FLEXIGROBOTS

D7.5 Methodology for Pilot Demonstration

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List of Acronyms

Abbreviation / acronym	Description
CAP	Common Agricultural Policy
Dx.y	Deliverable number y belonging to WP x
DIH	Digital Innovation Hub
GDPR	General Data Protection Regulation
i.e.	Id est
IP	Intellectual Property
KPI	Key performance indicators
NGO	Non-Government Organisation
OEM	Original Equipment Manufacturer
TRL	Technology Readiness Level
TV	Television
UAV	Unmanned Aerial Vehicle
UGV	Unmanned Ground Vehicle
WP	Work Package

Executive Summary

Many different pieces of technology, platform components and integrated systems were developed and assembled within the FlexiGroBots project. In order to maximise the impact of the project and disseminate its main results, a range of pilot demonstrations will be organised. This deliverable analyses various aspects of the demonstration activities and gives clear instructions for the pilots on how to organise them.

Firstly, the objectives of the Pilot Demonstrations are defined and elaborated. They include showcasing the technology in an operational environment, validation of the value proposition, increasing the visibility of the project and the technology, and attracting customers and partners for future exploitation and commercialisation. The deliverable positions itself in a wider context of digital agriculture by providing an in-depth analysis of stakeholders in digital agriculture and the value that the technology brings them. Although farmers are expected to be the primary user of the technology, there are other beneficiaries, such as farmers associations, large agri-businesses, DIHs, academic institutions, service providers, and equipment manufacturers that are involved in the analysis. The format of the events will be virtual in order to maximise the visibility of the demonstrations, attract people from a larger geographical area, and overcome possible problems with travel to remote rural areas where pilots are usually located, the events will take place in a virtual format. They will be held in parts of the year in which the phenological phases of plants and the weather allow this. Video materials and PowerPoint presentations will be prepared in advance and the online platforms and the internet connection will be backed up and double-checked to ensure smooth running of the online events. Besides the introductory notes and conclusions, Virtual Pilot Demonstrations will include the demonstration videos/presentations and testimonies. They will initiate discussion with attendees and make the events as interactive as possible through various digital tools.

The deliverable also covers suggested media channels, instructions for invitations and a concrete check-list for preparation. However, pilots will have the freedom to fine-tune their strategy to their target stakeholders and the specifics of their pilots/technology. The deliverable defines KPIs and key metrics that will be used for evaluation of the successfulness of the project. Last but not least, the deliverable gives an outline of the technology transfer process that will follow the demonstration activities and specifically highlights the role of DIHs in stakeholder identification, engagement and the exploitation of project results.

1 Introduction

1.1 Purpose of the document

The purpose of this document is to develop the methodology for virtual pilot demonstration. As the technical development of the project is approaching its final stage, the focus is shifting towards business development, commercial exploitation of the technology and long-term sustainability of the use-cases. The demonstrations must be planned and executed in a way that maximises the impact/impression on the stakeholders, with key messages conveyed in a clear and understanding way to both tech experts and laymen.

The deliverable will ensure that a strategic approach is taken towards organisation of virtual pilot demonstrators. In this way the technology and use-cases will be presented to the highest standard, uniformly across the pilots. In order to achieve this, this deliverable will identify the main target groups, the format of presentations, segments of presentations and their duration, and guidelines for promotion on social media and conventional media outlets, along with the guidelines for visuals and design. It will also specify the concrete objectives and evaluation methodology for assessing their implementation. The key partner in implementation will be the DIHs that gather key stakeholders from academia, industry, government and the non-government sector. They have been contacted to provide feedback on the technology, value proposition and market potential, but they also have a very good network of potential users of the technology and will be a key partner in gathering the audience for the virtual demonstrations.

1.2 Relation to Other Project Activities

This deliverable was produced as a result of *Task 7.4 Technology transfer and demonstrator roll-out*. The task has been following the development of the technology within the pilots (*WPs 4-6*) and the common platform (*WP3*) from M13 onwards, with the aim of identification of innovative use-cases, pipelines or segments of the technology, which show practical applicability, fill in the gaps in current field operations, and offer progress beyond the state-of-the-art. It leans on the work done within *WP2*, namely the *Stakeholder view to FlexiGroBots system scenarios* reported in *D2.1*, where different stakeholders have been interviewed and their comments were collected regarding the thoughts and expectations concerning precision agriculture, robotics and AI. This deliverable also leans on the previous work done within *WP7*. The Dissemination and Communication plans were developed within *T7.1* and *T7.2* and reported in their respective deliverables (*D7.1 Dissemination Plan* and *D7.2 Communication Plan and Communication Kit*). They are very relevant, as they contain the identified target groups for the project and adequate means of communication. Additionally, this deliverable

will use the findings from *T7.3 Business models and ecosystem building*, which explores the opportunities and business models for commercialisation and exploitation of newly developed products and services. Here, technology transfer is elaborated in the context of demonstration activities and the promotion of the technology with stakeholders. However, it will be analysed in detail in the *D7.6 Technology transfer report.*

1.3 Addressing M18 review outcome

There are several aspects of the deliverable that aim to contribute to answering, responding and steering the project in accordance with the review comments. Firstly, the stakeholders that were defined in the revised version of *D2.1 Stakeholder view to FlexiGroBots system scenarios* are elaborated here as well, as the target groups for demonstration. Each of them is identified and analysed with respect to their expectations from the demonstrators, and benefits that the technology developed in the project can bring them in their operations. Secondly, we analysed the potential engagement of DIHs in terms of promoting the demonstrator events and utilising the DIHs' network to attract as many stakeholders of different types as possible. The DIHs were recognised as the key actor in technology transfer and exploitation of project results, so an outline of post-demonstrator activities is also given, which relies heavily on their involvement. The review mentions positive comments about demonstrations conducted during the review meeting. As the methodology used there seems to be in the appropriate direction, we extended it and formalised through concrete action points.

