



D5.1 QuantiFarm DIA – initial version

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Abstract:	This document describes the QuantiFarm DIA and its mechanisms, as well as the training methods and materials that will be used in the different trainings. In addition, it describes in detail the training sessions of the 1st EU training workshop, which will aim to train advisors on how to organise a national level training and on the benefits and use of DAT. The deliverable will be updated on M30 to include the full description of all the training sessions and the training material.

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QuantiFarm Consortium			
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2	NEDERLANDSE ORGANISATIE VOOR TOEGEPAST NATUURWETENSCHAPPELIJK ONDERZOEK TNO	TNO	NL
3	POLITECNICO DI MILANO	POLIMI	IT
4	NEUROPUBLIC AE PLIROFORIKIS & EPIKOINONION	NP	GR
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6	CONFEDERAZIONE GENERALE DELL AGRICOLTURA ITALIANA	CONFAGRICOLTURA	IT
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21	ASOCIATIA NATIONALA A INDUSTRIILORDE MORARIT SI PANIFICATIE DIN ROMANIA	ANAMOB	RO
22	UAB ART21	ART21	LT
23	AGROSMART SIA	AgroSmart	LV
24	BENCO BALTIC DOO ZA SAVJETOVANJE IUSLUGE	BENCO	HR
25	FARM FRITES POLAND DWA SPOLKA Z OGRANICZONA ODPOWIEDZIALNOSCIA	FFP2	PL
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List of Abbreviations and Acronyms	
AKIS	Agricultural Knowledge and Innovation Systems
DAT	Digital Technologies in Agriculture
DIA	Digital Innovation Academy
DIH	Digital Innovation Hub
EU	European Union
TC	Test Case
WP	Work Package
AUA	Agricultural University of Athens



Executive Summary

The overall objective of QuantiFarm is to support the further development of DAT as key factors for improving the sustainability performance (economic, environmental and social) and competitiveness of the agricultural sector. This will be achieved through the establishment of an evaluation framework to assess the impact and effectiveness of DAT in agriculture and by developing innovative tools, services and recommendations for farmers, advisors and policy makers.

The QuantiFarm Digital Innovation Academy (DIA) will be established as the main capacity building mechanism for advisors for ensuring they will be able to support farmers in the selection and use of DATs. The basic scope of QuantiFarm DIA is to strengthen the capacities of advisors in the field of DATs and help them provide a set of innovative advisory services to farmers, in order to support the uptake and facilitate the positive impact of them in agriculture. Through 2 EU-wide training events and 10 national training events, following the "Train the Trainer" approach, advisors will be trained on the types of DAT available and their potential benefits, costs and sustainability impacts, as well as how to use the QuantiFarm toolkit to support farmers in selecting the best DAT to meet their needs.

In the same context a digital repository will become available, where all the created educational material will be published. All potential stakeholders will be able to have access to it and to take benefit of the results and data that have been obtained by the multi-year study that took place in the TCs as well as by further information collected.

As this is a combination of remote and face-to-face trainings that take place, several training methods will be put in practice, with a mentality of taking benefit of all different advantages that present each one of them. The trainees will also receive basic education on how to organize and perform a training event themselves.

By the time it is completed, the project is going to create relevant training materials to be used by universities that have courses on the subject of agricultural science, training students to become future farm advisors,



1. Introduction

1.1 Project Summary

The QuantiFarm project focuses on supporting the further development of Digital Agriculture Technologies (DATs) as a key factor for improving the sustainability performance (economic, environmental, and social) and competitiveness of the agricultural sector. To this end, QuantiFarm introduces a comprehensive Assessment Framework for independent qualitative and quantitative assessments of the multiple costs and benefits of digital agriculture technologies. Ensuring replicability and uptake of digital technologies by deploying innovative tools, services, recommendations and making them relevant and of practical use to farmers, advisors, and policy makers across Europe. QuantiFarm is building the project activities around 30 Test Cases (TCs) which span over 20 countries in 10 Biogeographical regions across Europe, capturing multiple geo-political and financial settings. More than 100 farms of different types, sizes, ownership, and operating conditions, committed to participate in the project, both directly but also through cooperatives and large umbrella organisations. The TCs actively engage farmers, advisors, Digital Innovation Hubs (DIHs), researchers/scientists, DATs providers, certification experts and policy makers.

Moreover, QuantiFarm Digital Innovation Academy (DIA) will be established as the main capacity building mechanism for advisors and other Agricultural Knowledge and Innovation Systems (AKIS) actors on the various types of digital technologies available, their costs, benefits and impact on sustainability and will offer training sessions for advisors. One of the DIA primary contributions will also be the provision of training with regards to the QuantiFarm Toolkit, a principal deliverable of the project, which consists a set of tools available to all different professional groups involved, oriented to provide support in decision making and policy design. QuantiFarm comprises 32 partners, representing all relevant stakeholders, including 8 scientific organizations and 12 farmer representatives and advisors.

1.2 Document Scope

The deliverable D5.1 “QuantiFarm DIA – initial version” is the first deliverable of Work Package 5 (WP5), led by NP. Its aim is to present the main objective of QuantiFarm DIA, its mechanisms and training material.

1.3 Document Structure

This document is comprised of the following chapters:

Chapter 1 provides a brief introduction to the QuantiFarm project, the scope of this deliverable, as well as its content and structure.

Chapter Error! Reference source not found. explains the relevant background and describes the QuantiFarm DIA, its aim & objective as well as the mechanisms by which it will be able to disseminate the relevant information.

Chapter Error! Reference source not found. provides a detailed description of the courses and training material, their structure and content along with presenting the final form that the educational material will acquire eventually.

Chapter Error! Reference source not found. presents the conclusions of this document.



2. QuantiFarm DIA Approach and Mechanisms

2.1 The project’s background and approach

The last decade has seen an explosion of interest and investment in the use of digital technologies in agriculture and food production. These initiatives have come under the label of “precision agriculture”, “smart farming” and more generally digital agriculture. Despite the many predicted benefits of the use of data and digital technologies in agriculture (DATs), actual uptake and use by farmers in the EU has been slow and limited for several reasons. These include a lack of knowledge about such tools, insufficient clear and “hard” data on the costs and benefits of DATs, their impact on sustainability when used under real life conditions, as well as impediments that can be defined as “softer” or social factors such as farmers’ cultural and behavioural attitudes.

