption business cases

The user cases (UC) are a key point of FAIRshare, which directly adapt the use of digital tools to the needs of the practice and properly implement them. To make it more convenient for all partners with an assigned UC, they should have the possibility to make their fulfilments for the UC and the business case (BC) at the same time. Also, a description was given to the partners, for the BC part project partner Naturland developed a Business Case House, where all relevant topics were described and categorized (Figure 7).

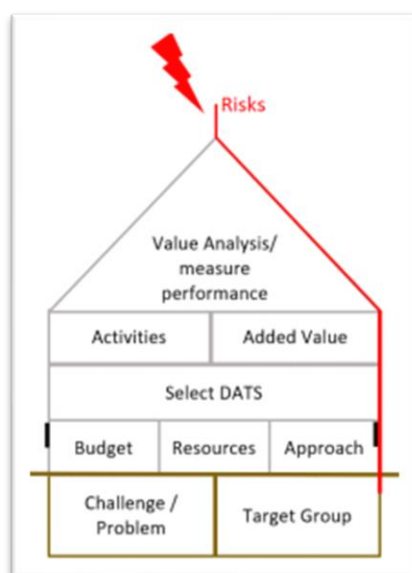


Figure 7. A Business Case House, where all relevant topics were described and categorized.

In addition to provide an inventory of DATS and classification of high impact advisory tools, focus was given on the expansion of the use of proven high impact digital technologies among Independent advisors within and between European countries. In this task the aims was to identify resource materials of trainings and develop learning competences for advisors to support adaption of DATS.

This can be considered as being part of the Living Lab approach explained in section 2.4 of this report. The work done seeks to develop and combine existing modules to targeted training, fostering adaption of digital tools by different advisory disciplines within organizations and networks.

Further reading:

[D6.1: Implementation of digital advisory tool adoption business cases](#)

[D6.4: Report on Training Modules 2nd year](#)

[D6.5: Report on train the trainer programmes and assessment](#)

2.7. Communication and dissemination of FAIRshare

The communication and dissemination of the project is an important part, to share the findings internally as well as externally. Hence, a plan was developed for communication, dissemination, and data management to define a consistent approach to engage with the key target audience. Aims to maximise the awareness on the project concept, objectives and outcomes, to organise all the communication and dissemination activities within the project, as well as, to provide the guidelines for the communication and dissemination to be followed by all the consortium partners. It includes the key performance indicators (KPI's) to monitor and evaluate the communication and dissemination plan.

Given the digitised nature of the project, special attention was paid on the use of some of the modern ICT tools such as social media platforms, website, multimedia materials, newsletters, to support communication and engagement. However, to ensure the project results and outcomes maximum dissemination, physical tools such as publications, articles and leaflets, conferences, seminars, exhibitions, and workshops were also used.

The document was dynamic, being adjusted accordingly. The planned activities were shaped and adapted in response to the feedback from multi-actor activities and engagements with external actors to the project.

With its multi-actors approach the project had to think about how to use social media to inform different actors. As farmers use social media differently than advisors or industry actors, it was important to develop a strategy in order reach every actor on social media.

The FAIRshare Social Media platforms aimed at creating awareness for the project and its scope, engage and encourage people to visit our website, encourage the subscription of our newsletters, encourage visitors to contribute to our DATS inventory/Permanent Networking Facility (PNF), boost the participation in FAIRshare events, share FAIRshare's results and outputs (Figures 8, and 9).

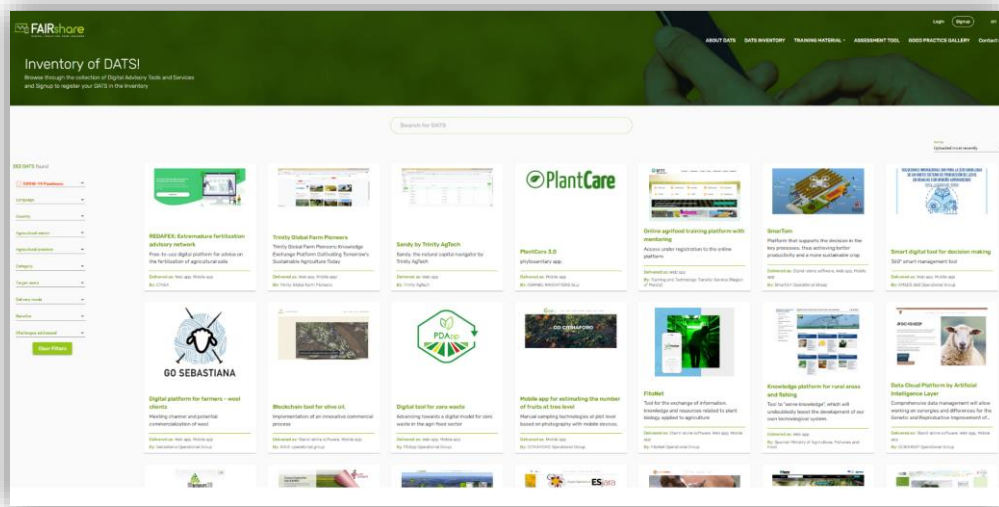


Figure 8. FAIRshare’s Permanent Networking Facility.

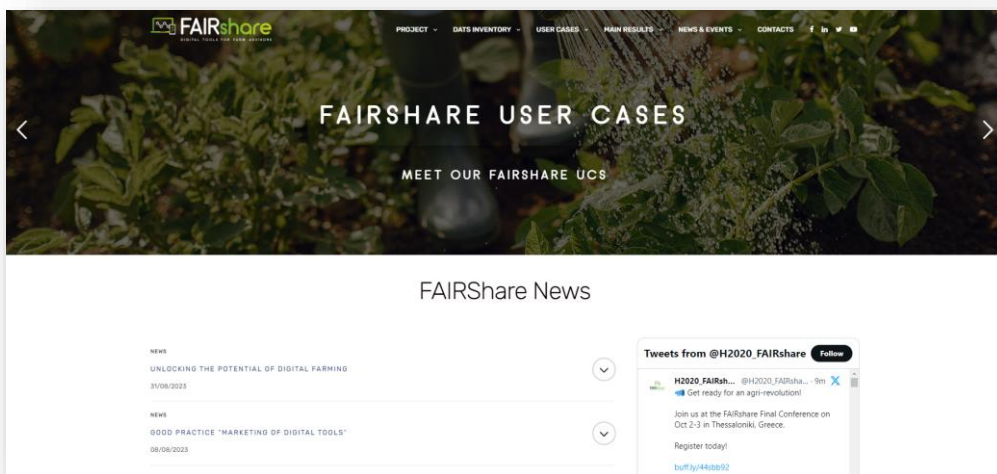


Figure 9. FAIRshare’s homepage News section and Twitter feed.