1.4 Structure of the document

This document is structured in 8 major sections.
Section 1 is the introductory section.
Section 2 is devoted to conceptualisation and planning of the demonstration activities.
Section 3 presents detailed instructions for execution of the demonstrations.
Section 4 presents the strategy for promotion of pilot demonstrations.
Section 5 presents the methodology for evaluation of demonstration activities.
Section 6 presents a brief checklist for organisation of a pilot demonstration.
Section 7 presents the potential risks and mitigation measures.
Section 8 presents the main conclusions of the deliverable.

2 Conceptualisation and Planning of Pilot Demonstrations

Planning of the Pilot Demonstrations was done according to the best practice observed in previous projects, such as AgRoboFood (https://agrobofood.eu/), the Robs4Crops sister project (https://robs4crops.eu/), and most of all the FarmDemo initiative (https://farmdemo.eu/) developed jointly by the AgriDemo-F2F (https://agridemo-h2020.eu/), Plaid (https://plaid-h2020.hutton.ac.uk/) and Nefertiti (https://nefertiti-h2020.eu/) projects. The initiative resulted in a very detailed and precise pipeline for organising virtual and on-field demonstrations, which maximises the impact, enhances networking and promotes knowledge exchange between tech providers, farmers and other stakeholders. The FarmDemo project resulted in the toolkit (https://trainingkit.farmdemo.eu/) that can be used as a practical guide for organising the demonstration events either in an online, in-person or virtual format. This was the starting point of our plan, but it was further fine-tuned according to the specifics of our project and the stakeholders.

All in all, in the planning of the Pilot Demonstrations, we conducted different activities that included:

1. **Specification of the objectives.** Objectives need to be set prior to any implementation, with respect to the target groups.
2. **Definition of target groups.** Selecting and addressing the stakeholder groups defined in the project.

2.1 Objectives

The main prerequisite in implementation of the pilot demonstrations is to have the objectives for the demonstrations set up. There are various objectives that cover the business, technical, networking and other aspects. Generally, the objectives are:

1. To show how technology works in an operational environment
2. To validate the value proposition of the technology
3. To attract partners for exploitation and commercialisation of project results
4. To increase the visibility of the technology, FlexiGroBots project and the institutions behind the pilot

5. To motivate and engage different stakeholders in digital transformation of agriculture on its way to increased efficiency and sustainability

These objectives will be customised for individual pilots, according to the technology-readiness level of the solutions, the type of end-users and the specifics of the relevant ecosystem: the target groups, number of end-users, business model and the niche it aims at. However, there are certain requirements that need to be fulfilled:

1. The technology must be shown in the operational environment either in real-time or as pre-recorded footage of the robot in the field
2. The value of the technology in terms of increase in profits/yield, cuts in costs, increase in efficiency, time-saving etc. must be clearly conveyed and highlighted.
3. Options for follow-up in terms of collaboration, exploitation and commercialisation of project results must be given with clear instructions how to initiate the following steps.
4. All the stakeholder groups must be contacted and notified about the events through the most appropriate means of communication.
5. The attendees must take with them new knowledge about the potential of new solutions developed in the project and digital agriculture in general.

2.2 Target Groups

Defining the target groups for every Pilot Demonstration is essential. Different use-cases target different stakeholders and each stakeholder group needs to be addressed with a unique value proposition tailored for them. The choice of stakeholders also dictates the tone of communication, jargon, technical depth and the required dynamics of the presentation.

The main target groups of the project have been defined in the Deliverables 7.1 and 7.2 that deal with the dissemination and communication strategies. However, for the Pilot Demonstrations they need to be fine-tuned, as not all stakeholders are interested in the demonstrations, at least not for the same reasons. The main target end-users recognised in the project as direct beneficiaries are: farmers, farmer associations, agriculture industry, machinery and robotics solutions providers, and agriculture service providers. The secondary end-users and indirect beneficiaries are: DIHs, innovation developers, research and academic communities, policy makers, common agricultural policy (CAP) agencies, media and the general public. The list of the stakeholders recognised as important is given in Table 1, with a brief description.

Stakeholder	Description
 Farmers	Farmers are by far the most important stakeholder group, as they will receive direct help from the robots in field operations. The integrated solution developed in FlexiGroBots can help them monitor their crops, understand their status and substitute them/ provide aid in tedious manual jobs. For farmers, it is often stated that they need to see to believe, so seeing the robots in operation will be extremely valuable for showcasing the value of the technology.
 Farmer associations	There are millions of farmers in Europe and it is extremely hard to get in touch with them directly. For this reason, we will use farmer associations to reach a large network of farmers very quickly. Moreover, it is farmer associations that facilitate joint procurement of the equipment for multiple farmers to share with one another, especially if there is no need for everyday use of the technology by a single farmer.
 Farming enterprises	Large agricultural companies are another important stakeholder group, as these big businesses have the resources to invest into novel technologies. They are generally high-input / high-output production systems so if a piece of technology is shown to improve production efficiency, they can easily purchase it. It could also help them with the problem of the lack of labour on the market for tedious and physically demanding jobs that are sought after.
	Agricultural companies are a very important stakeholder as they are often on the frontier of innovation. Firstly, they need to be aware of the new technologies to adapt their products to a new paradigm (e.g. highly concentrated herbicides that do not impose huge load on the robot which has a limited battery power). Secondly, agricultural

Agricultural companies	companies have extensive tests of their products with many repetitions, which requires huge manual labour. The technology develop in FlexiGroBots could help them reduce these efforts.
 Original equipment manufacturers (OEM)	These are companies that develop products and services for conducting precision agriculture operations. From the exploitation point of view, they could be a very important partner for further development. They are also candidates for licensing/purchase of the technology, and often act as the missing link between academia and industry (in this case - farmers).
 Agriculture service providers	This group uses commercially available technology to service a large number of farmers. They are especially interesting from the perspective of novel business models, such as Hardware-as-a-Service, where they could rent the robots and service the farmers, or it could be them who are lending the equipment to the farmers to conduct farm operations for a few days or weeks. The system could be integrated with particular farm management systems and represent the physical part of the digital platforms.
 Consumers	Consumers of agricultural products are another stakeholder. They are the buyers of agricultural products and the ones who wish to have healthy and safe food at the table. Technologies developed within this project are helping farmers produce food with lower consumption of pesticides and significantly lower presence of plant diseases, which can potentially be unhealthy.

