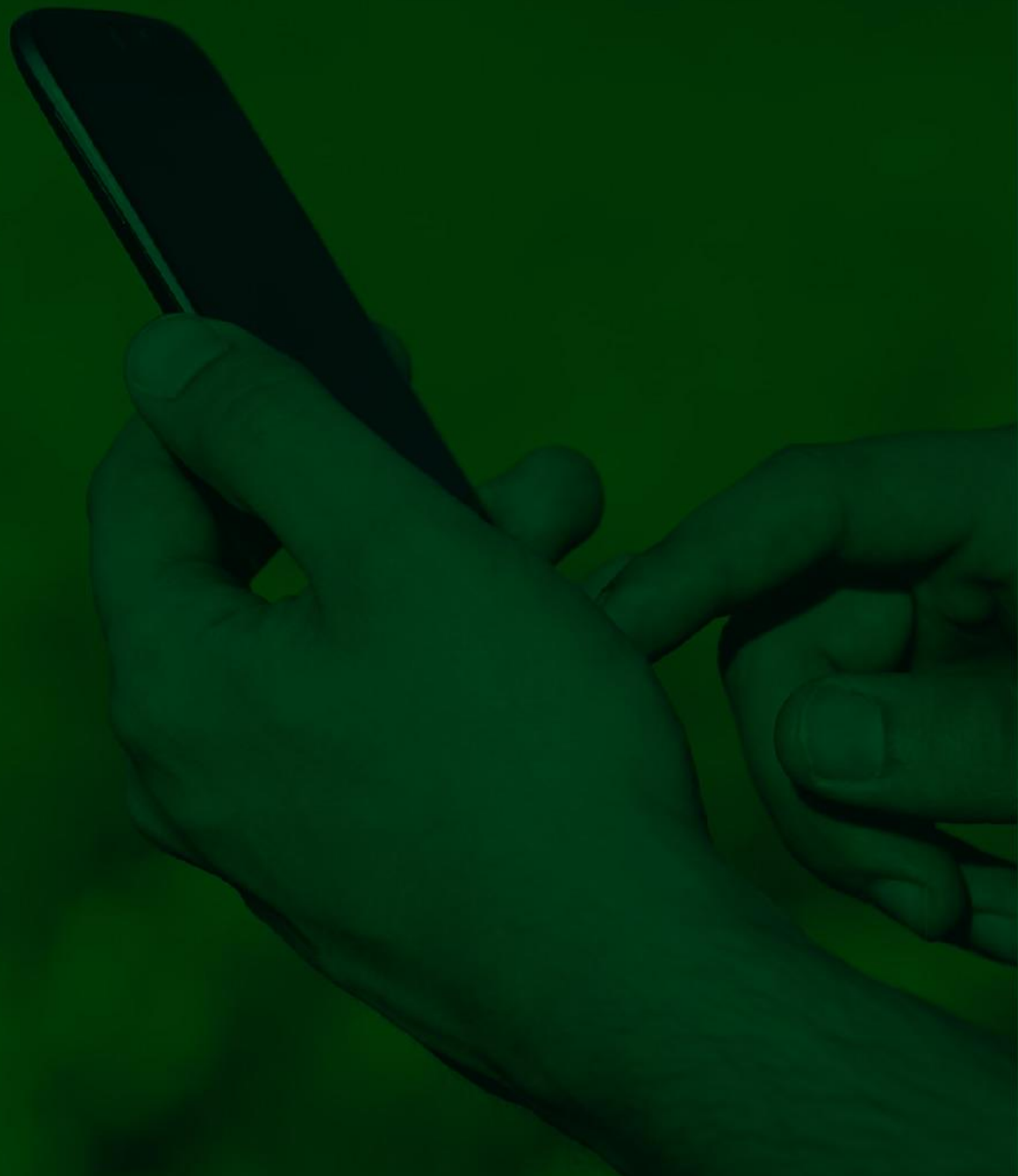




FAIRshare

DIGITAL TOOLS FOR FARM ADVISORS



Deliverable 3.6:

Overcoming barriers to uptake of Digital Agriculture by farmers

Authors: Pierre Cordel (AC3A)

Contributions from: Teresa Hooks (TEAGASC), John Hyland (TEAGASC), Tom Kelly (TEAGASC), Peter Parea (ZLTO), Vanja Bisevac (CEMA), Benedicte Fusai (IDELE), Lies Debruyne (ILVO), Evelien Lambrecht (INAGRO), Johannes Weiss (Naturland), Francisca Viveiros (Consulai), Miron Elena-Teodora (LKO), Karlheinz Knickel (Karlheinz Knickel)

This report only reflects the views of the author(s).