A radical transformation of the agricultural sector is envisioned by many with the increased application of ‘smart’ technologies in farming and food production. Significant social and cultural changes are expected with the emergence of ‘Digital Agriculture’ and the widespread application of smart, connected technologies in farming. Although offering many benefits and opportunities for agriculture, new technologies can also bring unpredictable or unforeseen impacts and social changes. Responsible Research and

Innovation, a cornerstone of the EU H2020 programme, is a governance framework which supports the development of technologies in a way that harnesses the benefits whilst managing the risks – it aims to ensure the trajectory of innovation is responsive to the concerns, needs and expectations of society.

FAIRshare is committed to the principles of RRI (Responsible Research and Innovation). A series of ‘RRI workshops’ within WP7 focus on cross-cutting ‘hot topics’ which consider the social changes technology can bring. The first cross-cutting hot topic for reflection in Year 1 of the FAIRshare project has been that of ‘data and ethics in digital agriculture’. This topic has raised many questions in agricultural circles, also relevant for advisory services. What are the issues surrounding data ownership and data sharing that farm advisory services should be cognisant of as more and more digital technologies are introduced to farming communities? What are the ethical and legal issues that farm advisory services may encounter, and how can they be supported to recognise and respond to these issues? What are the ‘new skills’ that farm advisory services may need to acquire to deal with ethical issues related to data in digital agriculture?

The main risks consortium partners associated with data generation through the use of DATS included: manipulation of data (misuse of data); integrity of data (trustworthiness of data); power shifts; and rights of the farmer. Suggested responses require actions from a wide range of actors but of particular relevance for the FAIRshare project, several actions were identified which involve the advisor. The advisor is viewed as having a gatekeeper role and can help to (1) raise awareness and inform farming communities about this issue; (2) provide practical support, education and training to farmers in this area; and (3) ensure that the actions and behaviours they themselves undertake with respect to DATS are responsible. It was identified that for advisors to assume such roles, training and awareness in the area of data and ethics in digital agriculture is first required for advisory services. The FAIRshare project should consider actions to support farm advisors to assume a gatekeeper role in ensuring responsible governance of data in digital agriculture.

One of the outcomes in terms of results dissemination where the EIP AGRI Practice Abstracts (PA’s). A practice abstract is a short summary published under a common format that is the same for all European projects (H2020 and Horizon Europe). This format is defined by EIP-Agri (Agricultural European Innovation Partnership) and facilitates not only the exchange of knowledge, but also the contact between potential partners in innovation projects. It contributes to building up a unique repository of practical knowledge across the EU via the [EIP-AGRI project database](#) which supports the dissemination of results of all interactive innovation projects.

A Practice Abstract (PA) aims at providing information, recommendations and/or best practices that can be used by the end-users in their daily practice. In FAIRshare’s framework, those recommendations can for example be used by technology providers to design new tools while considering best practises identified by the FAIRshare’s community on existing DATS. Practise Abstracts are also published from the project Use

Cases to extract recommendations addressed to a broad range of players of the AgTech sector. In other words, Practise Abstracts are essential tools for the dissemination of the results of a European project, produced by all the partners of the consortium and addressed to a varied and large audience: farmers, foresters, advisers or whoever is interested with short and concise practical information.

To ensure a wider dissemination of these Practise Abstracts (PA), WP7 worked on the elaboration of attractive visuals allowing a dissemination via different channels. All the PAs already delivered are available on FAIRshare’s website in a dedicated tab. They can be shared easily on social networks. These were intended to communicate practical information or recommendations that have been observed over the lifetime of Horizon 2020 projects. These PA’s are accessible and share practical information with a broad range of stakeholders. In the case of the FAIRshare project, this focuses on outputs for stakeholders and practitioners such as advisors and advisory organizations, farmers, developers of digital tools and ICT experts and indeed to researchers who can use the learnings from FAIRshare to embed into their daily practices.

The PA’s featured (Figures 10, 11) have also been made available on the EIP AGRI website where they will be shared more widely and disseminated to a broad range of stakeholders. A total of 63 PA have been created and shared. Up to date, the project has 63 Practise Abstracts published on the EIP-Agri platform.

Practice "abstract" 22:	<i>Several practice abstracts may be needed for one project, depending on the size of the project and the number of outcomes/recommendations which are ready for practice.</i>
Short title in English	Development of an online application to monitor the vaccination of livestock
<p>Short summary for practitioners in english on the (final or expected) outcomes (1000-1500 characters, word count – no spaces). <i>Do not complete if the summary below is completed in English</i></p> <p>This summary should at least contain the following information:</p> <ul style="list-style-type: none"> - Main results/outcomes of the activity (expected or final) - The main practical recommendation(s): what would be the main added value/benefit/opportunities to the end-user if the generated knowledge is implemented? How can the practitioner make use of the results? <p>This summary should be as interesting as possible for farmers/end-users, using <u>a direct and easy understandable language</u> and pointing out entrepreneurial elements which are particularly relevant for practitioners (e.g. related to cost, productivity etc). Research oriented aspects which do not help the understanding of the practice itself should be avoided.</p>	<p>The creation of an application to monitor the vaccination of livestock can be an interesting tool to allow the veterinarian to follow the vaccination schedule of the animals he or she treats.</p> <p>Thanks to a notification system, notifications are sent to both the farmer and his or her referring veterinarian. Such an application ensures a better management of the appointment booking and a better respect of the vaccination protocol. Such an application is especially useful for farmers raising different types of animals with different vaccination schedules.</p> <p>In short, such an application facilitates the life of the farmer, limits their stress, and is a good way to manage animal welfare and keep animals safe by preventing the occurrence of epidemics.</p>

Figure 10. Practice Abstract no. 22, unformatted.



Figure 11. Practice Abstract no. 22, formatted.

To make sure FAIRshare’s communication materials outlive the project collaborations will be made with recent projects like EU-FarmBook.

Further reading:

- [D7.1: Communication, dissemination and data management plan](#)
- [D7.2: Social media engagement strategy and actions commenced](#)
- [D7.3: Midterm report on plan implementation](#)
- [D7.4: Report on social media activities](#)
- [D7.5: Report on digital communication platform](#)
- [D7.6: Responsible Research and Innovation Workshop](#)
- [D7.8, D7.9 and D7.10: Practice Abstracts \(also \[here\]\(#\)\)](#)

2.8. Multi Actor Approach

FAIRshare employs a multi-actor approach (MAA, Figure 12) which encourages sharing of Digital Tools and Services (DATS), experience, expertise and motivation to overcome the barriers that limit farm advisors in their role in digital advisory. The processes were set out for FAIRshare partners to apply the MAA and training events were carried out in M1 (Kick-off-Meeting), M8 (first face-to-face Management Committee Meeting), and M13 (first Annual Meeting) of the project. The approach seeks to strengthen the capacity of the partners, the stakeholders and end users to meet the objectives of the project.