 Food producers	Farming produce can reach consumers either directly or via the food produced from the produce. Food producers should also be engaged as they are often setting the standards for agricultural production and are the link between farmers and the consumers. Additionally, aspects such as food traceability are becoming ever more important and for these reasons, food producers are another stakeholder that should be tackled in the project.
 DIHs	DIHs are very important for the organisation of the events, due to their rich network of stakeholders. However, they are also planned to be among the participants of the demonstrations, as they are on the constant lookout for new technologies, partners and business models with the purpose of testing the technology and matchmaking between the partners.
 Innovation developers	Innovation centres and companies are another important stakeholder group, as they can license the technology and raise its TRL to TRL 9, where the robots/systems are production-ready, and the technology could be sold to the actual customers or further licensed to large OEMs.
 Research and academic communities	Technology developed within the project should be demonstrated to other research and academic institutions, for possible collaboration on further development or incorporation in larger systems within other industrial or scientific projects. There are possibly overlaps in research between the research in the project and research conducted at other universities, so this might be the starting point for joint research in the future.

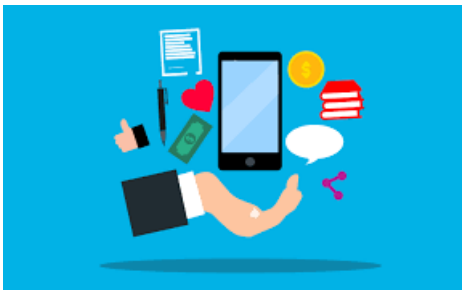
 Public authorities	Public authorities and government bodies are an important stakeholder, as they are setting new strategies and subsidy policies. They need to be kept informed about novel technologies and paradigms in agricultural technologies, among which are the solutions developed within this project. Being informed about the developments in AgTech will help them enact supportive policies and prevent barriers in further development and uptake.
 Media	Virtual demonstrations are an excellent opportunity to involve media and disseminate project results to the general public. They will receive the necessary information about the project per se (in the context of European/Horizon funding and agricultural innovation) and see the concrete benefits that it brings to a wider community.

Table 1: The list of the stakeholders with short description/analysis

Besides the target groups that will be directly engaged in the Virtual Demonstrations, there are stakeholder groups that should be notified about the outcomes, but should not be pressured to participate in the demonstrations, as they are observing the agriculture/IT eco-system from a broader perspective. These are policy makers, Common Agricultural Policy (CAP) agencies and the general public, who will be notified about the project results through media, newsletters and blog posts.

The aforementioned stakeholder groups are the ones that should generally be addressed with Virtual Demonstrations. However, due to the specifics of each pilot, demonstrations in each of them might be more focused on some of these groups and less on the others. The ones that are in the focus will dictate the choice of channels of communication, the dynamics of the presentations and the format.

Very much like in dissemination and marketing in other industries, it is the far-sighted early-adopters that lead the mass adoption of products and services. In the fashion, gaming, and automotive industries, they are often regarded as “influencers” but the principles are the same. Within the DIHs, we often observed that there are local farmers that lead the way in adoption of new seed varieties, pesticides and digital technologies. The local farming communities trust them and follow their example. These people are usually not too large land-owners (mid-sized farmers at most), with whom the local community can identify. They are sometimes owners of small agricultural retail shops or local consultants. These “influencers”

are key for successful promotion of the technology and a lot of attention will be devoted to recognising such actors in the local ecosystem and assuring that they are involved in the demonstration activities.

2.3 DIHs

The relevant DIHs have been recognised within the implementation of WP7. They have been contacted and it was agreed for them to participate in dissemination, communication and exploitation of project results. They have chosen to cover both the technical and agri-food aspects of the project in the relevant areas in Europe. Their role will be to provide the following services:

- **Test before investing.** Demonstrating the technology, how it is used and the value it brings to the end-users.
- **Skills and training.** Getting to know how the technology works and receiving the training.
- **Support to find investment.** Exploiting the DIH's network to find partners and investors for further technical development, mass-production and scale-up.
- **Innovation ecosystem and networking.** Engagement of the relevant stakeholders, promotion and positioning in different European regions and within the stakeholder communities.

The table of relevant DIHs is given in Table 2.

No.	DIH	Country
1	RoboCity	Spain
2	DataLife Galicia	Spain
3	Air4S	Spain
4	Agrobofood	Finland/Europe
5	Super IoT	Finland
6	BioSense DIH	Serbia
7	Science and Technology Park (NTpark)	Serbia
8	AgriFood Lithuania DIH	Lithuania
9	Visoriai DIH	Lithuania
10	Robotics DIH	Lithuania
11	EDIH4IAE.lt	Lithuania
12	AgriFood Croatia	Croatia
13	GIL	Germany
14	Digital SME	International/Europe
15	RI4EU	International/Europe

16	DIHNET.EU	International/Europe
17	Kok project	Turkey/Eastern Europe

Table 2: DIHs that will be involved in dissemination, communication and exploitation of project results

2.4 Format of Demonstrations

There are several approaches to demonstration events. The first type is the on-site demonstration. It involves gathering all the relevant stakeholders in the test field (vineyards/rapeseeds/blueberries) and presenting the technology in-person. The second type is having the presentations in the virtual format. It involves gathering the participants online on Zoom/MS Teams/Google Meet or other platforms with the potential aid of Menti/Slido or similar interactive tools. The demonstration video can be either pre-recorded or transmitted in real-time, from the fields. Having a live stream is an effective option, as it leaves a better impression on the attendees, but the pre-recorded versions of videos should be prepared, as connectivity can be quite problematic in rural areas, where the pilots are located. Thirdly, there is an option of having a hybrid event that involves on-site participation of part of the people, and virtual participation of other part of the attendees. This involves having cameras and good internet connection in the field. At the time of planning the project, the Covid-19 pandemic was at its peak and the online format that was planned at the time was virtual. However, now we acknowledge that other formats (on-site and hybrid) are also possible. Table 3 lists pros and cons for each of them.