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Contact	Tom Kelly (tom.kelly@teagasc.ie) and Teresa Hooks (teresa.hooks@teagasc.ie)

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Index

1. Introduction.....	4
2. Results and analysis.....	6
2.1. Main results of surveys (T3.2 and D3.2)	6
2.2. Main results of focus groups (T3.3 and D3.3)	6
2.3. Main results of Workshops (T3.4 and D3.4)	11
2.4. Findings from other literature	15
3. Conclusions.....	18
References	20

Table Index

Table 1: Barriers to the uptake of digital tools per region	7
Table 2: Solutions and inspiration to help overcome the identified barriers	8
Table 3: Solution to overcome the identified barriers in the workshop	12

Figure Index

Figure 1: Map of the four regional groups	5
Figure 2: What are the main barriers to using technologies on Irish farms?.....	17



1. Introduction

Deliverable 3.6 is the result of the work done in WP3 “the interface between Digital Agriculture (DA), the advisory and farming communities”. This document aims to compile the results of all the previous tasks within WP3 and assess the relevant literature to provide an overview of the use of DA by farmers, see what the main barriers are towards DA and to assess how these can be overcome. The first step of the WP3 was task 3.2 “Understanding farmer engagement with DA and novel digital technologies”. The goal of this task was to implement two surveys, one for farmers and one for advisors to develop an overview of the engagement with DA and novel technologies on the ground. After this, tasks 3.3, “Contextual Advocacy and Animation approach” and 3.4 “Co-design of communication interventions for different advisor/farmer contexts” were implemented using a multi-actor approach. This involved a diverse group of actors including farmers, advisors, FAIRshare project participants and digital industry representatives participating in focus groups and workshops in the four different European regions of the FAIRshare project (Western Europe, Central Europe, South-Eastern Europe and North-Eastern Europe).

The distributions of countries in the four regions are:

- **Western Europe:** Portugal, Spain, France, Ireland and UK
Hub leader: Teagasc
- **Central Europe:** Germany, Switzerland, Belgium, Italy, Netherlands, Czech Republic, Austria and Slovakia
Hub leader: ZLTO
- **South-Eastern Europe:** Serbia, Greece, Croatia, Slovenia, Hungary, Bulgaria, Kosovo, Montenegro, North Macedonia and Romania
Hub leader: SEASN
- **North-Eastern Europe:** Finland, Norway, Denmark, Poland, Estonia, Lithuania, Latvia and Moldova
Hub leader: LAAS



Figure 1: Map of the four regional groups



Due to the COVID 19 crisis, the focus groups and workshops took place online via Zoom. Other programs such as Pinup and Klaxoon were also used to facilitate brainstorming and interaction among participants.

2. Results and analysis

2.1. Main results of surveys (T3.2 and D3.2)

In the following, we provide a brief summary of deliverable 3.2: “Typology and reference list of popular applications in DA”.

We collected approximately 1,000 survey responses (more than 600 from advisors and almost 400 from farmers) in total. An overwhelming majority of advisors said that the most important digital advisory services are used for “one-to-one farm advisory”, in other words that they use DATS to keep in touch and communicate with farmers. Both farmers and advisors agreed that DATS have a positive impact on their activities and mainly in the areas of cost, time and resources efficiencies.

However, there are several barriers, which must be addressed to facilitate the widespread adoption of DATS. These include the lack of digital competencies among some advisors and farmers, the fact that DATS are not compatible to share and integrate information between each other, a lack of suitable information on available DATS, and, the biggest barrier (referred to by 90% of farmers) the investment costs (in terms of time and money). Finally, farmers sharing their data is also a big barrier however, on a positive note; most farmers trust their advisors in comparison to any other groups with whom they have to share their data.