There is a need for independent quantitative and qualitative assessments of the multiple costs and benefits and potential sustainability gains of DATs, examining both their positive and negative potential impacts. It is also important to make these assessments of DATs and their wider impacts replicable, comparable and of practical use. This is of particular importance for farmers, their advisors, and policy makers, as this is an essential stepping-stone to facilitate the uptake of DATs in the sector and may facilitate the design of tailored and effective policy measures.

The QuantiFarm project facilitates the further deployment of digital technologies in agriculture and thus enhance the sustainability (economic, environmental, and social) performance and competitiveness of the sector, by a) establishing an Assessment Framework for assessing the impact and effectiveness of data-driven technology innovations in agriculture and b) developing innovative tools, services and recommendations for farmers, advisors, and policy makers. Using a multi-actor research approach, QuantiFarm will build on the Ploutos project core results on the use of data-driven technology innovations to improve the sustainability of the agri-food value chain, in coordination with the most appropriate behaviour and business model innovations that are necessary for maximising their impact. With the creation of the QuantiFarm Digital Innovation Academy (DIA), as a major addition to the well-established Digital Innovation Hubs (DIHs) and Advisory Services/AKIS across Europe, the innovations and best practices developed within the project and identified from the wider literature and other projects will be made available to the ecosystems across Europe and will ensure the sustainability of project results beyond its duration. Figure 1 presents the overall methodology of QuantiFarm.

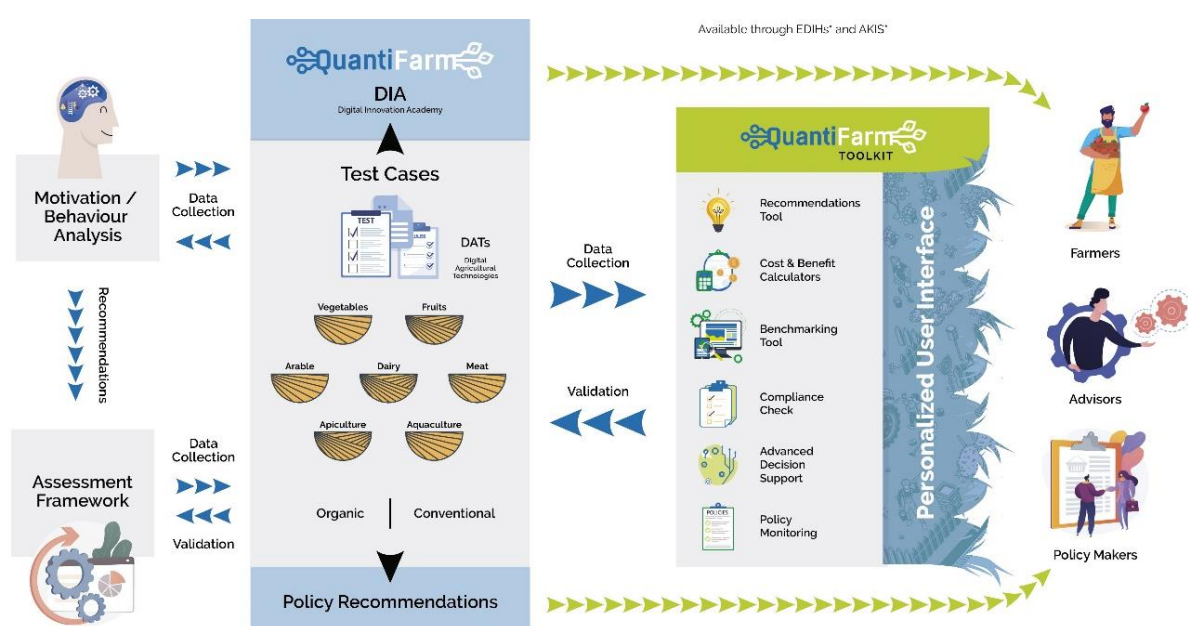


Figure 1. Overview of the overall QuantiFarm Concept and Methodology



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WP5 “Policy Making and Capacity building» aims at developing Policy Recommendation on possible interventions that will allow further uptake of DATs by farmers, to support sustainability and increase the competitiveness of the European agri-food sector. In the context of WP5, the QuantiFarm DIA will be established, in order to increase the advisors’ capacities and help them set up innovative decision support services for farmers.

2.2 QuantiFarm DIA Aim and Objectives

The main goal of the QuantiFarm DIA is to **strengthen the capacities of advisors in the field of DATs** and help them provide a set of **innovative advisory services** to farmers, in order to support the uptake and facilitate the positive impact of DATs in agriculture.

QuantiFarm DIA will offer a set of capacity building activities to advisors and other AKIS actors on the various types of DATs available, their costs, benefits and impact on sustainability. The DIA will also offer training sessions for advisors to help them make the most of the QuantiFarm Toolkit when selecting the suitable set of DATs for farmers they work with. The Toolkit will offer recommendations highlighting the conditions where the impact of DATs is high and should be prioritized. The Toolkit has powerful tools helping advisors manage their clients’ requirements and can be expanded with new tools to keep it relevant to the advisors’ needs. Finally, the DIA will offer guidelines to advisors as they work with farmers to support them in implementing DATs under real production conditions. Taking into consideration the finding of the behaviour analysis, a set of engaging and practical training material and guidelines will be created, covering all the aforementioned aspects.

The QuantiFarm DIA is designed to continue its operation beyond the life of the project, under the leadership of AUA’s DIH on agri-food and Smart Farming, together with member of network of relevant DIHs across Europe who expressed interest in supporting this (like GreenSupplyChain DIH in the Netherlands), as well as the support of EUFRAS and Copa Cogeca to support the uptake of the DATs. AUA’s DIH will ensure the sustainability and uptake of DIA and its services across all European countries, by tapping into the network of the established EDIHs and advisory services or the relevant AKIS actors in each country, depending on the specifics of each national AKIS ecosystem. EUFRAS will work towards the adoption of DIA by its member across Europe, making it available to all European advisors.

2.3 QuantiFarm DIA Mechanisms

The QuantiFarm DIA training plan and materials aim to create a flexible and efficient training process for all target groups. Through the 4 different mechanisms available, DIA will try to clarify its short and long-term objectives to the advisors and by extension to the agricultural producers, present its qualities and capabilities to the audience and users and furthermore, to provide training by exploiting all different means of education that are currently available.

By organizing 2 training workshops at European level, and then 10 trainings for agricultural advisors at national level, it will provide all stakeholders with basic knowledge about DAT and how they can be a powerful tool for the implementation of precision and smart agriculture.

Also, after the European and national training, all the training material created will be available on the project’s digital training material repository. In this way, any interested party will be able to upload and consult the training material at any time.