Format	Pros	Cons
On-site	• Direct contact with stakeholders • On-farm demonstration • Feeling, touching, trying out the technologies • Peer-to-peer exchange of knowledge • Networking	• Travel to remote rural location • Attendance requires a full day (travelling + demonstration) • Potentially high travel costs • Interested people from abroad not likely to participate • Language barriers • Must be conducted in a particular part of the season

Format	Pros	Cons
		• Last minute problems with technology (battery, connection…) • Limited number of participants
Virtual	• Ability to attract people from a larger geographical area and abroad • Less time-consuming • No travel costs • No language barriers (can be conducted in any language or subtitles can be added) • Unlimited number of participants • Pre-recorded materials can be used, thus lowering the risk of unsuccessful demonstration and last-minute technology errors	• Preparation of quality material prior to the event • Potential additional work on adding subtitles • No in-person and peer-to-peer interaction • No spontaneous networking
Hybrid	• People can choose the format that suits them most	• Language barriers • Need for video/streaming technology • Technological difficulties (video stream quality, noise, lag…) • Connectivity problems in remote rural areas • Preparation of quality material prior to the event • Potential additional work on adding subtitles • Difficult interaction between in-person and virtual participants

Table 3: Analysis of different demonstration formats

For the reasons listed above, and because of its potential to make the highest impact and reach the largest number of attendees, we chose the virtual format as the primary way of demonstrating the technology. This does not mean that other forms of presentation will be completely disregarded. The pilots will have an opportunity to hold live on-site demonstrations for the local communities if such need is recognised, especially the ones in the area of the fields on which the technology was developed and tested.
The exact choice of teleconferencing platform will be left to the pilots. They will select the most appropriate one with respect to the functionalities of the platforms, their corporate policies and licences.

2.5 Defining the Dates

There are several factors that will influence the choice of dates in which Virtual Demonstrations will take place, such as the availability of the farmers, overlap with fairs, conferences and other events, busyness of the farmers due to certain agronomic operations etc. However, the single most defining parameter is the actual agricultural season. In order to showcase the technology in real-life settings, one must take the UAVs and UGVs to the field when the phenological phase of the plants allows it, and this depends on the part of the season when rumex appears, when weeds start growing in blueberry field, when there is a risk of Botrytis and when grapes are harvested. The planned timetable is given in Table 4 along with the justification.

Pilot	Planned time	Justification
Pilot 1 Vineyards	August September/October	The period in which Botrytis is treated The period in which grapes are picked
Pilot 2 Grasslands	July September	The period when the rapeseed pests occur The period when the robot tractor is harvesting
Pilot 3 Blueberries	May/June April-June	The period when weeds start to appear The period when soil sampling is performed

Table 4: Planning the demonstration time with respect to the plant phenology

Due to the difference in the planned time of the demonstration, the three pilots will have their Virtual Demonstration at different times of the year. On-site operations by UGVs and UAVs will be recorded, so another 1-2 weeks should be allocated for processing the videos and images. As there will be an option to conduct a real-time demonstration of the UGVs on the field (in virtual format), these materials can be used as back-up. This means that there could be a live-stream video from the field where the operator is calling in from the field, while the meeting attendees are observing the execution of the pilot technology.

2.6 Project-level Virtual Demonstration

Virtual Demonstrations are envisaged as pilot-level events, where the technology developed in each pilot will be showcased in an operational environment (fields). These events are farmer-specific in a sense that they appeal only to the farmers that grow a certain crop. For instance, the demonstration of rumex eradication might not be interesting for a vine grower, who does not have such a problem in his/her own fields. However, there are many stakeholders that would be interested in seeing the technology from all three pilots. This especially holds for crop-agnostic farmers associations, large agri-businesses which cover multiple crops, research and academic institutions and OEMs. With them in mind, we will organise another Virtual Demonstration after all the individual ones have been organised, in the final months of the project. This will be a comprehensive event that will target an international audience with various backgrounds. It will include solutions developed in all individual pilots in the project as well as the FlexiGroBots platform, so that a complete set of developed technologies and contributions of the project is presented to the stakeholders.

3 Execution of Pilot Demonstrations

Demonstration events should be focused on showing and explaining the novelty and innovation of the proposed robotic solutions within a working farm environment, to all target groups identified in the previous section (Section 2). The Virtual Demonstrations will take place at the precise phenological stages (times of the year) defined in Section 2, and for the various practical reasons, they will be held in a virtual format. While the demonstration events will take place in a virtual format, on-farm demonstrations should still be organised for the purpose of preparing all the materials needed for the virtual pilot demonstration.

3.1 Technical Preparations

There are many ways to set up a virtual demo event, but it is crucial to start by thinking about the intended audience, technological, and organisational constraints. Comparing virtual settings to on-farm demonstration events, new difficulties and restrictions are present. These restrictions primarily relate to technical problems, encouraging interaction and discussion.
The first step is to identify our limitations related to the organisation, technology and target groups. On the organisational level it is very important to determine available budget and time for the virtual event. Technology limitations are related to the hardware and software/platform capabilities, licences for the chosen software/platform and network bandwidth. Within target groups the expected number of participants, their type, computer skills and available time should be established on the pilot level.
In order to overcome technology limitations everything that can be rehearsed and tested before the actual events should be done. This includes:

- Testing the online meeting software/platform on different devices, operating systems or browsers.
- Testing the FlexiGroBots technology (UGVs, UAVs, platform) prior to launching the demonstration
- Checking the capacity of the software/platform for the planned number of participants, file sizes, and formats that will be presented.
- Organising responsible persons in the technical team to support all the activities before and during the actual demo.

