D1.12: Development of materials for trainings and inter-regional demonstrations of CCs – final version

WP1 – Competence Centres and Technical Expertise Management

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Executive summary

The main purpose of this Deliverable (D1.12) is to present a set of available training materials that were created in the framework of and relevant for the agROBOfood project. This deliverable complements the previous deliverables D1.13 which listed a catalogue of training courses that are useful for the project partners, and D1.11 which analysed the training requirements.

Analytics key points:

- A list of available training materials has been drawn from previously catalogued training courses and events within the project.
- Most materials are available as videos, drawn from MOOCs, and are in English.
- Not all training topics from the three services are covered.

Recommendations:

- Register for relevant courses on MOOC platforms;
- Develop strategy to validate and share new materials;
- Organize webinar or event to present to consortium.

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1 Introduction

The agROBOfood project's main objective is to create a network of various stakeholders, both Digital Innovation Hubs (DIH) and Competence Centres (CC) within Europe to support the use of robotics within the agriculture and agri-food sector. This includes the use of existing open software and/or hardware tools as well as identifying the needs and development for training within the project network. This training can be divided over the three service areas: Technology, Business and Ecosystem. Training is not just for end-users only, but is also important for employees within DIH and CC. Training your employees is important to gain more expertise, to be able to conduct experiments, use their skills within R&D and to train end-users.

In the previous deliverable D1.13, a catalogue of available training courses was compiled. An analysis of training requirements was done in the scope of deliverable D1.11. As developing new trainings specifically for the agROBOfood project is beyond the scope of this deliverable, it is desirable to use the materials that are already available. Not all training courses listed in D1.13 are from within the organizations that are project partners, and further, some of these courses are part of academic degree courses. Besides, some courses are paid and have the materials behind pay walls. Therefore, this deliverable aims to present a set of available materials which are in a form of videos, webinars, PDFs, and other learning material.

The content of this document focusses on presenting a list of available materials, technology demonstrations within the scope of the project, and to what extent they satisfy the requirements. This document tries to answer the questions:

1. What materials are available that can satisfy the training requirements within the project?
2. What events were held for innovation experiments, and to support DIHs for these experiments?
3. What materials or interregional technology demonstrations were developed, which can be considered and used as training materials?

Thus, the present deliverable complements D1.13 and D1.11 in assessing which topics are covered by existing available training materials, and which topics require trainings to be set up. The information from this deliverable is also expected to be useful for the tasks in Work Package 6, related to the deliverable "agROBOfood DIH Toolbox (MSA-Tool, Service Box)".The collected materials within this D1.12 will be available for the DIHs in the network, to further mature themselves.

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2 Method

The data collection was done from the following sources:

1. Verifying the links from the catalogue of training courses from D1.13, which is also available on the project website: https://agrobofood.eu/training-catalog/
2. The project social media channels:

   Youtube : https://www.youtube.com/channel/UCosQLDFzC6Zh-Xrpxm2xYFg

   Facebook: https://www.facebook.com/agROBOfood.H2020

   LinkedIn: https://www.linkedin.com/showcase/agrobofood

3. Announcements made on the project account on basecamp
4. Contacting Regional Cluster leaders for any event/material not covered above.

A combined excel sheet was prepared listing the information gathered from the above sources. In all cases, the following information was gathered:

- Category (training, webinar, or technology demonstration)
- Type of material (video, PDF, site)
- URL and date of access
- Whether open or registration required?
- Topic and service
- Language and level

A list of events for innovation experiments and also to support DIHs for these experiments, such as webinars offering advice in preparing proposals, obtaining funding, and match making with the right investors, was also prepared.

The catalogue of training courses from deliverable D1.13 was updated to include the following.

The information collected then is compared against the topics and categories in which training is required from the information for D1.11 and a Python[1] script is used to compare which categories are covered by available materials and which ones are not.