Finally, the last mechanism of the DIA concerns the supported advisory services to farmers. With the completion of all of the above, a first step will have been taken towards the wider adoption of DAT by agricultural producers across Europe.



2.3.1 European-wide training

As mentioned above the 1st mechanism of the DIA is the organization of training workshops for agricultural advisors in Europe with participants from all relevant TCs. These workshops will constitute a combination of classic training that has the purpose of directly transferring a specific competence/skill, along with a thematic seminar with an aim to elaborate a subject. In this case an example of a subject to elaborate would be the several types of DATs available, their utilities and the fields they achieve their optimal efficiency and a competence to acquire would be the corresponding methodology by which the most appropriate technology is selected on each case, whether this is determined by analog or digital media (Toolkit). A total of two (2) pan-European workshops will be held. In order to maximise synergies and participation, we will receive EUFRAS support and we intend to synchronise the training with another related event.

2.3.2 National training in each of involved country

Nation-wide webinars offering training in the local language will take place in the same framework of disseminating QuantiFarm project and the DIA, but also to provide training to all interested groups. In addition to the European –wide events these training events will take place in the countries where the TCs are being led by advisors or DIHs, this time offering training in the local language. At these trainings a larger audience of agricultural advisors will be trained in order to then be able to offer advisory services to producers on the various DATs. They will also be able to train and support producers who will then get to adopt a DAT suitable for their crop. In addition, all training materials will be available for the advisors after the training sessions. A total of ten (10) webinars will be conducted nationally. Depending on the topic of each TC, the trainings will target the respective advisors of each sector (crops, livestock, aquaculture). The countries where the national trainings will take place are: TC1, 11 (Greece / GAIA & NP), TC2 (Portugal / Agromais & CONSULAI), TC26 (Ireland / Teagasc), TC15 (Cyprus / Filagro), TC14 (Serbia / Terra), TCs 6, 16, 19 (The Netherlands / Delphy), TC9 (Slovenia / KGZS).

The possibility to replace the webinars with face-to-face workshops will be considered by each TC leader, in coordination with the Task 5.1 leader, if this is considered to better fit the needs and situation of the local community of farm advisors.

2.3.3 Digital training material repository

The 3rd mechanism of DIA is a digital repository, where all the educational material that will be created will be published. All potential stakeholders will be able to have access to it and to take benefit of the results and data that have been obtained by the multi-year study that took place in the TCs as well as by further information collected. We believe that the use and existence of a digital repository where all educational material will be available is essential. Trainees will be able to review the material resulting in a better understanding of it.

2.3.4 Supported advisory services to the farmers

Under the guidance of the DIA, advisors will set up innovative advisory services in their countries, following the provided guidelines. They will engage the farmers and support them in selecting DATs and applying them on their farms. Towards this end, in addition to direct meetings they will have with farmers, they will take advantage of the thirty (30) Demo events that will take place during the last year of the project.



2.4 Action Plan

The training of the selected groups consists of the three district phases:

- **Phase A** will include two (2) face-to-face training workshops with the advisors at a European level.
- **Phase B** will include ten (10) webinars or face-to-face workshops offering training in the local language will take place in the same framework of disseminating QuantiFarm project and the DIA, but also training the farmers.
- **Phase C** will include training/support of farmers by local advisors.

Phase	Target group	Objective
Phase A	Advisors EU Level	Training on how to organise national seminars, the different types of DAT and their benefits. Training on the use of the QuantiFarm tool. Recommendations on under which conditions/how DAT yields the best results for a farmer. Guidelines and training to help advisors use all of the above modules.
Phase B	Advisors National Level	Familiarize with: <ul style="list-style-type: none"> • The various types of available DATs for different types of sectors (crops, livestock, aquaculture etc.) and their potential costs, benefits and sustainability impact. • Usage of QuantiFarm Toolkit and its different tools to support the decision making process in relation to the selection of DATs.
Phase C	Farmers	Advisory support for the selection of the appropriate digital tool based on the needs and the crop of each producer. Training and ongoing support in the use of the digital tool adopted by the producer.

Table 1 The training of the selected groups in three phases

2.4.1 Target Groups

The target groups of QuantiFarm are the following:

1. Advisors in both EU and national Level

This target group is the core group of the trainings. The advisors will be trained initially at European level on different types of DATs. They will be also trained on how to train advisors at national level in the use of DATs. Advisors are the key ally of the farmers in the ever-increasing challenges they face. They are individuals that farmers can and do trust as they are very familiar with the needs of their farm. Furthermore, farm advisors support farmers in their technical, financial, organisational or social decisions. They help them to adapt their way of farming to the new digital age, helping them to choose the DATs that are right for them. In this way they help them to improve their livelihoods and gain greater satisfaction from their profession.

2. Future Advisors

As QuantiFarm aims to achieve an impact in the long term, another important target group is the “future advisors”. Relevant educational material will be created to be used by universities that have courses relevant to the subject of agricultural science, training students to become the future farm advisors.



3. Farmers and Agricultural Cooperatives/Farmers Groups

Subsequently, trained advisors at national level will train and support producers in the correct selection and use of DAT. As farmers comprise the main end-users of DATs (together with the advisors and other actors), they need to be informed about the benefits of DATs, which one is suitable for their crop and how much the service will cost. Furthermore, they should have the support of advisors in the proper use of digital technologies in agriculture. For the aforementioned reasons, the training and information received by the producers should be simple and easy to understand.

2.5 Training Methods

QuantiFarm DIA aims to create a flexible pathway for trainees, combining various forms of learning and training. In order to facilitate learning, a mix of training delivery methods and tools is adopted. This includes face-to-face meetings and webinars, while the training material will also be available on the project's digital training material repository, so that it is accessible to all interested parties, facilitating asynchronous training.

Different forms of training are enlisted and combined such as the traditional lecture which requires both the trainer's and the trainee's physical presence, as well as the capitalization of any digital means of communication available that offer the opportunity to modern ways of education to be implemented. To facilitate the learning process, a combination of methods and means of education is adopted. According to the above, this includes face-to-face meetings but also webinars.

In the following paragraphs, all training methods to be used in the context of the DIA will be briefly analyzed and the reasons why it was considered necessary to carry out a combination of them will be explained.