Typical platforms used for live virtual events are: GoToMeeting, Zoom, Microsoft Teams, Cisco WebEx, and Jitsi meeting. In the previous Review Meeting, pilot-developers called in from the field using multiple cameras, which showed to be effective. It is therefore recommended that at least two cameras are available for the demos – one recording the general scene, and the other recording the specific activities of the UGVs. The event content could be shared later via different social networks depending on the target group. These could be: LinkedIn, Twitter,

Instagram, Facebook. Virtual events have a limitation related to interaction and the exchange of the ideas, therefore the participants should be encouraged to exchange the ideas via chat, or a short survey that should be initiated before and after presentations. Interactive tools such as Slido and Menti can be used for engaging the participants who could send their thoughts, comments and answer to quiz-like questions. An on-farm demonstration should be used to record the video of opinions of different target groups, which can be used during the virtual event to initiate the discussion on the particular subject of interest.
Last but not least, an online registration form should be set up, so that the organisers could keep track of the participants. This online form could include additional questions such as the stakeholder group for keeping track of the statistics. It could also include questions regarding robotics, farming and technology, to understand the technical skills and affinities towards smart agricultural technologies.

3.2 Organising the Content

It is crucial to take the duration of the event into account when creating the agenda, which could be from 30 minutes to many hours. Considering that compared to an on-farm demo, it is more difficult to maintain the focus for an extended period of time during an online demo event. Therefore, the time restriction for the event should be introduced or it should be assured that there is enough time for conversation and breaks between the various activities on the schedule. A virtual event should aim for a 60-90 minute runtime. If this time span is not sufficient, it is more effective to hold multiple shorter demonstration events than to organise a single lengthy event. Combining online presentations or demos with offline exercises in brainstorming groups or individually for hybrid demo events is also a possibility.
The following elements should be included in scripts for the demo event:

- Welcome and introduction
- Testimony and/or demonstration
- Facilitated discussion
- Wrap-up and follow-up

3.2.1 Welcome and introduction

Since there are considerably less opportunities for informal conversation during virtual demo settings than there are during on-farm demos, it may be even more important to properly welcome and introduce attendees. Thus, in a virtual setting, introductions between participants require more directed facilitation. Including an icebreaker activity that works well in a virtual environment is one method to achieve this. This includes using polling tools like Mentimeter, Kahoot, or Slido to ask for thoughts or suggestions at the beginning of the virtual

demo event as a way to introduce participants to one another and to the subject, as in Figure 1. A photograph or an item can also be used to urge individuals to introduce themselves.

Figure 1 - Example of a Mentimeter poll as an ice-breaker

3.2.2 Testimony or demonstration

Any demo event's main component is a visual/video that includes a testimonial or a demonstration of a practice, method, or approach. An old or new movie, images, a farmer's story, a PowerPoint presentation with research findings, live streaming, simulations, virtual reality, etc. can all be used in this context. One benefit of a virtual environment is that some demo components can be prepared in advance, for example by pre-recording movies, interviews, or presentations. As a result, compared to on-farm demos, this may require more time and preparation in a virtual environment. Naturally, real-time presentations are also an option, and they are recommended if one wishes to allow audience members to ask the questions right away. The most used formats probably are videos and ppt presentations. Because they are more connected to actual practice, videos and client testimonials may be a preferable choice to PowerPoint presentations for virtual demonstrations. If shared screens are to be used on the platform to show a video, it needs to be checked that the presenters know how to share their PC audio with the audience. Some teleconferencing platforms, such as Zoom, even have an option to optimise the transmission quality for the video, so that it would not be choppy/flickery. If creating a new video is challenging or expensive, older videos that have already been recorded on the subject can be presented. Due to participant distraction issues and speaking to a camera rather than a live audience, online presentations differ from live presentations. It is crucial that the narrative leaves an impression on the audience. This can be accomplished by having the structure that guides the story that is

presented, by including interesting and surprising results, and by including the interaction between the presenters and the participants.

3.2.3 Facilitated discussion

To increase the possibility of peer-to-peer exchanges between participants and between participants and demonstrators, as well as to reflect with participants on what they have seen during the demonstration or testimonial, a facilitated discussion is required. This greatly aids the participants' ability to learn from what they have just seen.

The likelihood of interaction will depend on the number of participants. Larger participant groups frequently only have access to the chat feature. Speaking can be more easily facilitated in smaller groups.

Break-out groups can be formed from larger groups, which is possible on the majority of widely used platforms like Zoom and Teams and this is convenient if the organisers wish to initiate a more active discussion. The main reason for this would be receiving feedback from the audience or making new contacts between the stakeholders to get additional views over a topic.

Some demo organisers have had success using pre-event surveys or soliciting questions from attendees in advance of the event. Demo organisers can better arrange an event this way and relate the topic to the concerns and interests of attendees. In this case, a questionnaire should be included in the registration form.

To encourage interaction, many other online tools might be deployed. In this situation, they should be set up in advance, tested in various browsers, and given with a link to the attendees, so that they may be used as a tool. For example, polls and surveys, brainstorming pin boards, and common content creation are the tools that could be used to facilitate interaction. An example of using Slido for facilitating the discussion through quiz is given in Figure 2.

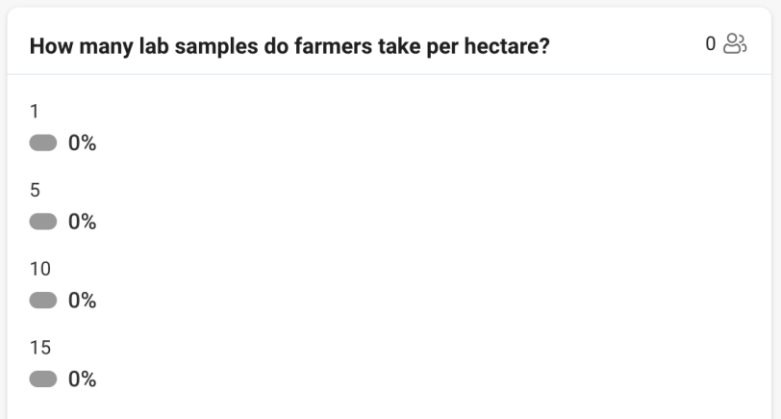


Figure 2 – Sample quiz for engaging the audience during the presentation

Some of these tools are even available as add-ons in the teleconferencing software, such as the Quiz Flight and Kahoot available from within the Zoom platform shown in Figure 3.