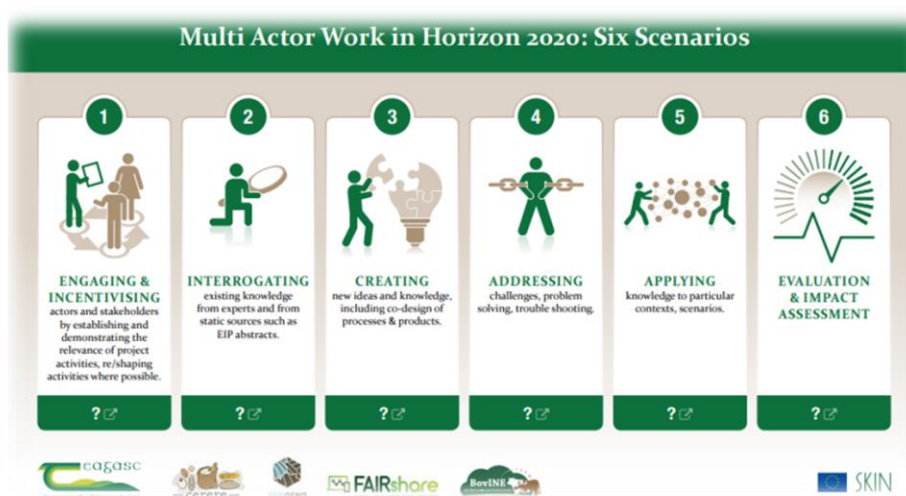


Figure 12. A screenshot of the MAA toolbox developed by Teagasc for Horizon 2020 projects.

The project has mainstreamed the MMA throughout all Work Packages (WPs) to proactively support project activities as well as how multi-actor events and workshops are facilitated. This ensures that the multi-actor membership of the consortium and the events with external actors taking place in workshops, focus groups, and 42 living lab user cases were as effective, beneficial, and impactful as possible.

Teagasc provided MAA training events to support the multi-actor networks involved in the project. MAA good practice training workshops were facilitated for participants-based state-of-the-art MAA criteria. The training included a participatory training workshops and was offered to partners coinciding with the Kick-off Meeting and again at the first general partners meeting, M12. Throughout the project UC leaders and participants were offered a similar training event to coincide with their initial workshops/meetings (Figure 13). Such allowed to embed a strong commitment to the project and its objectives.



Figure 13. Consortium members working through the participatory exercise conducted by AUA.

Further reading:

[D8.1: Kick-off meeting Minutes](#)

[D8.3: Share drive for participants internal collaborative platform](#)

[D8.4: Financial reports setup](#)

[D8.5: Data Management Plan](#)

[D8.8: Multi-actor approach training events](#)

3. Policy guidelines

3.1. Background information and methodology

Who?

Electronic data generation, analytics and communication technologies potentially enable more accurate, faster and better decision-making on farms, with huge potential to improve agricultural sustainability. With a major focus on digitization by EU and national/regional policy-makers to ensure that digital innovation in agriculture keeps pace with other sectors and the benefits of digitization are available to the wider farming community, FAIRshare, an European Union's Horizon 2020 project, engaged, enabled and empowered the independent farm advisor community, through sharing of tools, expertise, and motivations.

What?

FAIRshare has conducted several regional innovation workshops, including internal consultations on the Policy subcommittee level together with the support of EUFRAS and Copa Cogeca, that have been used to identify Policy needs which should be addressed by the Common Agricultural Policy, as well as on EU/national/regional/local level, thus support the better uptake of DATS by both farmers and agricultural advisors. Bottlenecks identified are:

- Problems related to data privacy;
- Availability of too many different DATS, making it difficult to know all DATS available;
- Need for and lack of training for new technologies;
- Difficulties in optimizing work management;
- Lack of commodity price certainty;
- Difficulties to produce in a sustainable way.

Based on the above, FAIRshare proposes Policy recommendations, summarized in chapters 3.2 – 3.5 of this deliverable, to overcome these gaps and needs:

- Trust and data sharing, standardization and interoperability for efficient information gathering and exchange;
- Connectivity;
- Demonstrate and share the knowledge;
- Financial support for investing in new/existing digital technologies and services.

Why?

The FAIRshare vision is to turn the policy into an opportunity to make EU agriculture smarter and greener, thereby contributing to a more sustainable and competitive EU agriculture. In this sense, EU and National policy makers are called to promote and realize a holistic approach aiming at:

- Create integral Agricultural Knowledge and Innovation Systems (AKIS) where advisors are enabled to support and encourage farmers to make optimal use of digital opportunities in their management;
- Encouraging farmers through active promotion, to share their data on secure platforms that can manage their data appropriately, and allow data sharing with the farmer's consent;
- Supporting further research to understand the reasons for distrust in data sharing and foster experimentation with data sharing through funding new projects which includes individual farmers as participants;
- Supporting development of standards in the field of interoperability and agricultural data sharing principles clarifies roles/rights and obligations for all stakeholders, depending on use case;
- Increasing advanced connectivity infrastructure in rural areas that supports mission-critical services in agriculture by providing more stable connection for running digital applications that demand high reliability and responsiveness;
- Supporting intensive communication and training campaign including applied research with field trials;
- National/regional/local governments should be the driving force, integrating digitalization into various policies and offer sufficient support towards this process, while reducing bureaucracy at the same time;

With policy recommendations, this deliverable sums up the main challenges, accompanying recommendations and expected impact of the proposed measures, as overall accepted by the consortium.

3.2. Trust and data sharing, standardization and interoperability for efficient information gathering and exchange

The FAIRshare project identified limited application of data sharing, where lack of trust and incomplete interoperability between different DATS and data format standardization are important bottlenecks for the better uptake of DATS by both advisors and farmers.

3.2.1. What is the challenge?

With the progress in digitalisation and connectivity, massive amounts of data can be generated and transferred. Data can contain information on persons and their businesses. Access to data and privacy protection have long been on the priority list of legislators. The first to be tackled was the privacy enshrined in data with the General Data Protection Regulation (GDPR). The GDPR obliges data holders to protect that privacy by pseudonymization and other measures internally in the company and to the external world. Given that many agriculture related datasets contain location, they are indirectly linked to persons and therefore subject to the GDPR. However, it does not cover any relationships or conditionalities in relation to data sharing. With the Data Act, a first step has been taken to provide rights and obligations in relation to data sharing, but the discussions are ongoing. The lack of a clear legal framework, but also the missing tools/architectures/interoperability mechanism for data sharing, is an issue for both product users and data holders.