[1] https://www.python.org/

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3 Results and Discussion

The slido poll at the digital week webinar in 2020 registered 18 active users, and the number of responses obtained was 7 for the one-on-one video calls, and 16 for the questionnaire. The responses after cleanup and merging in a standard format were analyzed with a Python script which produced the graphs and analytics presented in this section.

3.1 Events organized within agROBOfood

The project website, basecamp, and social media channels were searched for events that either announced the opening of calls for innovation experiments, question and answer sessions, and webinars for offering support. The target audience of these events was both the SMEs that want to carry out the innovation experiments, as well as the DIHs that would offer supporting services and expertise. Some of the areas in which support was offered was in facilitating networking, match-making with the right investors, finding sources of financing, etc. Other events such as those related to boosting the DIHs, and ethics are also listed.

These events with the links to the videos are presented in Table 1. All these events were online and in English. Some have the session, in whole or in part, available on the project's YouTube channel. While this list is meant to serve as a list of the events, some of them have multiple webinars on different topics, and will be covered in the next section.

Table 1: List of events related to innovation experiments and supporting them.

Event	Description	Date	URL
1st Open Call for Innovation Experiment	specifics of the call, application process	13-04-2020	https://www.youtube.com/watch?v=FUQZSxwuwps
Webinar on ethical issues of robotics	ethics in robotics	30-06-2020	https://www.youtube.com/watch?v=bI7zxmu_fmw
Boosting your agROBOfood Digital Innovation Hub	networking, community building, finance acquisition, best practices	14-07-2020	https://www.youtube.com/watch?v=Idy0IDSNkJY
Visioning the future of agri-food Robotics	future trends, funding, business growth	29-06-2021	https://agrobofood.eu/visioning-the-future-of-agri-food-robotics/
Pitch your Robot! Find your Investor!	matchmaking, networking, finance acquisition	10-02-2021	https://agrobofood.eu/pitch-your-robot/

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Agriculture and farm robots	presentations and networking among agricultural robotics companies and agROBOfood	07-07-2021	https://agrobofood.eu/agriculture-farm-robots/
2nd Open Call on Innovation Experiments - Webinar for SMEs	information for SMEs interested in participating: eligibility criteria, topics of the challenges, application procedure	31-03-2021	https://www.youtube.com/watch?v=N7TIzWHPmak
2nd Open call on Innovation Experiments - Webinar for DIHs	necessary information for supporting the SMEs in preparing their submissions	16-03-2021	https://www.youtube.com/watch?v=RZQlQulkeRo
SmartAgriHubs and AgROBOfood webinar - funding opportunities (UK/IRL)	funding opportunities, best practices, preparing proposal	24-11-2020	https://agrobofood.eu/smartagrihubs-and-agrobofood-webinar-funding-opportunities-uk-ireland/

3.2 Technology Demonstrations and other materials developed within agROBOfood

The relevant materials (videos, slides, etc) that are available on the project's YouTube channel and on basecamp were organized into a list in an excel file with information on the source URL, type (technology demonstration or webinar), and topics. It must be noted that more than one webinar may be part of one of the events listed in Table 1.

The complete list is presented in Table 2. Again, all materials are in English. The slides which are in basecamp require login with an account associated with a consortium member organization.

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Table 2: List of accessible webinars, technology demonstrations, and other materials created in the scope of the project.

	What	Type	Material Type	URL	Topics	Service
1	Monitoring vineyards by drone	Technological demonstration	Video	https://www.youtube.com/watch?v=QU-J3hIS8sk	drones	Technology
2	Autonomous Greenhouse Logistics for Agrobotics	Technological demonstration	Video	https://www.youtube.com/watch?v=MKIT2u5IvjY	automation	Technology
3	Autonomous Robotic System for Soil Nitrates Monitoring and Mapping	Technological demonstration	Video	https://www.youtube.com/watch?v=ENiPefYwMD0	automation	Technology
4	Cabbage handling and processing using collaborative robots and vision technology	Technological demonstration	Video	https://www.youtube.com/watch?v=-YtBRvDWqGw	robotics	Technology
5	Monitoring olives	Technological demonstration	Video	https://www.youtube.com/watch?v=BTuyutsoP30	robotics	Technology