2.5.1 Face-to-Face Education Scheme

While many things can be done virtually in the digital age, physical interaction remains one of the best ways to learn. Communicating and developing relationships through personal interaction is one of the key reasons face-to-face learning continues to be a preferred methodology. Learners gain from the depth of information and experience that is imparted to them by the trainer. Therefore, despite the increase in the use of technology, face-to-face training remains one of the most reliable methods regarding the training outcome, as it contains several aspects that cannot be replaced, such as discussion and peer-to-peer learning, trainer-participant interaction and engagement, adaptability and ability to have 1-on-1 help. Furthermore, richness of information and memorable experiences are deduced through behavior and body language, including one's mannerisms, gestures, tone, language, and volume of voice. Face-to-face communication allows the entire experience to not only be heard but also seen and felt.

As it can be understood, those workshops would be able to acquire an interactive character, as the presence of the participants from all relevant TCs could enhance the creation of ideal conditions for an extended discussion, with the contribution and the view of all stakeholders. One of the main objectives here would be to let all concerns be expressed and all practical difficulties of implementation to be addressed. All of these matters should be discussed in the context of developing different theories for correcting possible deviations and express different concerns related to the combination of various DATs functioning in the service of particular crops. All the above should take place in a context of exploiting face-to-face contact which offers a flexibility in organizing and conducting extensive conversations in which people that own a direct practical experience of the TCs in progress, but they are not familiar enough with digital communication media, to participate in the right for them way and express themselves for as long as they would like to.

2.5.2 Digital/Online Education Scheme – Webinars

Webinars are a powerful tool in any training program, as they are of a low cost, easy to implement and can attract a large number of participants. In our case attracting more attendees from all over the country



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and increasing national coverage would be the main objective. In addition, they offer the ability to access all content and material after the event. Given this, attendees can review the presentation multiple times, helping them to digest all the necessary information and apply the content as needed. A webinar is also a tool to easily hold additional meetings, if deemed necessary due to providing clarifications or presenting results, without having to organize a face-to-face at high-cost event, which would not be easy for participants to attend.

Digital means of education have apparently been a whole new trend in recent years and consequently present their own advantages. Taking benefit of a cutting-edge technology, digital means have the capacity to carry out educational events of several types on real-time. Their “easy to access” nature attracts more attendees than the traditional types of lectures and offer the opportunity to participants to avoid wasting resources. All data and material provided are also easily accessible allowing the user to retrace all necessary information at any time on a mobile device. Digital media of education is a ever-evolving sector and functions in line with all technological developments occur over time. Their contribution in recent years, where every remote learning methodology has been employed due to quarantine, has proved to be enormous.

2.5.3 Asynchronous Training - Digital training material repository

The establishment and operation of a digital repository presents the advantage of offering easy and continuous access to the training material, enabling asynchronous training and offering the user the possibility to train on his/her own pace and time. The digital repository will be designed at a later stage and, depending on the findings of task 5.1 from the interaction with the three target groups, it will either be a part of the QuantiFarm Toolkit or the project website. The final selection will be based on the needs of the target groups and the size and format of the developed training material.

2.5.4 Training methods to be used

As we mentioned above, trainings will be realised face-to-face and remotely. Therefore, in order to organise effective training, the methods used should ensure that the knowledge and skills of the participants are enhanced and/or built.

Training methods are the techniques that educator uses to implement trainings and transfer knowledge, skills and attitudes to training attendees. Therefore, to properly organize a training course, it is necessary to correctly identify the appropriate methods capable to ensure the participants’ engagement in the learning process. When designing trainings, organisers must take into account not only the aims of the training, but also the knowledge background of the target users as well as the variables that determine a method as suitable for achieving the training objectives. In the following of this section the most popular training methods are listed and described:

- Lecture
- Case study
- Demonstrations
- Self-study

Lecture

The lecture is one of the most effective and concise methods for introducing new information and concepts to attendees of a training course. A lecture is the most basic part of a training session, and its main characteristic is that little or no interaction takes place between the trainer and the trainees. This little interaction that may take place is due to the several variations with which it may be applied. The main objective of lecturers is to improve knowledge on learners who generally already have basic or no information and knowledge at all on the field of the training. Through lectures, learners can increase their knowledge on a specific field and then relate what has been learnt to a conceptual framework.



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Lectures are useful for stimulating and motivating learners for further enquiry and for presenting a specialized body of external information.

The main reason why it is considered necessary in the case of QuantiFarm is that the trainees may lack knowledge about the topics to be presented during the training. This may be technical information about DATs or theoretical information about the methods by which they are required to transfer knowledge and organise national seminars.

Case Study

Case study is based on the concept of creating knowledge through the observation and the study of others' experiences in the form of a case. The possibility given to learners to reflect upon and analyze such experiences and to derive new ideas is the main benefit provided by this method. Case studies, both if presented in written and verbal forms, allow learners to make similitudes and to observe similar cases also from the experience of other people, benefiting of the lessons learnt and the knowledge generated by these case studies.

QuantiFarm DIA educational mechanisms are intended to include case studies in their courses whether it concerns an online or an onsite session. The training to be carried out will not only cover the operational part of the digital decision making process but also the theory behind it. A case study constitutes a great practical exercise for trainees with an objective to put all relevant theory related to the decision-making process methodology of selecting the correct DATs in either case, into effect. Case studies can be presented to entire groups of learners, by providing directly the results and experience derived, or to smaller groups of attendees, by giving each group a different topic to reflect and discuss. Through this process each group should carefully decide every single step until it reaches a successful finalization. Then their views may be presented and consolidated in a collective session.

Demonstrations

This method is based on the opportunity provided to participants to observe from an external point of view the objects or processes that they wish to learn in their execution, with the aim of understanding the working modality; demonstrations can be based on real-life or on situations or models. This method is useful for simply conveying complex information, since the possibility of assisting and seeing someone else (an expert) using a complex object or managing a complex process makes learning considerably easier. Therefore, this method is useful both for improving skills and generating awareness around a specific topic. Several EC-funded projects like H2020 IoF2020 (<https://www.iof2020.eu/>), H2020 NEFERTITI (<https://nefertiti-h2020.eu/>) and H2020 AgriDemo-F2F (<https://agridemo-h2020.eu/>) identified demonstrations as one of the most important methods when dealing with innovations in the agri-food sector.

Similar to the case study purpose of use, the demonstrating method will be implemented in a systematic manner in the case of QuantiFarm, allowing trainees to connect theories of DATs and training methods to actual practice. A detailed description of a decision-making process, for example, will make a multi-criteria analysis clearer to trainees. Since this particular teaching method is an interactive one, it will be used to gain the interest of the participants who will be able to express questions by interrupting the process if necessary, as opposed to, for example, a classical lecture. The use of graphs and pictures can also make the process even more interesting.