There is a **strong link between trust-building and adequate data-sharing regulation**. However, data sharing legislation like the Data Act will not by itself lead to building trust, but it can certainly be seen as a contributor to it. In particular, since the Data Act is so horizontal, covering many sectors, the link is unclear. The possibility exists to create further legislation on sectorial data spaces and one has to wonder whether the agricultural sector would not need its own data space legislation.

The lack of trust between data owners/data generators (farmers) and data users (advisors, companies, policy makers) was frequently discussed during the FAIRshare regional workshops and working groups. Participants see that Digital Advisory Tools and Services (DATS) were not accepted and successfully implemented if there is lack of trust. Several reasons have been identified as to why farmers and others data owners are not willing to share data:

1. **An unclear business case.** An actor is asked to share data, but the return and benefit of sharing data is unclear.
2. **Risk of negative influence of business relations.** For instance, if a data user has more insight about the farm's performance, she/he might 'punish' the farmer by not offering insurance or not offering a contract. Or the company's advisors could use the company's trade secrets/intellectual property rights of the farm to advise competing farms. In practice, it could lower the negotiation position of farmers.
3. **Risk of using data for other purposes** by the app or the business partner. For example, providing farmers and their advisors with digital data on the contracts of

cooperatives and investor-owned firms could facilitate the publication and sharing of information that is not in their interest.

4. **Risk of data ending up elsewhere.** For example, governments obtain this data and implement harsher regulations on environmental performance and relate it to CAP subsidies.
5. **Data sharing may change the position of the farm.** The ability to control processes will redefine contracts and organisational forms, and the operational freedom of the farm will be lost due to automated decision-making.
6. **Data ownership and management.** For example, a farmer wants to stop sharing data and/or asking to delete all the data generated or getting the data for using on another platform, the process might be complicated or impossible. And the farmer does not now if this really happens.
7. **Resistance to the ‘platform economy’.** Platforms combine data to create services that users find useful, with a business model that maintains and innovates the platform.
 - A farmer quickly becomes dependent on a certain platform as data cannot be easily transferred at a later stage to a better service provider due to a lack of portability;
 - It is often not clear how farmers benefit from the provision of providing data, but it is often clear that other actors in the food chain benefit from a big data strategy;
 - There is the feeling that the data is provided for free, but that product upgrades or new services that benefits from this data have to be paid for.

Lack of trust is a very complex issue that must be considered from several aspects, all of which deserve attention:

1. **Confidence** in new technologies’ performance: non-existence of benchmarks for a fair comparison, harmonised test methodologies, etc.
2. **Reliability** of the new digital tools. The reliability standard in the farming sector is set very high: ICT tools must be “as reliable and robust as a tractor”, while farmers should receive all support required to make the best use of the DATS.
3. **Interoperability between different DATS** – It is important to be able to combine different DATS for optimal support and quicker upgrade of the knowledge base for decision making. **Usage of public data, open standards and interoperability** is needed, and the development of interoperable formats and ontologies becomes a necessity. Interoperability standards that enable public and private data sharing between brands, for services, for decision support... can enhance the added value and lower the barriers for sharing and/or re-using data.

The current **fragmentation** and **diversification** of digital solutions offerings and the lack of interoperability represent a major bottleneck for a wider adoption of digital farming products and services, which aim to become plug and play components, which clearly requires more standardization efforts. This also applies to data sharing, where FAIR principles and clear benefits need to be elaborated and promoted.

3.2.2. Policy recommendations

Based on the identified challenges, FAIRshare propose following policy recommendations in order to overcome data sharing and related trust, data format standardization and interoperability between different DATS.

- Farmers should be encouraged through **active promotion**, to share their data on secure platforms that can manage their data appropriately, and allow data sharing with the farmer's consent. **The EU code of conduct on agricultural data sharing** examines general principles for farm-to-farm products sharing of agricultural data within the agri-food chain. It constitutes a joint effort from signatory organisations to bring greater clarity to contractual relationships and provide guidance on the use of agricultural data. The Code of Conduct is a non-binding document that provides guidance on the use of agricultural data, examining at general principles and contractual relations where the farmer remains at the heart of the collection, processing and management of agricultural data. **The Data Act** is legally binding for some of the principles/conditions and in relation to data sharing, as can also be found in the Code, but lacks specific rules on data sharing for the typical use cases in agriculture. The development of an agricultural data space and possible related legislation could enable a better working data sharing community by working out suitable requirements for the stakeholders and conditions related to the use of data from agricultural production and beyond.
- Certain data (some of which could be very sensitive) is stored and used in 'libraries'. **The creation of digital data libraries** may further help to (a) promote standardisation, (b) foster the re-use of data for public purposes such as monitoring, for example to track the impact on environment or food safety and (c) allow the development of common policies related to how and under which conditions/security rules. This will allow for a more democratic governance of data by all stakeholders.
- **Policy makers should support:**
 - Further **research** to understand the reasons for distrust in data sharing across the EU, including the lack of information on technical solutions and legal provisions.
 - **Open discussion networks** on trust and the willingness to share data and give more room in this discussion to explore the variety of farmers' concerns;
 - **Fostering** experimentation and upscaling with data sharing through funding new projects which includes individual farmers and their organizations as participants who can contribute to the realisation of innovation, making trust an explicit focus in project design and project evaluation (e.g. in future Research and Innovation (R&I) programmes on European and national level).
 - **Finance** pre-/non-competitive infrastructures for data sharing, including standardisation.
 - Open public data for farming.

- **Development of standards in the field of interoperability** and agricultural data sharing principles clarifies roles/rights and obligations for all stakeholders, depending on use case. The goal is to provide the technical means for seamless, automatic, secure data sharing, while at the same time reducing conflicts, false expectations, and avoiding to legal issues related to misuse of data.
- The assessment of the effectiveness of present and upcoming legislation. This should lead to (a) **amending existing legislation** where it imposes unnecessary limitations to data sharing, and/or (b) **creating new** legislation and jurisprudence to clarify the roles/rights/obligations of data sharing partners in agriculture. That includes protecting individuals/legal entities from unwanted distribution of data, formation of monopolies or a market dominated by a few large players. It also includes the protection of intellectual property rights and trade secrets.