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6	IPR in the Agri-food Sector: a Guide to Geographical Indications, Trademarks, Patents & Plant Variety Denom	Webinar	Video	https://www.youtube.com/watch?v=fVlkTkSsrec	Intellectual Property	Business
7	Dutch Soft Robotics; Gripping of natural objects	Webinar	Slides	https://3.basecamp.com/4240733/buckets/12603100/messages/3069450056	robotics	Technology
8	Soft interfaces and their possible application in Agro Food industries. Mushroom harvesting case	Webinar	Slides	https://3.basecamp.com/4240733/buckets/12603100/messages/3069450056	robotics	Technology
9	Bio-inspired Technologies with focus on soft/flexible/compliant structures and mechanisms	Webinar	Slides	https://3.basecamp.com/4240733/buckets/12603100/messages/3069450056	robotics	Technology

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10	Challenges and approaches: Lessons of gripping in nature.	Webinar	Slides	https://3.basecamp.com/4240733/buckets/12603100/messages/3069450056	robotics	Technology
11	Ethics in robotics	Webinar	Video	https://www.youtube.com/watch?v=9UknYD6e7GM	ethics	Technology
12	Ethical issues of robotics	Webinar	Video	https://www.youtube.com/watch?v=bI7zxmu_fmw	ethics	Technology
13	Boosting your agROBOfood Digital Innovation Hub	Webinar	Video	https://www.youtube.com/watch?v=Idy0IDSNkJY	funding, networking	Ecosystem, Business
14	Reflections on the positioning of the existing DIH networks	Webinar	Video	https://www.youtube.com/watch?v=nVrI00NUZXU	funding, networking	Ecosystem, Business
15	What is the future of robotics in the EU and beyond?	Webinar	Video	https://www.youtube.com/watch?v=8ZMcRNIZ8dg	Business Models	Ecosystem, Business
16	Experiences of Innovation Experiments in using DIH	Webinar	Video	https://www.youtube.com/watch?v=xZI5icsg5cA	best practices	Technology, Ecosystem

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	CC services and IE achievements					

3.3 Courses from training catalog with materials

Out of the 98 training courses from the catalogue from deliverable D1.13, 27 were found to have the material available. Most of these are online courses (MOOCs) which are free to audit and therefore access the materials, but require registration which is possible only at certain times the course is offered, The training modules from SmartAgriHubs[2] also require registration and association with a registered DIH to be able to access the videos and slides.

The list of courses with materials available is presented in the annex. The next section 3.4 presents an overview on all the materials available from this set of courses as well as the materials developed within the project.

[2] https://www.smartagrihubs.eu/portal/trainings

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3.4 Overview of all available materials

We now present some analytics on a combined list of the courses from D1.13 that have materials available and the materials developed within the project, to provide an idea on the kind of materials and if they cover the training requirements.

3.4.1 Type of Materials

In Figure 1, we present the breakdown of the available materials as per type (videos, slides, codes) as a bar graph. The overwhelming majority of the available materials are videos, which is expected as the respective courses/events are either webinars or MOOCs.