2.2. Main results of focus groups (T3.3 and D3.3)

In the following, we provide a brief summary of deliverable 3.3: “Advocacy and animation of DA application”.

In the four focus groups, we asked a range of multi-actors to identify the day-to-day challenges that they face in their work and to outline if they were aware of any DATS that



could help them to address their challenges. Additionally, participants were asked to assess the main barriers related to uptake of tools and digital technologies that they were aware of and to offer any solutions that might help to overcome these barriers. Many barriers were identified by participants during this exercise and the below table provides a summary of the barriers identified and the region in which they were captured.

Table 1: Barriers to the uptake of digital tools per region

BARRIERS	Western Europe	Central Europe	South Eastern Europe	North Eastern Europe
Too many different tools – uncertainty around the most appropriate tools			X	X
Lack of independent advisors on DATS				X
Lack of or poor internet connection	X		X	X
Poor skills, lack of skills or lack of training on how to use digital tools (both farmers and advisors)	X	X	X	X
Low importance of data in decision making				X
Lack of time, willingness or motivation to learn to use DATS		X	X	X
Language barriers		X	X	
Fragmentation of tools which address only 1 or few problems	X	X		
Unique data formatting		X		
Region specific tools not applicable in other regions		X		
Output or data presentation not easy to understand		X	X	
Unaware of tools or technologies		X	X	
Availability of independent tools		X		
Tools not up to date		X		
Not enough focus on specific user problem		X	X	
Too expensive (especially for small farmers)		X	X	

Value or benefit(s) not clearly visible		x	x	x
Data collection and security too complex	x	x	x	
Tools promise more than they can deliver		x	x	
Not user friendly (need to take into account user needs and competencies)	x	x		
No marketing for free tools		x		
Too many tools without clear benefits	x	x		
Too much effort to input data (same data is often required in different tools, but there are no proper interfaces)	x	x		
Older farmers not interested in tools			x	x
Tools appear too complex			x	
Willingness to cooperate in problem solving is limited			x	
Unpleasant public tenders			x	

We can see from Table 1 that the most common barriers (mentioned in at least three regions) are:

- Lack of or poor internet connection
- Poor and lack of skills and training in using digital tools for both farmers and advisors
- Lack of time, willingness and motivation to learn how to use DATS
- Value and benefit(s) of using DATS are not clearly visible
- Data collection and security too complex

The last part of the focus group involved finding ways and providing solutions to help overcome some of these barriers to increase the uptake of DA. The below table provides a summary of the solutions that were provided in more than one region.

Table 2: Solutions and inspiration to help overcome the identified barriers

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

	<ul style="list-style-type: none"> - DATS that are simple and load quickly
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"> - Offer trainings - Establish: <ul style="list-style-type: none"> - Working groups - Learning networks
Lack of time or motivation to learn how to use DATS	<p>Foster on different types of motivation:</p> <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
Output or data presentation not easy to understand	<ul style="list-style-type: none"> - Establish working groups, including advisors and farmers, to share tips and insights on how to address output issues
Unaware of tools or technologies	<ul style="list-style-type: none"> - "Trusted" short-list of best performing tools - Promote tools provided (paid) by public institutions
Not enough focus on specific user challenge	<ul style="list-style-type: none"> - Co-create with a user group - Address the daily work of the farmer and at the same time the advisors/agronomists needs
DATS not being user friendly (consider age profile etc.)	<ul style="list-style-type: none"> - Take into account profile/age group/ skill level of users - Develop an attractive interface
Too expensive (especially for small farmers)	<ul style="list-style-type: none"> - Provide free promotional period (although no long term solution)
Value or benefit(s) not clearly visible	<ul style="list-style-type: none"> - Provide "trusted" short-list of best performing tools - Create Information hub - Establish working groups to share benefits and tips