3.2.3. Expected impact

If taken on board for the existing or coming legislation on all level, we expect positive impact of proposed policy measures as follows:

- **Building up and keeping a high level of trust** is one of the biggest challenges faced by the sector and it requires a **joint continuous effort, preventing (unintended) data leaks and privacy errors** by all stakeholders, including public bodies. Such joined effort will provide for a much greater likelihood of success;
- **Clear technical and legal requirements on secure/automated/seamless data sharing and on roles/rights/obligations of the different stakeholders** will be the main trust-building elements and thus the incentive for farmers to share their data.
- Easier access to the data, gained through farmer consent, would **empower agricultural advisors** to guide and lead the farmers with the support of DATS towards a more resource efficient and sustainable agricultural production;
- Considering the strong recommendation to focus efforts on developing “**easy-to-use technology that can make life simpler**”, a **closer cooperation** between technology providers and the agri-food industry would help identify balanced revenues for big players (tech providers, suppliers, retail, ICT) as well small ones (farmers/contractors and their organizations, advisory companies, dealers) advantages immediate that will facilitate the adoption of DATS. The EIP-AGRI Operational Groups could be excellent instruments to drive and test in practice this kind of cooperation especially if there is a reinforcement of digital investments, advance payments and Simplified Cost Options (SCO) to reduce administrative burden.

3.3. Connectivity

Lack of or poor connectivity and access to broadband internet in many rural areas still represent major issue for efficient and effective use of DATS.

3.3.1. What is the challenge?

Technological limitations are still a major bottleneck for adopting and implementing digital advisory tools and services (DATS) for both farmers and advisors, as identified in many FAIRshare user cases. These limitations are wide-ranging, thus coordinated effort between policymakers and technology providers is required to overcome these difficulties.

The FAIRshare project identified many technological and regulatory differences between countries, such as bandwidth, internet accessibility, and DATS solutions provided. Lack of connectivity in rural areas, **poor or costly internet access, or interference with connectivity**, proved to be the biggest challenges for policymakers identified by FAIRshare project. Rural areas, where most of the agriculture activity is concentrated, have traditionally been underserved in terms of connectivity services. This represents a serious barrier for the development of digital agriculture and the uptake of its benefits in rural communities daily operations.

Although some DATS offer offline functionality, it is a fact that many DATS need **stable internet connection** to be used and perform in most effective and most efficient way, therefore **connectivity** is critical to enable the adoption of digital technologies in the agri-food sector and to empower both advisors and farmers with digital skills and competences. The transition to smart agriculture with the support of DATS requires networks that are easy and inexpensive to set up and running, support many devices and provide the performance for fast and continuous data transfer essential to unlock the value of more advanced and complex digital application(s).

3.3.2. Policy recommendations

Based on the identified challenges, FAIRshare propose following policy recommendations in order to overcome the lack of or poor connectivity and access to broadband internet in many rural areas:

- It is very important that every household and particularly the rural area has a broadband internet. National governments should oblige and support the telecommunication companies to provide a good connection everywhere. It should be considered as a basic right for everyone. Governments can fully or partly **subsidize the cost of connectivity infrastructure** and/or services, or other options can be explored, e.g., providing subsidies directly to farmers (via CAP) for services;
- Create a regulatory environment that **encourages innovation** and **public/public-private partnership** investments and enhance optimal use of the EU regulations that favour creation of data infrastructure for technological development in infrastructure and create high performance landing points where networks can be

- connected, preferably glass fiber technology;
- Rural populations may lack broadband network connectivity, for one of three reasons: they may be geographically located in an area where there is only 2G coverage (for voice and text), they may be located in remote rural areas where there may be no coverage at all, or they may be living in small clusters dispersed in areas without network coverage. If glass fiber technology is not an option, mobile broadband connectivity can be provided in all scenarios described above through selective investment in mature mobile broadband technologies. Service providers with the support from national governments using e.g. Public-private partnership (PPP) approach can do so by:
 - **Upgrading** existing 2G/3G sites to 4G or, where appropriate, 5G;
 - **Extending/densifying** network coverage in remote rural areas through low cost 4G solutions, and/or;
 - **Deploying** fixed wireless access networks using 5G for those in remote village or isolated clusters.
 - Policies should include increasing **advanced connectivity infrastructure** in rural areas and developing more effective digital tools for the industry to foster widespread adoption of the connectivity across different sectors applications, particularly agriculture;
 - A detailed analysis of the **cost-benefit** of bandwidth requirements in different areas is needed to ensure that no area is left behind. Although different Member States will require different levels of investment and networks, these infrastructures must be reliable and accommodate the agricultural sector's needs;
 - The connectivity infrastructure must support mission-critical services in agriculture by providing more **stable connection** for running digital applications that demand high reliability and responsiveness;
 - **Coordination and harmonization** of national rural connectivity initiatives to minimize the number of connectivity technologies and frequency bands to be used, thus to harmonize solutions proposed in different territories.

3.3.3. Expected impact

If taken on board for the existing or coming legislation on all level, we expect positive impact of proposed policy measures as follows:

- **Increasing broadband network** in rural areas is one of the main priorities of Broadband Europe, which promotes the European Commission's vision and actions to turn Europe into a Gigabit Society by 2025;
- **Better access** to broadband for farmers to use digital technologies and become more efficient while producing in a more sustainable way. Connectivity is crucial and an adequate rural broadband will contribute to the successful adoption and uptake of digital advisory tools and services by both advisors and farmers;
- Development and implementation of a coherent strategy for rural connectivity that involves different levels of implementation: **regional, national and European**;

- Being able to connect to the internet is crucial for many rural areas and will be an **enabler** of a wider use and more efficient uptake of the digital tools and services, both for farmers and advisors.
- In the case of cooperatives and public private partnerships: stronger social cohesion using revenues from network exploitation for finance of further developments.

3.4. Demonstrate and share the knowledge

3.4.1. What is the challenge?

Farm advisors face obstacles in different topics and contexts. In the FAIRshare project, advisors have chosen new digitalisation solutions or approaches to their services. They identified a challenge to be addressed and described it in a single User Case (UC). Once they have defined what they want to achieve, they choose or add existing DATS in the FAIRshare inventory and use these as a focus in their User Case to improve, change or renew their advisory service. **The core of the UCs**, are the advisors' needs and ambitions for a digital service in the future, while the key in the UCs is an improved, changed or renewed advisory service. The development process has been planned in a Business Case (BC), detailed in an action plan and visualized in a road map. The implementation is monitored, while support and training are organised in parallel. DATS must address the real needs and thus offer a clear added value to the user. In addition, digitalisation of the service should have the right balance between costs and benefits, ease-of-use and good functionalities as well as specific number of UC individual requirements.

COVID-19 was an impulse for a major breakthrough in digitalization, and although it presented uncertainties for the future of advisory, it has also, to some extent, forced advisors to engage more with digital tools. Setting up 42 funded user cases, helped advisors **overcome digitalization challenges** through a process of change, including the adaption of DATS by advisors. Many obstacles were overcome, for example, the complexity of procurement laws, tax issues and the diversity of advisory topics, contexts, languages, structures and systems.