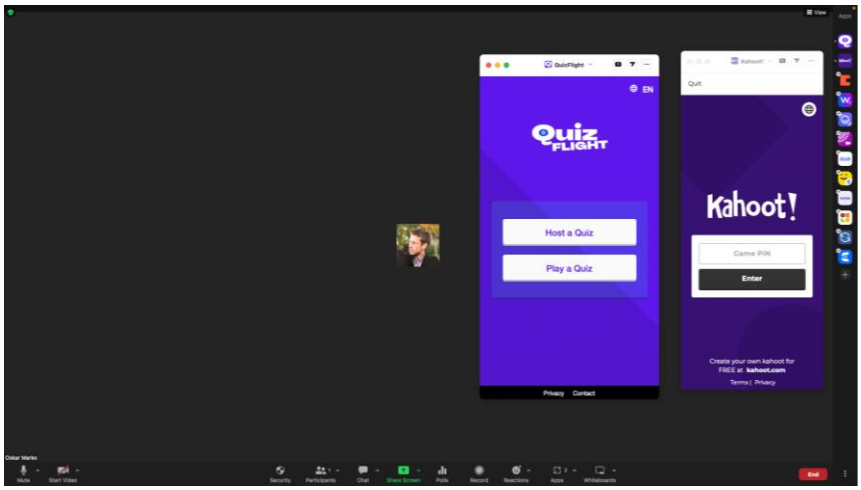


Figure 3 - Interactive tools as add-ons in the teleconferencing software

3.2.4 Wrap-up and follow-up

A short wrap-up and follow-up session should be planned at the end of the virtual demonstration. For example, the main points can be summarised, the goals from the beginning of the event revisited, feedback from the participants taken, etc. It is crucial to be explicit about what else participants might anticipate, such as the date of the following meetings/events/conference presentations. It must be stated whom the participants may contact if they have further inquiries, and where the attendees can find more details regarding the subject of the demo. Furthermore, a poll to get opinions on how the demo was set up and what it contained (e.g. using Mentimeter) can be organised. This is a quick technique to get

participant inputs that can be used to assess the demo and enhance a subsequent virtual demo event.

3.2.5 Exploitation and technology transfer

Virtual Pilot Demonstrations will be the first step towards exploitation and commercialisation of the technology developed within the project. It will gather different stakeholders that will catch a glimpse of the value that the technology brings, how it is used and what is its potential in digitisation of agriculture. Here as well, the DIHs will play the key role, as a facilitator for networking, promotion and attraction of relevant actors in the value chain. However, in order to scale the technology, the key partners for technology transfer must be further engaged, after the demonstrators, and for them, a more detailed presentation of the technology must be organised. They will be identified prior to conducting the pilot demonstrators and invited to participate. This will be done by utilising the DIH's network of partners that includes equipment manufacturers, services providers and other companies suitable for technology transfer. For these stakeholders, we will organise separate follow-up activities in the following forms:

- **Bilateral meetings.** These will be organised either in-person or online and will represent an opportunity to delve deeper into the various aspects of the technology, how it was developed and what it takes to scale it up or produce on mass scale, as well as the practical aspects and user experience.
- **In-person field visits.** These activities will be organised as interactive sessions, where the potential partners for technology transfer can pose concrete questions about the technology in the operational environment and have a first-hand experience with it. Here, the discussion would be mostly directed towards the benefits of the technology and the user experience.
- **In-person lab visits.** These visits can help potential technology transfer partners see how technology was developed, how its components were constructed and implemented and how the manufacturing process would look like with respect to the production requirements, machinery and human skills. Here, the discussions would be focused more on future mass production and the technical aspects.

An important aspect of the talks will be the intellectual property (IP). There are multiple models that should be explored:

1. **Licensing.** The technology could be licensed to an OEM or another company that will deploy it on the market. In this case, the business model (e.g. profit share) needs to be discussed in detail.
2. **Joint development.** The technology can be further developed to cover more use cases or to be tailored to the needs of a specific target group. In this case, the share of IP

between the FleXiGroBots and external partners need to be defined prior to this endeavour.

3. **Patent sales.** Patents could be sold as-is to a third party that will commercialise them. In this case, a fair value needs to be negotiated.

Last but not least, the technology developed within the project can also serve as the basis for establishing new university spin-offs. They can continue the development of the technology in the direction dictated by the market requirements. This would be done on a more practical level compared to this project, as the spin-off would need to take care of the production techniques suitable for scalable production, which takes into account the availability of materials and components, production price, complexity of the process and the machinery and tools needed for the production and assembly. Depending on the university policies, an appropriate model for technology transfer will be applied, which can be based on the equity sharing between the co-founders and the university, or revenue/profit sharing between them. This will be further analysed and reported in *D7.6 Technology transfer report*.

3.3 Delivering the Virtual Demonstration Event

To ensure that the demonstration event runs smoothly, it is crucial to explicitly delineate roles among the organisers of the event. There are three roles that are distinguished:

- Facilitator
- Demonstrator
- Technical expert

The facilitator ensures that the process of knowledge exchange is done smoothly, while the main messages of the event are communicated to the target groups. To accomplish this, a facilitator needs to:

- Create an atmosphere that will nurture the exchange of ideas, and discussion
- Open the event or part of the event with appropriate greeting,
- Introduce participants and demonstrators
- Explain the agenda
- Enable and foster discussion
- Assist the demonstrator to set the discussion (read the comments or questions from the participants)
- Set and explain basic rules at the start of the event (e.g. use chat to ask questions, being muted if not talking).