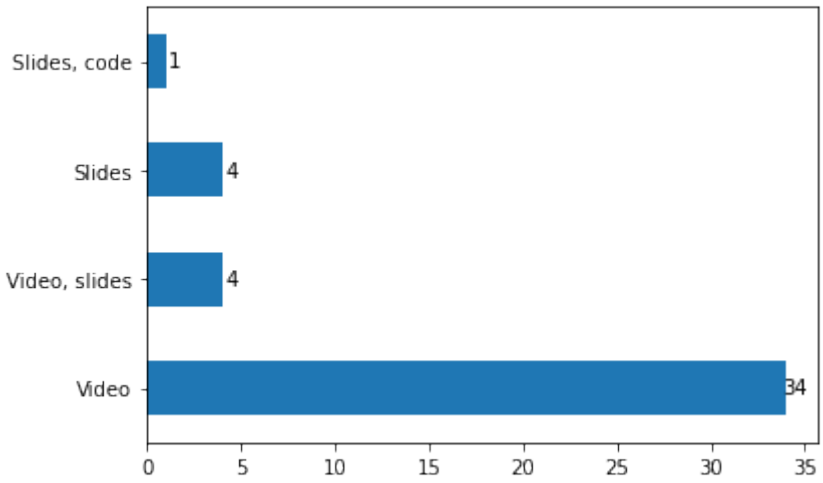

Figure 1: Types of materials (video, slides, code) from the materials that are available.

3.4.2 Within agROBOfood or external

In Figure 2, the breakdown of the available materials based on development within agROBOfood or from external sources is presented. As explained, the technological demonstrations and webinars such as the ones supporting the innovation experiment calls comprise the internally developed materials.

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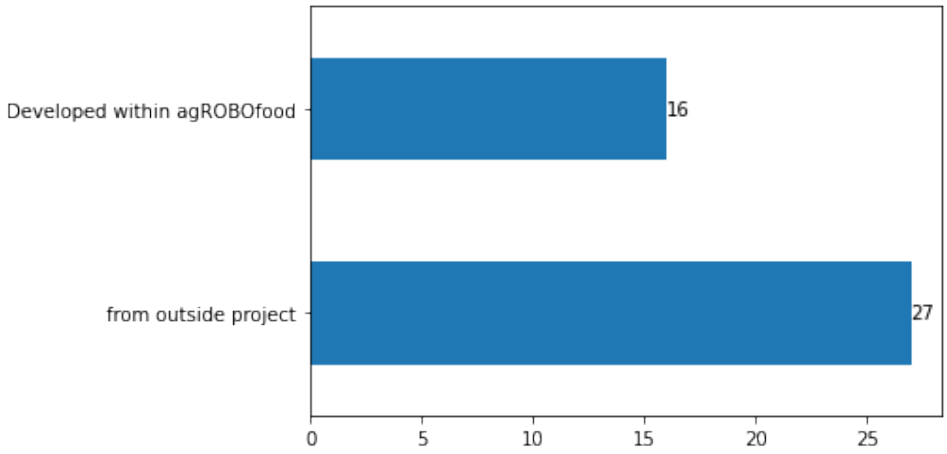

Figure 2: Materials developed within the project or from external catalogued courses.

3.4.3 Language

The breakdown of the available materials based on language is presented in Figure 3. As also could be seen in previous analysis on the catalogue of courses as well as the training requirements, most of the materials are in English, and very few materials are available in Spanish, French, and German. Since most DIHs and CCs reported that either English or the respective country's language were ok for training, the available materials meet the language requirements.

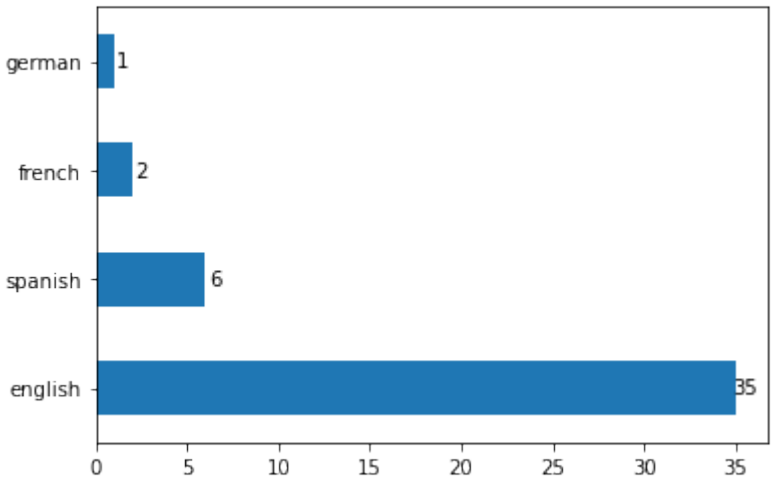

Figure 3: breakdown of languages in which materials are available.