	<ul style="list-style-type: none"> - Develop demonstration farms, learning networks and host competitions to promote benefits of DATS - Provide free promotional period - Fostering different kinds of motivation: better illustrate advantages, foster networking, improve information, provide good support and team work - Good DATs must be clearly distinguished from others e.g. a rating system - DATS should not only come from commercially oriented companies
Tools promise more than they can deliver	<ul style="list-style-type: none"> - Provide "trusted" short-list of best performing tools
Too much effort to input data (same data is often required in different tools, but there are no proper interfaces)	<ul style="list-style-type: none"> - Interoperable tools: DATS and its different applications should be able to communicate with each other - Focus on interoperability from the start - Shared data: making commercial data available - Standardization of data to allow for easy exchange - Aggregating data from multiple sources: Not all farm data is recorded by the farmer, so records need to be brought together to provide a full picture of the farm. - Data capture needs to be as automated and streamlined as possible
Data collection and security too complex	<ul style="list-style-type: none"> - Legislation regarding data safety in DATS - Data cooperatives at local level - Ensure purpose of the data is clear
Fragmentation of tools which address only one or few problems	<ul style="list-style-type: none"> - Interoperable tools: different tools should be able to communicate with each other - Focus on interoperability from the start

Many of the solutions provided in Table 2 can help to address more than one of the barriers identified. The solutions listed below can, in fact, help to overcome the majority of these barriers and include:



- Creation and organization of working groups, learning networks, peer-to-peer learning, training, tutorials and on-farm demonstrations to drive awareness and skills
- Develop DATS so that they can work offline for a certain period (even with basic functions)
- Develop DATS with the end users involved in the design process to ensure they are fit for purpose
- Create a (short) list of trusted and useful tools compiled by independent advisors
- Provide direct online translations of DATS
- Develop an integrated platform of tools that can communicate with each other (interoperability)
- Pay more attention to and enhance data security

2.3. Main results of Workshops (T3.4 and D3.4)

In the following, we present a summary of deliverable 3.4: “DA solution to common operational challenges faced by farmers”.

During the workshops in the four different regions, a lot of challenges and barriers (≈30 per regions) were identified. To summarize, we characterized six major barriers:

1. Issues related to data privacy
2. The availability of too many different DATS, making it difficult to know a number of DATS sufficiently
3. Lack of training for new technologies
4. Difficulties in optimizing work management
5. Lack of price certainty
6. Difficulties to produce in a more sustainable way

These workshops also aimed to find ways to overcome these barriers. Table 3 provides a summary of the solutions that were identified.

Table 3: Solution to overcome the identified barriers in the workshop

Barriers	Solutions
<p>Issues related to data privacy</p>	<ul style="list-style-type: none"> - Develop a protocol for each DATS, clearly explaining, and allowing different levels of permissions, clearly explaining how and what data will be used. The protocol should also explain if the DATS are compatible with others. - Train farmers on this protocol as well as in General Data Protection Regulation (GDPR). - DATS programming should be standardised to ensure interoperability, such as an “ISOBUS”. The output should also be generated on a universal format (i.e., Excel, API functionalities). - DATS should be user friendly, with clear displays and data from the farm should be automatically synchronised to the platform.
<p>Availability of too many different DATS, making it difficult to know all DATS sufficiently well</p>	<ul style="list-style-type: none"> - Create a European DATS inventory platform, which is already being developed in the FAIRshare Permanent Networking Facility, to share information about DATS and allow users to share their experiences and reviews.

<p>Lack of training for new technologies</p>	<ul style="list-style-type: none"> - Since farming will become more and more digital, continuous training (based on real cases, with testimonials) will be required throughout farmers careers. These can include demonstrations, cross visits, networking and knowledge transfer opportunities, such as workshops and thematic networks. - Advisors have a decisive role in training farmers on problem solving skills and new communication tools and approaches as well as digital/precision farming tools. The training should be tailor made wherever possible. Young advisors should mentor older advisors regarding digital skills and tools. - There should be communication between DATS/IT companies and farmers/advisors, promoting free training for farmers.
<p>Difficulties to optimising work management</p>	<ul style="list-style-type: none"> - Administrative work should be reduced, by using lean management and automated administration. Digital tools shall be a good solution to improve workflow and work management.