Since the virtual events should be recorded for future dissemination through different channels, the facilitator should be in charge of recording the event in accordance with the GDPR rules which were agreed by all participants. In the outro part of the event, the facilitator should explain the follow up actions, describe the proper way for the participants to express their opinions or ask additional questions after the live event is finished.

The demonstrator is typically the one who presents, testifies, or explains the event topic to the participants. Different people should assume the roles of facilitators and demonstrators. If there is no other choice and for smaller gatherings, the demonstrator could also serve as the facilitator, but this is not recommended. It is challenging to keep focus on the presentation while watching the demonstration content, the chat's participants' comments in chats, and possibly making notes on what was said. The demonstrator prepares content (presentation, pictures, videos…) and engages the participants by interacting with them during the demonstration. Furthermore, the demonstrator should know all the necessary functionalities of the software/platform used for a virtual demo event (screen sharing, features to stimulate interaction, audio and video settings).

It is crucial to have a dedicated individual or team handling any technological concerns because virtual demo events have unique technical requirements. Virtual demo events have technical bottlenecks, as mentioned before. The technical expert(s) can foresee these bottlenecks and address them before and during a virtual demo event. Both the organisers and participants of demos might benefit from the assistance of technical professionals. Technical experts are in charge of pre-testing the entire programme on the chosen software/platform, support demonstrators, help the participants to connect, mute/unmute, share the screen, create alternative internal channels of communications (e.g. Rocket Chat/ Pumble/ Slack/ WhatsApp group) for the organisers to solve technical issues during the event.

4 Promotion of Virtual Demonstration Events

The demonstration events should be advertised taking into account the specifics of the target audience. A virtual event is promoted in a similar manner as an on-farm event. As the channels for promotions, websites, social media, radio, mailing lists or networks of partners and collaborators can be used.

When inviting participants and promoting the event it is important to highlight the following:

- Event name
- Abstract of event containing the main objectives and organisers of the event
- Time of the event
- Agenda of the event with listed keynote speakers
- A clear explanation of how to register and participate in the event

Once the participants are registered for the event, they should be provided with the following pieces of information:

- Link to the software/platform used.
- A short guideline on how to register for the platform or install the software needed.
- Any other information that is related to presentations, videos and the rest of materials in case of the technical problems during the demonstration event.
- Links to surveys that could ask for their opinions, expectations and questions that are related to the demonstration event. Knowing more about the participants' interests and background can help us tweak the demonstration content.
- Participants should be notified if the demonstration event will be recorded in order to comply with GDPR regulations. Similar holds for the questionnaire and registration form, that could potentially include personal information such as name, email and job, which are protected by GDPR.

4.1 Invitation Activities

Promotional activities should be addressed towards a predefined target group. All invited participants need to be informed by sending invitations via email and calendar invitations. The invitations should clearly state what will be shown with defined schedule and goals of the demonstration. It would be helpful to provide a registration link in order to have an approximate number of participants. It is necessary to start sending invitations and promotion materials at least one month before the date of the demonstration in order to introduce potential participants with the topic of the demonstration.

4.2 Promotion Channels

The demonstration activities and technological achievements will be presented through various promotional channels. In order to achieve high visibility of demonstration activities, it is necessary to organise good marketing promotion on different platforms. Promotion activities will be conducted through traditional TV and radio shows, as well as over digital web platforms. The list of the communication channels considered is given in Table 5.

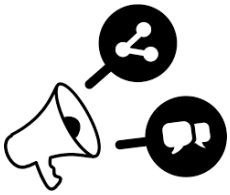
Channel	Description
 Websites	Web portals where the demonstration will be promoted include: • Official project website • Web portals related to agriculture and IT • Official project YouTube channel
 Social media	The event will be promoted on popular social networks Twitter and LinkedIn.
 Radio/television	A wide audience can be reached by participating in radio and TV shows, where potential participants will be informed about demonstrative activities.
 Newspapers	Newspapers in digital format like agro magazines can attract precisely the targeted group of participants from the field of agriculture.

Table 5: Communication channels for promotion of the events

4.3 Promotional Materials

In order to successfully carry out the demonstration of the pilot, it is necessary to prepare promotional materials. Digital brochures/visuals illustrate and briefly define the impact of the project, technical aspects of innovations and the concrete solutions that will be presented. A simple and informative digital brochure should be sent via email and it should act as a teaser for the Virtual Demonstration.

5 Methodology for Evaluation of Pilot Demonstrations

Evaluation is a crucial, yet frequently overlooked, part of the demo event planning process. Demo event organizers should set aside time for this after the event because it is the only way to learn from and better your future demo events. It is highly beneficial to discuss any criticism and own reflections within the organization team in order to get lessons acquired from your previous experiences.

The participant feedback is an important factor to consider when evaluating a demo event. An online survey that is sent to the participants can be used to collect feedback (for example, in Google Forms, Lime Survey, or Survey Monkey). The survey should generally not collect any personal data, but can contain information about the participant's occupation (stakeholder type) and the overall thoughts about the demonstration and the presented technology.

As a follow up activity, the organisers can send event recordings, demonstration materials used at the event, links to additional information (such as who to contact for further information), or a feedback survey. To boost the effect of the presentation, this material can also be made available on websites and through social media.

Feedback from participants will be useful to improve the organisation of future demonstrations and to carry out follow up activities. A short online survey can be useful for feedback from the audience. Through a survey they can evaluate the usefulness of invention and its applicability to the daily tasks of performing work on the farm.

The final evaluation will be determined through the achieved KPIs (Table 6), the most important of which is the number of demonstrative activities defined in the project proposal. An additional evaluation will be the number of participants in the demonstration events views on video materials that will be available on the project's web portal and official YouTube channel after the demonstration activities. Although we will track the interaction with stakeholders both in-person and online, through social media, the main measure of the successfulness will be the number of new contacts established with industrial and research partners and the follow-up activities and meetings with them.