Agricultural community needs **regular training**, organized at regional and national levels, but also on the European level with respect to new, and existing digital advisory tools and services. All stakeholders need to be included in these actions. Training is important to all types of agricultural stakeholders: regulators, advisors, farmers, students, and local authorities. Based on the FAIRshare findings, there is a general opinion that there is a **lack of training courses** for both farmers and (young) advisors on digital tools and technologies. For instance, it is important to regularly promote and organize seminars, workshops and demonstrations about digital tools and services. If possible, **good practices** should be included in the training courses on a regular basis. It would also be important to establish a common charter at European level that would deal with guidelines for the application of digital tools. **Testimonials** from experienced and convinced users help spread the benefits of DATS to the farming community. If the farmer/advisor is esteemed in his/her community, other members of the group will follow

(e.g. farmer with the highest reputation in wheat breeding uses a new digital tool and shows the benefits, he/she is a role model).

3.4.2. Policy recommendations

Based on the identified challenges, FAIRshare propose following policy recommendations in order to satisfy the need for demonstration of good practices and knowledge sharing within the agricultural community:

- **Create** an integral AKIS where advisors are facilitated to use and promote DATS;
- **Translation programs, automatic translation services** should be supported by the governments. IT developers should think about “language packages/modules” from the very beginning of the DATS development process;
- Support the development of **demonstration facilities** (e.g. farms) **and learning networks** to promote benefits of DATS. That includes clear and informative communication on all levels, illustrating examples and benefits, supporting networking and peer to peer learning and providing technical support for farmers. Demonstrations at the farm level (peer to peer learning) are being seen by farmers as the most effective way of knowledge exchange and innovation uptake. This is not always supported with the necessary funding opportunities and training tools. Public authorities, research and innovation funding bodies and other relevant AKIS actors should implement specifically **targeted funding measures** to assure that demonstration and training activities are properly supported and valorised;
- **Networking activities** are considered a positive contributor to the functioning of demo facilities in the AKIS and, as a result, may influence future funding streams dedicated to such activities. The level of networking is strictly related with the activism and vitality of AKIS actors in the individual member states. In the EU, several networking activities are underway in countries and regions, with different models of demonstration actions and Demo Farm management being adopted. Efforts are still needed to support the alignment of quality standards of demo facilities at European level and the creation of a comprehensive European repository of competences and Demo facilities that can provide guidance and identify strategic priorities;
- **Integrate demonstration approaches** if possible as a requirement for innovation and investments schemes in funding programmes (e.g. EIP AGRI OGs, CAP, ERDF, etc.) where the role of advisors can be highlighted;
- Support development of **harmonized Research and Development (R&D) and cost/benefit methodologies** that provide representative findings on the performance of digital advisory tools taking into account also mitigation measures tackling climate change challenges, thereby helping farmers make a decision on the use of such technology, particularly concerning yield performance and the reduced use of farm inputs;
- **Promote demonstration activities** at the farm level aimed at showing the advisors and farmers in their own region/country how new smart technology perform; Demonstration farms are key examples of support strategies facilitating the adoption and uptake of digital tools and services;

- **Promoting** tools to share farmer's experiences, as well as the exchange of information about training courses and materials used throughout Europe in order to compare and, above all, to improve and harmonize the training courses provided;
- **Competence development programs for advisors and consultants** working in rural areas that combines practical training with tried and tested advisory techniques should also be supported. **CECRA** (Certificate for European Consultants in Rural Areas) training programs helps participants to improve their advisory and extension techniques, including the use and promotion of the adoption of DATS in the farming context;
- **Creation and organization** of working groups, learning networks, peer-to-peer learning, training, tutorials and on-farm demonstrations to drive digital awareness and skills of **(young)advisors and farmers** with whom they interact on a daily basis;
- At **advisory organization level**, is recommended to implement policies that **encourage the cooperation between different departments by using digital tools and services including mentoring programs aimed to young advisors**. This will improve **efficiency** within the organization, **eliminate fragmentation** in communication (often resulting in crucial information being side lined or misunderstood) and **provide support** in keeping and sharing internal knowledge and expertise;
- **Regional and national government** should continue to collaborate and **support cross-visits approach** to understand and get deeper insight into the needs, challenges, failures and success stories of the other actors and stakeholders of the agricultural sectors, international exchange also taking into account different the point of views and experience;
- **Governments** should be the driving force, **by integrating digitalisation in various policies** by comprehensive and adaptive planning and offer sufficient support towards this process. Based on the FAIRshare UC experiences, having a supportive government is not an absolute precondition or requirement, but nevertheless an important aspect to consider in the overall process of improving the uptake of digital tools;
- **Promote digital tools** that facilitate the communication between advisors and advisors and farmers to share knowledge and better understanding of each other's' needs and expectations. This would also contribute to more positive behavioural change, as advisors sometimes consider digitalisation as a threat to their conventional role within the farming community;
- In **future projects** where there is a need to engage actors beyond the immediate partners and linked third parties, enhanced and better advice and flexibility should be given to use project grant aid as a mechanism to **reward participating groups** of advisors and farmers.
- It is important to organize dedicated **follow up actions that connect project results and best practices and build synergies** from the agricultural sectors to territorial and sectorial strategies, so that each single project may provide a better impact to the local community.

- It is important to **promote the integration of training policies** with demo farm practical approaches, pursuing missing/new curricula strategies with technology providers.

3.4.3. Expected impact

If taken on board for the existing or coming legislation on all level, we expect positive impact of proposed policy measures as follows:

- More empirical based evidence from **R&D** and farmers' field trial based on real-life conditions on the economic benefits of using DATS **will encourage farmers to invest in new innovative digital technologies**, together with rural ones.
- **Training and good practice** sharing/demonstration will provide farmers/advisors with the necessary information for balanced use of digital tools. It is expected that 'proof by data' from R&D and practical experience will become increasingly important due to digitization and cross-domain integration of stakeholders. It fits within the partnership 'Agriculture of Data' where data should help farmers make better use and better decision based on monitoring the application process. In parallel the resulting data can also be used to prove good practice;
- **Demonstration activities** at farm level are a crucial example of the agricultural knowledge exchange for innovation, with the added benefit of having the possibility of testing the DATS directly on the field;
- Farmer-to-farmer **learning** is a crucial example of knowledge exchange in agriculture that can help in the uptake of new digital advisory tools;
- **Regular trainings** on the use of the technology, offered to advisors to improve their competences and capabilities to use digital tools and ensure that this adds value to their on-farm visits and practice;
- **Development** of new types of advisory activities in collaboration with national and EU authorities with a focus on making farmers able to better handle involvement and investments in digital technologies.
- A farm advisor community **ready to actively use** the possibilities of digital technologies and guide farmers in the present and future digital agricultural landscape;
- **Energize advisors** to be more proactive in the use of digital tools by providing them with the access (DATS inventory), training and support needed and the motivation to fully support the increased involvement of farmers in digital tech;
- **Attracting young advisors** who are better trained and more proactive in the use of technological tools;
- **Training programs such as CECRA** will have a transformative impact on advisors (**including young advisors**), equipping them with essential skills to face ever-evolving business challenges and equipping them to excel in developing rural and agricultural advisory skills;
- There is much to learn during the implementation and rollout phase. Even if the DATS does not work for the addressed challenge, learning is priceless. We can benefit a lot from each other's experiences i.e. **peer to peer learning**.