Self-study

Self-study is an effective training method for increasing learners' skills and knowledge about a certain field of knowledge. With respect to the other methods, the self-study methodology achieves these results without the presence of a trainer leading the activity. However, for achieving effective results with a self-study method, an adequate presence of training material is necessary; on the contrary the time of



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the learning process may be longer than a training course guided by a trainer, since learners cannot rely on other experience and summaries ensured by the application of the other methodologies. This method is useful for creating awareness and improving knowledge.

The QuantiFarm project will create educational material that trainees will have access to at any time, and which will offer them the opportunity for self-improvement in the scientific field they will be working in. Guidance will also be provided through the relevant literature for those interested who aim at a lifelong learning of the subject.

2.5.5 Guidelines for the trainers

It is essential before beginning the training, that the trainer learns about the trainees: who they are, their educational background and their expectations. Furthermore, trainers need to discover what the trainees can already do and what they know about different types of DATs. The trainer should know exactly what areas the trainees need training in, and he/she will need to make it clear exactly what the trainees will be expected to learn. QuantiFarm DIA training and material has specific learning objectives which state what the trainee is expected to know, or be able to do, after completing the training procedure.

Also, it is important that all the training activities will follow the same agenda, with slight adaptations, where necessary. More specifically, the trainers have to:

- Use the provided training material (but adapt them to the trainees own native language).
- Choose the appropriate training and development methods and processes to effectively implement and execute the above plans.
- To be flexible in using the proposed methods and material, according to training curriculum for each training group.
- Make sure that the main objective of each course will be fully presented.
- Follow the announced agenda for each training.

2.6 Training Material

Training resources include a mix of curriculum materials, presentations with notes, manuals, demos, guidelines etc.

- a) Presentations
- b) Manuals
- c) Hands-on work

a) Presentations will include different types of material, including multimedia such as video testimonials from actual users of DATs, and they will be focused on user perspective and they will benefit of sketches, mocks-up and high level description of the QuantiFarm DIA and its objectives. Since the training material combines technical information along with a theoretical training approach, providing detailed explanations on the relevant material can be a very complex task. Considering also the fact that a large part of the audience is new to all relevant information, a detailed description of them using all the above-mentioned methods is necessary. Typical examples of presentations that would be useful in the case of lectures, but not only, would be the presentation of the DAT, an introduction to the toolkit as well as various results collected from the TCs.

b) Manuals will serve as complementary material to be used for describing other necessary elements of the courses, which can be divided according to the concepts that the users should handle. Therefore, relatively to courses and specific technical training with the available DATs, manuals will describe the QuantiFarm Toolkit and its different tools, providing information about the expected results from each tool;



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c) **Hands-on work** guidelines will aim at increasing the capability of trainees to properly use all digital tools and will consist of additional material such as cases in which the data can be used, and selected in a way that can cover all the possible spectrum of scenarios. The same applies to the use of the Toolkit that trainees may possibly have to witness several scenarios while running during a course, in order to understand in depth its functions and capabilities.



3. QuantiFarm DIA Courses and Training Material

By collecting useful information from the QuantiFarm project itself, as well as from other ongoing or past projects, a pool of useful information and lessons learnt is being created. Building on all this information, QuantiFarm project aims to create a series of courses that will be in line with the needs and the purpose of the project and the DIA. Due to the extensive scope of QuantiFarm, there is a need to create courses covering multiple training objectives such as the categories of DATs and their functioning, the conditions under which each one of those performs at its best, but also behavioural determinants for DATs adoption in general. All relevant conclusions will be presented in these modules and solid knowledge that was produced through various tasks will be offered to the trainees. Different target groups may be interested in each one of those, since all of them will be implemented in a different framework.

3.1 Main Training Subject of the QuantiFarm DIA

As already presented in the previous sections, in the context of the QuantiFarm DIA a number of training courses will be designed in order to increase the advisors' capacities in relation to the use of DATs and help them set up innovative decision support services for farmers. These courses will be adjusted according to the needs of the target group for which it is intended. Thus, the main training course will be primarily designed for the needs of advisors that are already working in the field, while another version will be designed with customized training material, which will be more appropriate for use as part of the curriculum of universities like AUA. By doing so, QuantiFarm DIA will help support the capacity building of both current and future farm advisors.

The courses will focus on following training topics:

- a) the different types of DATs, potential benefits, cost and impact on sustainability;
- b) how to use the QuantiFarm Toolkit and training on how to support farmers in making decisions on DAT selection based on their needs;
- c) recommendations on under what circumstances/how DATs deliver the best results for a farmer;
- d) guidelines and training to help them use all of the above to support farmers a) in using DAT in real-life production conditions and b) in adopting potentially appropriate business or operational interventions; and
- e) behavioural determinants for DAT adoption and guidelines for behaviour interventions towards the design of innovative tools and advisory services.

a) The different types of DATs

As mentioned above, QuantiFarm DIA will train advisors on the types of DATs available and their potential benefits, costs and sustainability implications. The content of this course covers in depth the requirements mentioned above. More specifically, it will include the following sections:

- Digital Agricultural technologies: Basic Concepts.
- Advisors and agronomists: role, tasks and obligations.
- Categorisation of DATs and examples of solutions.
- Information on how they work, cost, for which crops they are suitable and for which biogeographical regions, countries or climate conditions.
- Potential financial, environmental and social benefits of DATs.

Those who have successfully completed this module will be familiar with how different digital agricultural technologies work, their potential benefits, cost and impact on sustainability. They will also be able to initiate, train other agricultural advisors as well as farmers on various types of DATs.



b) Using the QuantiFarm Toolkit to support decision-making

One of the major topics of the training is the QuantiFarm Toolkit, which will offer a set of tools to support farmers, advisors and policy makers in decision making in relation to the adoption of DATs. Each tool will be focused on a specific target group to cover identified needs in relation to decision-making and policy evaluation. The DIA will train advisors, and ultimately farmers, on how the QuantiFarm Toolkit, explain how it can be useful for farmers, advisors and Policy Makers and demonstrate how they can use the tools that are specifically designed for them. In a nutshell the course should contain information relevant to the points below:

- i) Demonstrate to the trainees the QuantiFarm Toolkit's and the way it was constructed and its functions (Cost-Benefit Analysis & Sustainability Assessment Component)
- ii) Present its main tools that are appropriate for each of the target groups and demonstrate how each of them can be used.