Demonstration KPI	Target number
Demonstrators incorporating both UAV and UGV robotic platforms	>= 3
Number of robots taking part in demonstrated multi-robot systems	2 (min. per pilot)

Demonstration KPI	Target number
Number of participants in Virtual Pilot Demonstrations	>90
Post-event surveys received	>30%
Total number of views of pre-recorded videos per pilot	>200
Total number of follow-up activities/meetings with contacts	>20%
Tweets	15
Retweets/Likes	120
Twitter impressions	1500
LinkedIn organic impressions	5000
Reactions	20%

Table 6: Demonstration KPIs

5.1 Post-event Survey

The post-event survey should check the satisfaction of participants with the virtual event. The questions should cover the content of demonstration and the technology itself. The questionnaire could be translated in the local languages if found suitable. This will also be an opportunity to acquire more information about the stakeholders that will complement the questionnaire distributed within *D2.1*. The additional feedback will be used to follow the changes in stakeholder opinions and stances towards digital technologies in agriculture and extend our understanding of their perspective on the benefits of novel technologies developed within the project. The questions are given below.

Participant background and expectations

Organisation type

- DIH representative
- farmer
- farmer association
- agriculture industry
- machinery and robotics solutions providers
- agriculture service providers

- research and academic communities
- innovation developers
- general public/ media
- other: _____

Which pilot event did you join?

- Pilot 1 – Grapevines
- Pilot 2 – Grasslands
- Pilot 3 – Blueberries

Why did you attend the event?

- Learn more about agricultural innovations
- Learn how robots can help in my crop production
- Find potential partners for a consortium
- Research purposes
- Finding partners for development of new technologies
- Scanning the technologies that can be commercialised
- Other _____

How did you hear about the event?

- Newsletter
- Email
- Direct invitation from a consortium member
- Social media
- Conventional media (TV/radio)
- Project website
- Other _____

Overall satisfaction

How satisfied are you with the event? (1-10)

How would you rate the organisation of the event? (1-10)

How would you rate the content of demonstrations? (1-10)

How would you rate the involvement of the participants? (1-10)

How would you rate the value of technologies presented during the event? (1-10)

How practically applicable do you deem the presented technologies? (1-10)

Would you like to be informed about the further development and commercialisation of the technologies?

Event execution

Did you find the event format satisfactory in relation to duration and content quality?

- The event was too short; it would be useful if we had more time to discuss/ask questions/network
- It was optimal duration
- it was too long; we could have learnt everything presented in a shorter amount of time

How was the event helpful?

- I increased my understanding of the Soil Mission
- We identified relevant soil challenges in our region/country to address with the Soil Mission
- I learned about the idea and method of Living Labs
- I found inspiration/motivation to engage in establishing a Living Lab
- Other…

What do you think could be improved?

Other comments

6 Pilot Demonstration Checklist

Defining goals

☐ Promotion of the use cases to the end-users
☐ Technology showcases that will be prepared for transfer
☐ Increase the visibility of developed the technology
☐ Motivate and engage different stakeholders

Target audience

☐ DIHs
☐ Farmers + farmer associations
☐ Agriculture industry
☐ Machinery and robotics solutions providers
☐ Agriculture service providers
☐ Research and academic communities
☐ Innovation developers
☐ General Public / Media

Promotion of events

☐ Preparation of a digital brochure or similar promotional materials
☐ Event promotion through digital channels

Organisation for demonstration activities

☐ Defining demonstration place and time
☐ Technical preparation (teleconference links set up)
☐ Creation of pre-recorded videos
☐ Presentations created
☐ Attendance form set up
☐ Teleconference link set up
☐ Invitations sent

Evaluation of event

☐ Survey
☐ Achieved KPIs
☐ Recording the number of participants
☐ Recording the number of new contacts established with industrial and research partners

7 Potential Risks and Mitigation Measures

Although virtual demonstrations are probably the safest option for demonstrating the technology, there are some risks associated with it. These are given in Table 7, along with the appropriate mitigation measures.

Risk	Mitigation measures
The weather does not allow for in-field operations and recording at the planned time	The mitigation measure will be to delay the operations for a few days. In case that the required phenological phase is ending by that time, we will look for other field with plant varieties with a longer season (higher relative maturity groups) that enter this phase later than the plants at the field originally planned for demonstration.
Field not in a suitable condition for execution of the demonstration	In case that rumex/Botrytis/weeds are not present in the test field we will choose an alternative field for experimentation. If the similar conditions prevail over all the fields, we will delay the demonstration for a week or two for the appropriate conditions to occur.
Connectivity issues at the organisers' side	The mitigation measures will include risk dispersion, i.e. securing backup internet access (mobile network or other ethernet/wireless/satellite networks).
Connectivity issues at the attendees' side	All presentations will be recorded and uploaded to YouTube or other platforms for non-real time viewers (watch later).
The equipment that the consortium institutions possess does not allow for quality video footage	Hiring a professional service to record the videos in high-quality format.
Video editing done by the people involved in the on-site experiments not on the sufficient level	Hiring a professional service to edit the videos (colour grading, contrast, cropping/framing, filters…).

Table 7: Risks and mitigation measures

In order to minimise the chances for unexpected events, the demonstrations will be rehearsed internally prior to the planned date.

8 Conclusion

Demonstration of the technologies developed in the project is crucial for their visibility, and visibility of the FlexiGroBots project and partner institutions. Showcasing the value that it brings in the context of digital agriculture is an essential step towards sustainability and exploitation of the project results. Within this deliverable we observed the organisation of the Virtual Pilot Demonstrations from a wider perspective of different target groups and the value that the technology and the demonstration itself may bring to them. We provide analysis of various technical aspects of the presentation, its format, time and presentation platforms along with an outline of the content, which should be further customised according to the pilot specifics and importance of different target groups as event participants. We also provide a concrete and practical check-list for event organisation and the methodology for evaluation of the events, so that we are certain that the technology developed in FlexiGroBots provides value to the farmers and accelerates the digital transformation of agriculture.