3.5. Financial support for investing in new/existing digital technologies and services

Investment in new digital technologies requires financial support on European/national/regional/local level, not only for purchasing the equipment, but also for purposes of training and education, and in the meantime reinforcing the Advisory services.

3.5.1. What is the challenge?

Adoption of digital advisory solutions is often **expensive**, especially when it comes to digital technology where investments on technological equipment or infrastructure are required. Lack of financial resources and funding/investments is one of the main obstacles for those willing to engage with. Both European and national financial support is therefore **essential** to promote the uptake of such solutions and is a key point for the digitalization of EU agriculture, including better adoption of DATS. In other words, the main objective is to make public subsidies **efficient** and to **reduce** the bureaucracy at the same time.

Measures that financially support farmers to adopt sustainable practices are essential, as a means to **mitigate the risks** and **costs** of transition from the current to more innovative practices with support of DATS, but also to mitigate the additional risk from the potential loss of production in order to comply with European and national regulations.

3.5.2. Policy recommendations

- **National/regional/local governments** should be the driving force, integrating digitalisation into various policies and offer sufficient support towards this process. Based on the UC experiences, having a **supportive** government is not an absolute precondition or requirement, but nevertheless it is an important aspect to consider in the overall process. Availability of government support for digitalisation and DATS use and adoption, for instance by providing funding or by prioritising digitalisation in specific development programmes/policies on national/regional/local level. **Bureaucracy** in some countries has been indicated as a barrier that makes innovation and digitalisation far more challenging, monitor on bureaucracy, seen from the smaller stakeholders and involve them to mitigating the effects of bureaucracy;
- In order to **continue supporting sustainable agriculture through the CAP** National Authorities need to further elaborate and understand what is meant by sustainable agriculture, how it is performed and measured in the national/regional context. A more specific & performance-driven indicators help farmers move toward specific directions related to sustainable agricultural practices including **better uptake of DATS**, which require investment on the one hand and uncertainty on return on investment (ROI) on the other at farm level, where support measures can be focussed on specific challenges;
- As described in **national strategic plans**, **CAP** partially provides financial support for

the adoption of new technology, but the framework needs to be detailed and the funding schemes need to be reinforced by a systematic approach of designing new, well accessible, financial instruments for awarding technology adopters;

- Despite the effectiveness of the use of digital agricultural solutions, unpredictable damages that affect the farmers' income might be caused not only by the implementation of sustainable agricultural practices, but also by the implementation of digital technology. Safety by design should be fostered as basic development and re-engineering principle, pre-competitive industrial efforts to implement these investments should be subsidised.
- There is a need to **rethink** the insurance system, to also cover these damages, so that farmers will be assured that they will be financially covered in case of possible damages and consequently will be more willing to adopt DATS;
- **Develop funding instruments** (e.g. innovation actions funded via the ERDF) that facilitate direct investments by actors, interested in demonstrating innovative solutions, favouring the use of demo farms as a way to prove the economic sustainability and as a way to facilitate the marketing of solutions;
- The farmers/advisors considered as a **role model** should be supported (financially, organizationally, and in terms of tools) to work as a role model and educate other farmers/advisors;
- **Member States** should invest in training courses with practical content on DATS use and adjustment in practice, for all actors, including policy makers/regulators, advisors, farmers and technology developers. Training modules should be continually updated so that all actors are aware of the latest R&I on innovative digital tools and techniques and/or use programs of 'train the trainers' should be setup;
- Integrate and financially support as much as possible **demonstration approaches** as a requirement for innovation and investments schemes in funding programmes (e.g. EIP AGRI OGs, CAP, ERDF, etc.).

3.5.3. Expected impact

- **Improvement** of the existing and development of new digital advisory tools to facilitate more efficient and sustainable agricultural production, also considering environmental aspects;
- Improvement of the digital skills of all actors involved in agricultural production and protection, both directly and indirectly (policy makers/regulators, advisors and farmers) to ensure a better uptake and practical implementation of DATS;
- **Linkage of subsidies to potential efficiency gains** based on implementation of the DATS on a consensual basis by all stakeholders that will build trust among advisors and farmers and increase **the uptake** of new technologies/techniques, while ensuring the good working of the internal market.
- **Promotion** of programmes/projects that encourage and support the engagement of end users in the development and optimization of the tools, as users' feedback is the precondition for success. Innovation with and by the users.
- Financial support of **training and good practice sharing/demonstration** will provide the necessary intelligence to farmers/advisors to make a well-balanced purchase in

addition to the use of FAIRshare Inventory.

- Potential **reducing of the production costs** for the farmers that are implementing DATS, could lead to **reduced prices** for the final consumer.



4. Final conference report

4.1. Description of the event

The FAIRshare Final Conference, was the culmination of years of collaboration and innovation. It took place on the 2nd and 3rd of October 2023 in Thessaloniki, Greece. Hosted at the Aristotle's University of Thessaloniki Conference Centre, the event brought together over 80 registered attendees, with around 70 participants joining in for the two-day gathering.



Figure 14. FAIRshare final conference.

Day 1: October 2, 2023

The conference opened its doors at 9.00 AM with assembly and registration, setting the stage for a packed schedule of insights and discussions. Raquel Caetano Ferreira from Teagasc welcomed the participants and introduced the session's chairperson.

Tom Kelly, also from Teagasc and project coordinator, extended a warm welcome and shared introductory comments, emphasizing the significance of the conference. The

event's scope broadened with Natalia Brzezina from the EU presenting a policy brief, providing context to the agricultural policy landscape.

The pivotal role of digitalization in advisory support services was highlighted by Tom Kelly, further underlining its foundational importance. Sofia Mouseti from AUA shed light on the Permanent Network Facility and its relevance to advisors.

The morning continued with Aine MackenWalsh from Teagasc sharing valuable insights into "FAIRshare good practices". Pierre Cordel from AC3A delved into the digitalization challenges and opportunities unearthed during the project.

After a short break to recharge, a panel discussion with project advisory board members, moderated by Tom Kelly, discussed how FAIRshare laid the foundation for future actions. The panel featured Kristin Davis from the International Food Policy Research Institute and Krijn Poppe from Wageningen University and Research.