By the end of the training the trainee should be able to make decisions related to different DATs, by taking benefit of a personalized user-friendly interface offered. All levels of access and of information will be rendered through this Interface according to the potential user role (farmer, advisor, policy maker).

c) Recommendations on optimal use of DATs

A key principle when using DATs is that not every DAT is suitable for all farms and that they do not deliver the same results under all climate and weather conditions. For example, a satellite-based DAT that resulted to a significant decrease in the use of inputs in Greece, might not have the same results in Poland, where the weather is different, and the clouds make the use of Sentinel 2 satellite data less useful. In the same way, a DAT supporting optimal irrigation will have a different impact on a year with extensive draught compared to a year with lots of rainfall. Finally, the DATs need to be used in the way that they were designed, following the instructions of the DAT providers. Not following the protocols will provide different results than expected.

Knowledge on these issues is critical to achieve optimal results, avoid misunderstandings and earn the farmers (and advisors) trust in the DATs. This training session will extend the initial information about the different types of DATs and their potential benefits and provide recommendations on under what circumstances/how DATs deliver the best results for a farmer.

d) Guidelines for the use of DAT in real-life production conditions

This session will focus on providing the necessary guidelines and training to the advisors, to help them use all of the tools and learnings from the previous training to support farmers a) in using DAT in real-life production conditions and b) in adopting potentially appropriate business or operational interventions that would be necessary for reaping the potential benefits of the DATs.

After the completion of the training session, the trainee will be able to support the farmers, offering specialized directions in selecting the most appropriate DATs for their farm and applying them in real production conditions in a way that will maximise their impact.

e) Behavioural determinants for DAT adoption

QuantiFarm is intended to identify the behavioral determinants which inhibit the uptake of DATs by European farmers, in order to examine the possible interventions that can be made to achieve a more effective rate of adoption as well as ensure the developing of farmers' skills on them. The available training material will present the theory around behavioral determinants, the main methods used to identify them, their evaluation as inhibitors to the adoption of DATs and the usefulness of the conclusions reached. The main findings of QuantiFarm will be discussed.



3.2 Timeplan of training

In order to better schedule the above-mentioned trainings, the following timetable has been drawn up. The 1st EU training event will take place in June 2024 immediately after the 5th Project Meeting of the project and will be face-to-face. It will focus on the 7 sections mentioned above and will have a duration of 1.5 days. This date was chosen based on the fact that the 1st version of the toolkit will be ready, and that the 1st year of DAT implementation will be completed, so we will have some first results to share with the trainees. The fact that the workshop will take place immediately after the 5th plenary meeting of the project, which will be held in person and attended by all project partners, also contributed to the choice. In this way we will reduce unnecessary travel for participants.

After the completion of the 1st EU training workshop, the 2nd EU training workshop will take place in October 2024 and will be conducted remotely. Its aim will be for the trainees, after studying the material of the 1st workshop, to resolve any questions that may have arisen and to finalise the material to be used in the national trainings.

Following the completion of the 2 EU training workshop, the 10 national trainings will take place in March 2025. Until then, trainers will have time to translate the training material and organise their trainings. Also, by March 2025 we will have completed the Toolkit as well as the results of 2 growing seasons where DAT will have been implemented.

Finally, and once the training of the advisers at national level is completed, they will be able to provide advisory services to farmers. This can start immediately after the completion of the 10 national trainings, and more specifically from April 2025 to November 2025, before the end of the project. The advisers will be able to offer the advisory services either through the network they maintain, or also in the context of the DEMO events of the TCs.

Training Event	Date
1st EU training workshop	June 2024
2 EU training workshop	October 2024
10 national trainings	By March 2025
Advisory services to farmers	April 2025 to November 2025

Table 2. Time schedule of training events

3.3 Training advisors

In the case of advisors already operating in the field, the initial aim of the project was to design educational materials in the form of a new CECRA training module on digital technologies. This decision was made at the time of conceiving QuantiFarm, as CECRA (<https://www.cecra.net/en/home/>) is the most prominent competency development programme for farm advisors and consultants. A number of QuantiFarm partners like AGRIDEA and Teagasc are deeply engaged in CECRA and offer training and certifications to farm advisors across Europe. CECRA training modules work following the "Train the Trainer" approach, and they could be the appropriate vehicle for expanding the QuantiFarm training on DATs across Europe.

At a second stage it was realized that CECRA focuses on developing the soft skills of trainers, while a large part of the DIA training is focusing on more specific and "technical" subjects. For this reason, although QuantiFarm will design such a module and propose it to CECRA with the aim to be incorporated into the official CECRA seminar series, another approach was selected for the "main" training course to be developed for advisors. More specifically, QuantiFarm will create the main



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training course for advisors, building on the knowledge, lessons and best practices from EU-funded projects such as [FAIRshare](#) and [i2connect](#), which are also following a "Trainer the Trainer" approach.

The following sections present the courses and plans for the different levels of training at a European and national level, as well as the initial design of the training module to be proposed to CECRA for adoption.

3.3.1 “Train the Trainer” trainings

The first part of the DIA training will focus on training advisors at a European level, aiming to train advisors of the QuantiFarm partners, as well as advisors from EUFRAS network. The training will focus on two pillars:

- how to organize national trainings, tools and methods that are available and can be used; and
- in the topics presented in section 3.1, namely the types of DATs available and the potential benefits, costs and sustainability impacts, as well as on how to use the QuantiFarm Toolkit to support the farmers in selecting the best DATs to satisfy their need.

This training workshop will have a duration of 1.5 days and will focus on 7 different sessions which are presented below.

1) Methodological part of how to organise a national training.

Duration: Two (2) hours. Leader: AGRIDEA

Each country presents its own peculiarities that one should take seriously into account before putting themselves through the complex process of organising a number of specialized training workshops. First of all, the existing (baseline) situation should be examined in detail and the needs and gaps that the potential trainees present in terms of knowledge and information should be identified. Once the relevant study and research has been completed, each individual aspect of the training material should be adapted accordingly. Educational tools and methodologies also play a major role in the whole process, as in each case and always depending on the characteristics of the target audience, different methods and approaches are respectively the most appropriate.

Therefore, this session will present the methodology of how the trainers/advisors will have to organise the respective events at national level. All key steps will be analyzed and all points that may probably need special attention will be mentioned. Guidelines and material will be provided to ensure that the events have maximum impact. At the end of this course every attendee should be aware of all crucial parts of a national training organization and have relevant educational material in their possession. All relevant material should then be translated into the local language. This will be done by aid of a blueprint of a national training.