	<ul style="list-style-type: none"> - Identify and promote a wider dissemination of flagship farms between farmers and advisors.
<p>Lack of price certainty</p>	<ul style="list-style-type: none"> - Create DATS to track global commodity prices, regional contracting prices and conditions, as well as producer organizations prices that allow farmers to sell directly to consumers. - Specific DATS that record expenses and can benchmark farmer's expenses should also be used. - Organize proper data protection so that this sensitive information is exclusively available for farmers, where they are in a minor position compared to processors and retail. - Translate these tools using automatic translation software like Google translate, DeepL or other translation software. - Artificial Intelligence will also be a future solution for this barrier.
<p>Difficulties to produce in a more sustainable way</p>	<ul style="list-style-type: none"> - Quality digital tools for accurate weather forecasting for specific areas and fast notification of farmers about changing conditions are needed. - Advisors should encourage farmers to adopt the crop varieties that diversify their crops to protect themselves

	<p>better from weather risks and to invest in crop and weather insurance.</p> <ul style="list-style-type: none"> - Sustainable production methods, e.g. agroecology needs to be further supported (financially, in a research and development capacity and socially). - Collect and provide access to digital Decision Support Tools (DSTs) that help farmers in developing initiatives that strengthen their position, helping consumers and producers in rural communities to reconnect.
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2.4. Findings from other literature

Of course, the FAIRshare project is not the first project to consider the barriers to the use DA and the use of DATS. A number of other projects and publications have developed similar findings that echo those found throughout WP3 of the FAIRshare project. These include findings from the H2020 DESIRA project, from EIP AGRI, the SCAR AKIS working group, the Irish Farmers Association (IFA) and also the Food and Agricultural Organization (FAO).

For instance, the H2020 DESIRA project report (2021) highlights a number of barriers towards the adoption of DA including:

- The differences in the levels of digital competencies and skills
- Access to good internet infrastructures
- Digital transformation can often favor a certain type of farming (large-scale, intensive farming)
- Trust issues surrounding data management, ownership and security
- The poor interoperability between different systems and DATS
- The risk of digital applications becoming an obligation (related to certification)



- The investment cost of digital tools

They also identified different actions to help overcome these barriers, including:

- Training to help improve digital skills
- Mechanisms to help farmers to identify appropriate DATS
- Improve connectivity and internet infrastructure in rural areas
- Develop DATS that address the needs of various farmers and farming systems

EIP AGRI, in their workshop “Enabling farmers for the Digital Age: The role of AKIS” (2018) also outline the main barriers hampering the adoption of DATS in agriculture. These include the need to support and train both farmers and advisors in the use of DATS and the need to clearly show the benefits and value of adopting DATS. Interestingly, this report reflects on the diversity of farmers, farms and farming systems across Europe and its impact on the adoption of DA. The report states that *“each farm needs a tailored...digitization plan or strategy”* because *“the situation varies throughout Europe”* and *“there are big differences within the European farming community in terms of digital uptake. This diversity may depend on the region (some regions are front runners while others lack behind), sector (some sectors are more digitized, i.e. intensive horticulture), generation, farm size, etc.”*

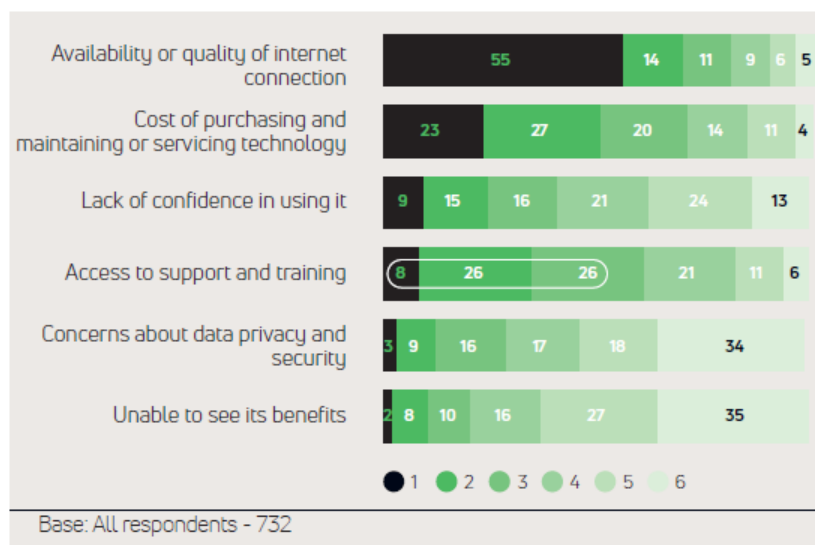
The SCAR AKIS (2019) working group also identified a number of important barriers to the adoption of DA:

- Sustainability of digital infrastructures (including regularly up-dating of systems and applications)
- The ageing demographic of farmers across Europe and their willingness to use and adopt digital infrastructures
- Lack of digital skills, competencies and the lack of professional training, advice and coaching around DATS
- Privacy concerns related to data sharing and ownership
- Lack of user-friendly interfaces and a lack of interoperability between different digital tools and systems

- The cost-benefit ratio and lack of confidence in returns on investment in using digital technologies
- Lack of promotion and awareness of digital infrastructures, tools and services that are available
- Insufficient data and information connected to what farmers actually need or want from DATS
- A significant proportion of the EU agricultural community does not have access to internet in rural areas or equipment such as smartphones

The Irish Farmers Association (IFA, 2019) also carried out a study on the attitudes towards the adoption of DA in Ireland and found some similar barriers. One part of the study relied on a survey of almost 800 Irish farmers to ascertain their views towards DA on Irish farms. As can be seen in Figure 2, when questioned surrounding the main barriers to using DA on Irish farms, the majority of those identified correlate to the findings of FAIRshare and the other publications cited in this report. For example, issues surrounding internet infrastructure in rural areas, cost issues, data protection and ownership as well as the need for support and training to build confidence in adopting DA and DATS.

Figure 2: What are the main barriers to using technologies on Irish farms?



The graduation from 1 to 6 is a priority scale from the most important (1) to the least important (6)

Trendov et al. (2019), on behalf of the FAO, also developed a briefing paper based on a worldwide view towards the adoption of DA and technologies in rural areas. While this paper takes a more global focus the barriers identified replicate with those found in Europe and in FAIRshare, for example the lack of digital skills, access to a good quality broadband, the diversity of available digital technologies and the lack of standardization between them.

We can conclude that the barriers for the adoption of DATS and DA are well established and are relatively similar across Europe and the globe. However, the relevance of the barriers identified will vary from country to country and region to region. For example, poor internet connection may not be as big of an issue in one country in comparison to another country – they could in fact, have a bigger issue sufficient knowledge of available tools. Therefore, the barriers may be similar everywhere but everyone may not need to address them in the same order depending on their local context.

3. Conclusions

Based on our findings, many barriers need to be addressed in order to enhance the adoption of DATS across Europe. We see that many of the barriers identified are the same across Europe, for example, access to good internet, the issue of data security, use and ownership, the lack of digital skills among farmers and advisors (training), the lack of interoperability of DATS and uncertainty around benefits and value of adopting DATS.

We also identified several ways to overcome these barriers. Examples include the possibility to use DATS (even with basic functions) offline, to have more legislation on data usage, sharing and ownership, to offer training and establish working groups that bring DATS developers, farmers and advisors together. These working

groups will also ensure that DATS answer the real needs of farmers and that they are brought on board early in the design process. Another solution to promote the awareness of DATS is to develop an inventory whereby tools can be shared and assess based on their usability, this is a solution that FAIRshare is already addressing through the development of its PNF.

All of these findings will inform the next steps of the FAIRshare project, particularly with the implementation of the User Cases (UC). The UCs will develop their business cases and actions plans in which they will identify and set out the steps to address the specific the barriers they face in their UC. The support of FAIRshare, both financially and with the expertise of the FAIRshare project partners will be crucial in this. In addition, the creation of training modules for advisors and farmers will help them to have a better understanding of DATS available in every region. Last, but not least, cross-visits will be a very good and practical way to facilitate knowledge exchange and facilitate solutions to overcome barriers towards DA at a local level for both farmers and advisors.

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