Following a lunch break and networking opportunity, the afternoon session commenced with User Cases from the Northeast and West Europe hubs presenting their cases, DATS, and outcomes.

Day 2: October 3, 2023

The second day began with an assembly, setting the stage for another day of insightful discussions. Raquel Caetano Ferreira from Teagasc updated the program and introduced the sessions.

Evi Arachoviti from i4agri discussed the User Case model, while Evelien Lambrecht from Inagro explored "Digitalization: Strategic planning and road mapping process". Peter Parea from ZLTO shared insights into the User Cases experience, the importance of training and cross-visits with the support of Bart van de Beek from Fruit Tech Campus and Franz Hobmeier from Naturland.

Rui Almeida from Consulai delved into the multiplier effect and communication with a wider audience in an interactive quizz. Aine MackenWalsh from Teagasc led an interactive session on engaging the wider advisory community.

A coffee break provided participants with a chance to network and recharge. The morning session continued with an interactive session on the future of project outcomes, led by Evelien Lambrecht from Inagro.

Discussions with two advisors, led by Patricia Fry from HAFL, Aine Butler from Teagasc and Djessie Donkers from ZLTO, highlighted the added value and learnings from their DATS experiences. Peter Parea from ZLTO provided an overview of the User Cases, their implementation, learnings, and good practices.

Lunchtime offered another opportunity for networking and sharing experiences. In the afternoon, User Cases from the Southeast and Central Europe hubs took the stage to present their cases, DATS, and outcomes.

A revitalizing break prepared participants for the conference's conclusion. The event wrapped up with FAIRshare policy guidelines, challenges, recommendations, and expected impact, presented by Vanja Biševac from CEMA.

The FAIRshare Final Conference marked a significant milestone, celebrating five years of collaborative efforts, knowledge sharing, and digital innovation in agriculture. It provided a platform to reflect on achievements, share insights, and chart the course for the future of agriculture. The event was a testament to the dedication of all involved, and it promises to leave a lasting impact on the agricultural landscape.



Figure 15. FAIRshare Consortium

4.2. Key Takeaways

The key takeaways from the conference were summarized in the table below:

Monday, 2nd October 2023	
Session	Key Takeaways
Policy brief	
The Permanent Network Facility – what is it and its value to advisors	<ol style="list-style-type: none"> 1) Participants were very interested in the continuation of the DATS Inventory. 2) We can use the API to facilitate the DATS Inventory to transfer easily to other systems. 3) Define specific action plan of how we

	<p>sustain the Inventory for the next years, update, maintenance, etc.</p>
<p>What we learned about digitalization challenges and opportunities</p>	<p>1) All countries in Europe have the same challenges regarding digitalization in agriculture.</p> <p>2) We know how to overcome them, but we have to make a big effort to do so.</p> <p>3) The DATS inventory could be really helpful as same as the training inventory.</p>
<p>Advisors experience in facing a digitalization challenge / opportunity</p>	<p>Two user case leaders:</p> <p>1) See a clear opportunity for DATS to lead to smarter decisions in the extension world.</p> <p>2) Find that farmers love new technologies. This is true for early adopters.</p> <p>3) Emphasize the need to build trust and share the impact of DATS and the skills by means of storytelling on a peer-to-peer basis to reach all farmers.</p> <p>4) Question whether there will be less work for extension services if farmers use DATS.</p> <p>5) Emphasize the need to address these application areas: AI and Blockchain are here to stay.</p>
<p>Tuesday, 3rd October 2023</p>	
<p>Session</p>	<p>Key Takeaways</p>

<p>User Case model</p>	<p>1) UCs energized advisors to be more proactive in the use of DATS by providing them with access, training and the motivation to fully support the increased involvement of farmers in digital tech. and services.</p> <p>2) Great value of peer-to-peer learning and exchange.</p> <p>3) Demonstrating a clear benefit from using DATS and providing a positive experience, C22is more likely to encourage the use of digital tools.</p>
<p>Digitalization: Strategic planning and road mapping process</p>	<p>1) Insight in 'the road to take' for the enhanced use of digital farm advisory tools.</p> <p>2) Supporting actions and materials (trainings on how to organize workshops, with supporting tools and templates, guidelines, frameworks, daily support) were very helpful for the UC-leaders to get the right focus.</p> <p>3) Training materials will remain available.</p>
<p>The User Cases experience, the importance of training and cross visits</p>	<p>1) Interaction in training and cross visits was essential for good progress in the use cases.</p> <p>2) To create interaction, specific programme with adult learning was developed.</p> <p>3) Virtual cross visits were a strong new tool to create effective interaction.</p>
<p>Multiplier effect and communication with a wider audience</p>	<p>1) Communication and dissemination of the main outcomes of the FAIRshare project were assertive and effective, reaching advisors from all over Europe, farmers, researchers, and policy makers.</p> <p>2) UCs are a nice way of disseminating the project, even after it's end.</p>

	<p>3) Materials such as short videos and infographics were very popular with the intended target groups. Dynamics developed on social networks (e.g., FAIRshare sessions on Twitter) had a wide reach. Synergies with other European projects and networks were also essential.</p> <p>4) The multiplier effect only multiplies if we start - It's now up to us to continue disseminating the results.</p>
<p>Interactive session: The future of the project outcomes</p>	<p>1) All UC's convinced of benefits.</p> <p>2) Some bottlenecks to face, delays in implementation, but suggestions to overcome.</p> <p>3) The end of the project is not the end of adaptation/adoption of DATS.</p> <p>4) UCs are ready for testing, validating, optimizing, and upscaling the use of DATs.</p>
<p>Discussion with two advisors of added value and learnings from their experience with DATS</p>	<p>Two advisors working in two user cases:</p> <p>1) Found the role of their DATS in the consultation remarkable. In the case of ZLTO, the DATS led to a clear insight at local level. In the case of Teagasc, their DATS was initially perceived cautiously by the extension workers. When she realized that this tool allows more interaction with farmers on the ground and leads to less office work, the advisor was enthusiastic.</p> <p>2) They mentioned the need for sharing expertise among peers to facilitate adoption. It was mentioned that peer-to-peer learning among advisors played an important role in overcoming the initial phase of feeling lost with the new tool.</p>

FAIRshare policy guidelines: challenges, recommendations and expected impact

FAIRshare aims to turn the policy into an opportunity to make EU agriculture smarter and greener. In this sense, policy makers are called to promote:

- 1) Create AKIS where advisors support and encourage farmers to make use of digital opportunities in their farm.
- 2) Encouraging farmers to share their data on secure platforms and allow data sharing with consent.
- 3) Supporting development of standards in the field of interoperability and agricultural data sharing.
- 4) Increasing advanced connectivity infrastructure in rural areas.



5. References

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