2) Didactical part of “Train the Trainer”

Duration: 1 hour and 30 minutes. Leader: AGRIDEA

“Train the Trainer” educational model shows specific advantages which make it the most appropriate one under certain circumstances. One of the main reasons why it is being implemented, is its ability to respond to the effective dissemination of information and skill building, in a relatively shorter period compared to traditional training methods. In conclusion, the Train the Trainer model offers a well-organized strategy which allows new trainees, to be suitably equipped with specialized knowledge in order to organize and carry out a training themselves and disseminate knowledge by applying all the basic principles of educational theory.

In this context advisors should be kept aware of both technical details of DATs as well as of how to disseminate information and support farmers to develop the necessary know-how around the subject.



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As previously mentioned though, they will also be trained in how to train advisors at national level in the use of DATs. Therefore, they will in turn be requested to conduct similar to the ones events they are attending and pass on all the relevant knowledge they have received. This particular session will therefore focus on the didactic part of the process of organising train the trainer trainings, their objectives, content and methodology. This will also be done by aid of a blueprint of a national training.

3) Methodological part of adapting the training on the use of a DAT to the different sectors (crops, livestock, aquaculture etc), national differences and environments

Duration: 1 hour and 30 minutes. Leader: AGRIDEA

As it is commonly known the use of DATs can be applied to various operations in the agri-food sector. In recent years, the evolution of digital technologies has reached the point where it can offer high quality services to the ordinary farmer, regardless of the type of farm they are dealing with. The types of farms to which these technologies can respond are diverse and often quite different from one another. The same applies for all different environments that each DAT needs to adapt, since the project's TCs cover a very large part of the European continent. The national trainings that the advisors will have to realize may therefore relate to different agricultural holdings and conditions and before doing so, they should have come up with a specific methodology for adapting each training course to the different sectors.

The aim of this session is to provide an analysis of methodologies on how to adapt the training for the adoption of a DAT according to the sector to which each targeted TC focuses on, as well as the differences of each country and overall environment/context of each TC. There will be a presentation of different tools that can be used by advisors during a training at national level as well as the optimal way of using each one of them. At the end of the session each advisor should have a better idea of how to integrate the relevant information into the training method they will follow.

4) Training on various types of DATs and their potential benefits, costs and sustainability impacts

Duration: 1 hour and 30 minutes. Leader: NEUROPUBLIC

One of the main reasons why this project was created was the fact that it was considered necessary for an independent quantitative and qualitative assessment of the multiple costs and benefits and potential sustainability gains of DATs to be carried out. This would be conducted by examining both their positive and negative potential impacts. QuantiFarm also considers that it is important to make these assessments of DATs and their wider impacts replicable, comparable and of practical use. This is of particular importance for farmers, their advisors, and policy makers, as this is an essential stepping-stone to facilitate the uptake of DATs in the sector and may facilitate the design of tailored and effective policy measures.

Therefore, in this session advisors shall be trained in the types of DATs available and their potential benefits, costs and sustainability impacts and how to scale it up or down, depending on the farm. There will be a detailed presentation of the above as derived from the analysis of the respective project WPs which will be devoted to all basic facts and key points of the analysis behind a decision-making process with regards to the application of digital media in agriculture. Moreover, this session focuses on developing the hard skills of the advisors-trainees and provide them with all necessary solid knowledge on DATs so that they are able to disseminate it in turn through national trainings.

5) Technical part on how to use the QuantiFarm Toolkit

Duration: 1 hour. Leader: NEUROPUBLIC



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The assessment data that will be collected in the context of the 30 TCs, both by farmers and also by the actual DATs using the mechanisms for independent monitoring, will be fed to the QuantiFarm Toolkit to increase awareness and support decision making. The Toolkit then will be able to offer recommendations highlighting the conditions where the impact of DATs is high and should be prioritized. The Toolkit has powerful tools helping advisors manage their clients and can be expanded with new tools to keep it relevant to the advisors' needs. Ensuring its proper use by advisors is therefore crucial to making a decision through the use of it.

Having analyzed the theoretical framework of decision making in the previous lessons, in this one trainee will learn how the process is digitally automated through the toolkit. A presentation of the QuantiFarm toolkit and its uses will be made and training material along with a proper lesson will be provided to advisors on how to use it in order to support farmers in making decisions on DAT selection based on their needs.

6) Recommendations under which conditions/ in which way DATs deliver best results for a farmer

Duration: 1 hour. Leader: NEUROPUBLIC / CONSULAI

As the TCs will test DATs under different conditions, farm types and business models, QuantiFarm will examine what is the best solution for each case and under which conditions DATs deliver best results for a farmer. This session will provide recommendations to help the advisors understand under what circumstances/how DATs deliver the best results for a farmer and enable them offer personalized supporting services to their customers.

7) Methodological part of guidelines and training to help advisors use all the above modules

Duration: 1 hour. Leader: NEUROPUBLIC / AGRIDEA

A set of engaging and practical training materials and guidelines will be created to help them use all that has been described in the previous sessions to support farmers a) in using DAT in real production conditions and b) in adopting possible appropriate business or operational interventions. Also, a set of guidelines on how to present the various DATs to producers will be provided to advisors. Suggested ideas on how to keep their interest during the training. For example, using video testimonials from other farmers already using DAT. What are the particularities when advising farmers in DATs.

The approach to be applied in the 1st Europe-wide session for the training of the trainers of advisors will be based on the following scheme.



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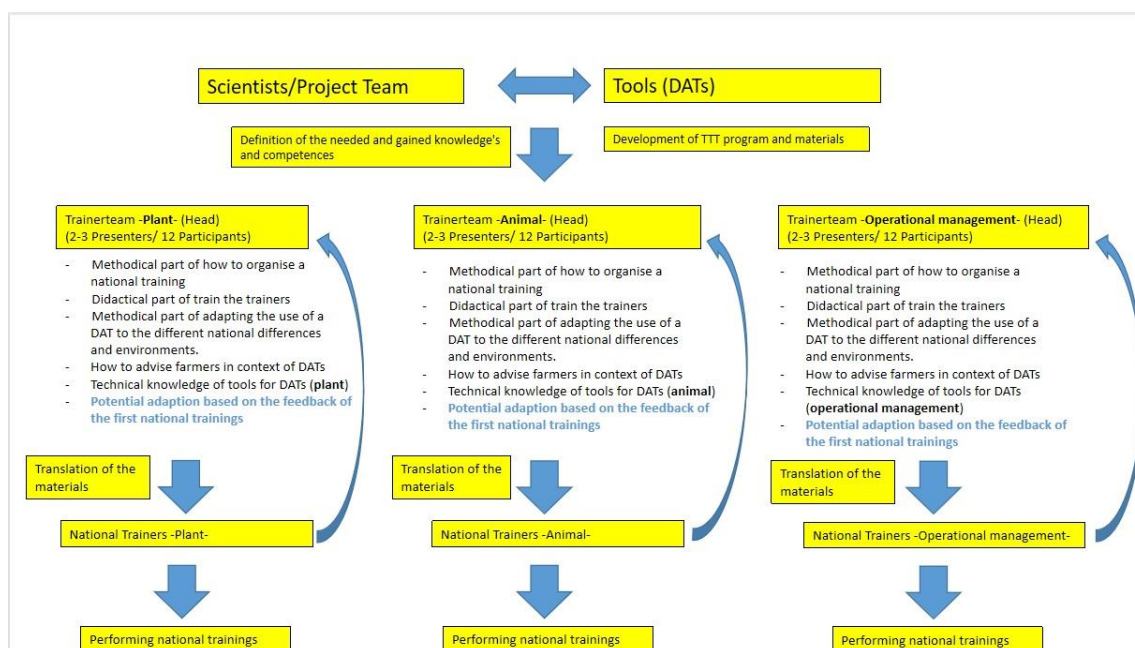