3.4.4 Satisfying Training Requirements

To verify whether the available materials meet the training requirements presented in deliverable D1.11, an analysis was done on the combined table and on the table of required topics. A python script browsed the topics in each of the 3 services, for which training is required and checked if the said topic is covered in the present list of training material topics. The resulting breakdown of the topics that are covered in the materials or not, by service, is presented in Table 3.

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It can be seen that for the business service, around half the topics are covered, but most of the topics for the technology and ecosystem services are not. It must be noted that the technological demonstrations are an example of a hands-on use case in the respective area, and not an in depth tutorial.

Table 3: Whether required training topics (defined in deliverable D1.11) are covered by the available materials

Service	Required topics covered in materials	Required topics not covered in materials
Technology	(9) robotics, artificial intelligence, agriculture/agronomy basics, ICT, computer vision, innovation management, agri food tech, robotics hardware, data science	(17) data management, technology standards, regulations/norms/ethics, online mapping, innovation scouting, value sensitive design, prototyping, robotics operating environment, simulation, digital maturity assessment, deployment, TRL, sensors, machine learning, environmental science, programming, digital twins
Business	(4) business models, marketing, planning, project management	(5) funding acquisition, value models, market intelligence, consulting, strategy development
Ecosystem	(1) best practices	(11) community building, brokerage, presentation and communication, shared risk partnering, outreach, international networking, educational methodology, business networking, standardization , online networking, linkage

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4 Conclusions and Recommendations

The conclusions from the compilation of the data and the analytics are summarized below:

- There are more materials from external sources (27) than those developed in the scope of agROBOfood events (16).
- The inter-regional technological demonstrations within the project are an example of a hands-on use case in the respective area, and not an in depth tutorial.
- The English language is the most common one for the available materials. This is due to the fact that the videos of the agROBOfood events are in English, as are most MOOCs. Thus they are suitable for audiences from DIHs and CCs, which indicate English or the respective language as preferred for receiving training.
- From the technology service topics in which training is required, around a third are addressed in the available materials. It must be noted that scientific and engineering topics generally require further hands on study, apart from watching the videos.
- Roughly half of the business service topics required are covered in the existing materials.
- The available materials cover ecosystem topics like knowledge sharing and best practices, but none of the other topics. This is an imbalance compared to the other two services.

Based on these findings, the following recommendations are made:

- As many of the training materials are available on MOOC platforms such as Coursera or EdX, it is recommended to create accounts on these platforms and have a few people, ideally at least one colleague per organization, registered in the relevant MOOCs to be able to get around the time restriction.
- A strategy needs to be developed on how to validate training materials, with regards to the content, quality, level, and usefulness. For example, define a time frame to decide if the knowledge learnt is being applied. This will require inputs from consortium members. This exercise can be synchronized with similar work planned in WP6, on obtaining specific sub-topics for training/expertise;
- It would be useful to organize a project meeting or webinar that explains the process of submitting/sharing training materials or how to access them.

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5 Annexes

Annex I: Subset of catalogue of training courses, which have materials available.

Title	Type	Material Type	Website	Sign in required	Areas	Service	Language
Drones for Agriculture	MOOC	Video	https://www.edx.org/course/drones-for-agriculture-prepare-and-design-your-dro	Yes	Drones	Technology	English
Análisis de datos: Llévalo al MAX()	MOOC	Video	https://www.edx.org/course/analisis-de-datos-llevalo-al-max	Yes	Data Science	Technology	Spanish
Big Data Strategies to Transform Your Business	MOOC	Video	https://www.edx.org/course/big-data-strategies-to-transform-your-business	Yes	Data Science	Technology	English
Introducing Robotics	MOOC	Video	https://www.futurelearn.com/programs/robotics	Yes	Robotics	Technology	English