Figure 2 "Train the Trainer" trainings scheme

3.3.2 Webinars for training advisors at the national level

As mentioned in the previous section, the aim of the 2 EU training workshops is to train the advisors on how to organise the national trainings as well as to give all the information about DATs. Having completed the trainings at European level, the advisors will have all the tools in their hands to plan and organise national trainings. They will be able to handle the toolkit as well as know about the different types of DAT and their potential benefits, costs and sustainability impacts. All training material will be translated into the respective language where the training will take place.

3.3.3 QuantiFarm CECRA module

As mentioned earlier, QuantiFarm project has set the objective to create a new CECRA module that will satisfy and fill the training gap and the dissemination needs that exist with regards to DATs. The project argues that the digital transformation in agriculture appears to be the most suitable mean for the implementation of more sustainable practices and interventions and considers that such a pioneering approach should definitely be a part of the curriculum of the most recognized competence development program for advisors working in rural areas. After accomplishing all actions to create the necessary curriculum based on the principles of the organization, the final goal would be the submission of a proposal which the training material will be attached with and through which the trainees will acquire the relevant skills so that they, in turn, can pass on basic information in relation to DATs and the reasons why they should be taken up as soon as possible by agricultural producers around the EU. The team of task 5.1 already works in this direction and has made contact with the appropriate CECRA body.

As mentioned above, CECRA seminars strictly follow the "Train the Trainer" model but also operate according to a particular advisory process. This advisory process is a target- and solution-oriented communicative relationship between client and advisor, actively shaped by both parties. In this process, the advisory service is bound to neutrality, and geared exclusively to the client's success. The advisor must possess sound social, personal and communication competencies, as well as expert knowledge and ongoing training, to successfully guide advisory processes. In addition to advising individual enterprises, this involves supporting cooperative ventures and cross-sector advisory projects, as well as



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organizing adult-education provision. By respecting all principles above, QuantiFarm has proposed a module description by using the CECRA official template that has already been forwarded to the responsible person with the help of AGRIDEA.

<u>Module Description</u>	
Title	Training on various DATs types and their potential benefits, cost and sustainability impact
Type	CECRA Certificate Elective Module
Format	Presence, blended or online
Requirements	Professional competence in one's own field through study or vocational training
Proof of Competence	Module confirmation or confirmation of equivalency
<hr/>	
Learning Targets/ Action Competence	Those who have successfully completed this module <ul style="list-style-type: none"> • will be familiar with how different digital agricultural technologies work, their potential benefits, cost and impact on sustainability • will be able to initiate, train other agricultural advisors as well as farmers on different types of DATs
Content	<ul style="list-style-type: none"> • Digital Agricultural technologies: Basic Concepts • Advisors and agronomists: role, tasks and obligations • Categorisation of DATs • Details of how they work, cost, for which crops they are suitable and for which regions/countries • Details on their environmental and social benefits • Specific communication tools and relevant training material (e.g. presentations)
Recommendation	

Figure 3 The proposed description of the QuantiFarm module using the official CECRA standard

3.4 Training future advisors/ university students

By consulting a typical university department curriculum format, the course will be designed for students relevant to the subject of agricultural science and holdings. The teaching methodology follows that of classical education and as it is not a training of trainers, the curriculum focuses on an introduction of DATs and their potential contribution to sustainable development, to a training on various types of DATs on different sectors (crops, livestock, aquaculture etc.) and their potential benefits, costs and sustainability impacts and recommendations under which conditions/ in which way DATs deliver best results for a farm.

AUA will co-create and use in the class in the context of the project, the corresponding educational material. It will be the first educational institution to incorporate something similar in the curriculum and it is planned to be proposed to more university institutions related and active in related specialties. Depending on the conclusions and the material that will arise from the completion of the project, it will then be determined the number of the courses and that can be created and presented in different audiences, as well as their duration and deepening to the subject, depending on the level of the trainees.



3.5 DIA-powered services for Farmers

Having now properly trained advisors at European and national level, they are ready to set up innovative advisory services in their countries, following the guidelines provided. They will engage the farmers and support them in selecting DATs and applying them on their farms. Using the network of producers they already support and taking advantage of events like the Demoe events/Open Days organised by each TC, they will be able to inform producers about the DAT available and suitable for them. They will also be able to support the producer in the use of the Toolkit in order to select the right DAT for them. They will then offer advisory services for the effective use and implementation of the DAT on their farm.

Therefore, the role of the advisor will not be to train farmers, but to offer them advisory services on which DAT is suitable for them and to support them in the proper and effective use of the DAT.



4. Conclusions

The preparation of an effective plan for the trainings to be organised for the advisors required the initial identification of the target groups and the subsequent participation strategy to be adopted to ensure the participation of an audience suitable for the purposes of the trainings.

Therefore, this deliverable first analysed the QuantiFarm DIA approach and its mechanisms. Furthermore, for the appropriate design of trainings, an analysis of the most common training methodologies was carried out, identifying the advantages and disadvantages of the methods identified.

In the last section, the sessions designed for the 1st “Train the Trainer” training were presented and analysed. Also, the sessions to be designed for future advisors were mentioned, as well as the effort made to design a separate CECRA module for DAT and the obstacles encountered in its creation.

The QuantiFarm material will be designed for both current and future farm advisors to help support their capacity building. The training material for current advisors will be designed, based on "Train the Trainer" and possibly CECRA standard training approaches. The material concerning Universities and future advisors will be co-created with AUA and will be used in the class in the context of the project.