Robotic Vision	MOOC	Video	https://www.futurelearn.com/programs/robotic-vision	Yes	Robotics; Computer vision	Technology	English
Aerial Robotics	MOOC	Video	https://www.coursera.org/learn/robotics-flight	Yes	Robotics	Technology	English
Introducción a la robótica e industria 4.0	MOOC	Video	https://www.edx.org/course/introduccion-a-la-robotica-y-sistemas-para-la-indu	Yes	Robotics	Technology	Spanish
Diseña, fabrica y programa tu propio robot	MOOC	Video	https://www.edx.org/course/disena-fabrica-y-programa-tu-propio-robot	Yes	Robotics	Technology	Spanish
Introducción a la visión por computador: desarrollo de aplicaciones con OpenCV	MOOC	Video	https://www.edx.org/course/introduccion-a-la-vision-por-computador-desarrollo	Yes	Computer Vision	Technology	Spanish
Robotics: Vision Intelligence	MOOC	Video	https://www.edx.org/course/robotics-	Yes	Robotics	Technology	English

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and Machine Learning			vision-intelligence-and-machine-learning				
Autonomous Navigation for Flying Robots	MOOC	Video	https://www.edx.org/course/autonomous-navigation-for-flying-robots	Yes	Robotics; Computer vision	Technology	English
S'initier à la robotique	MOOC	Video	https://openclassrooms.com/en/courses/4076871-sinitier-a-la-robotique	Yes	Robotics	Technology	French
Venture Capital	MOOC	Video	https://www.edx.org/course/venture-capital	Yes	finance	Business	German
Hello World with ROS	MOOC	Video	https://online-learning.tudelft.nl/courses/hello-real-world-with-ros-robot-operating-systems/	Yes	Robotics	Technology	English

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Innovation Management	MOOC	Video	https://www.coursera.org/learn/innovation-management	Yes	innovation	Business	English
Business Model Innovation	MOOC	Video	https://www.coursera.org/learn/business-model	Yes	business	Business	English
L'impact investing, la finance qui change le monde Specialization	MOOC	Video	https://www.coursera.org/specializations/impact-investing	Yes	finance	Business	French
Administración de Proyectos: Principios Básicos	MOOC	Video	https://www.coursera.org/specializations/administracion-proyectos	Yes	management	Business	Spanish
Marketing Strategy	MOOC	Video	https://www.coursera.org/specializations/marketing-strategy	Yes	sales	Ecosystem	English
ICT Biochain trainings	Webinar	Video	https://ictbiochain.eu/e-learning-materials/	No	ICT in agriculture; finance; business	Ecosystem	English, Spanish

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Webinar: Opportunities for ICT in the biomass sector	Webinar	Video	https://www.youtube.com/watch?v=vy254PkX-z8	No	ICT in agriculture	Technology	English
Webinar: Train the trainer and ICT-BIOMASS platform launch	Webinar	Video	https://www.youtube.com/watch?v=NkteNrsU0Ss	No	ICT in agriculture	Technology	English
Client ROS Training	MOOC	Slides, code	https://www.theconstructsim.com/ros-team-training-3/	Yes	robotics	Technology	English
Business Planning for DIHs	MOOC	Video, slides	https://smartagrihubs.curatr3.com/courses/dih-exchange/home#level/228430	Yes	business	Business	English
Business Models and Strategy for DIHs	MOOC	Video, slides	https://smartagrihubs.curatr3.com/courses/dih-exchange/home#level/232328	Yes	business models, planning	Business	English

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Financing of DIHs	MOOC	Video, slides	https://smartagrihubs.curatr3.com/courses/dih-exchange/home#level/236613	Yes	finance	Business	English
Marketing & Engagement	MOOC	Video, slides	https://smartagrihubs.curatr3.com/courses/dih-exchange/home#level/238961	Yes	sales; business	Business	English

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