D4.7 SYNTHESIS REPORT ON LESSONS LEARNED

WP 4

02 May 2022

smartagrihubs.eu

DOCUMENT IDENTIFICATION

Project	SmartAgriHubs
Project Full Title	Connecting the dots to unleash the innovation potential for digital transformation of the European agri-food sector
Project Number	818182
Starting Date	November 1st, 2018
Duration	4 years
H2020 Call ID & Topic	DT-RUR-12-2018: ICT Innovation for agriculture – Digital Innovation Hubs for Agriculture
Website	smartagrihubs.eu
File Name	D4.7 SYNTHESIS REPORT ON LESSONS LEARNED
Date	02 May 2022
Version	1
Status	Final
Dissemination level	Public
Author(s)	Kristina Karanikolova (TNO), Caroline van der Weerdt (TNO), Frank Berkers (TNO), Stavros Tsitouras, Ahmad Issa, Rebekka Tegtmeier, Agustín Serrano; Review: Peter Paree
Contact details of the coordinator	George Beers george.beers@wur.nl

LIST OF ABBREVIATIONS

Abbreviation	Explanation
CC	Competence Centre
D	Deliverable
DIH	Digital Innovation Hub
FIE	Flagship Innovation Experiment
IPR	Intellectual Property Right
IE	Innovation Experiment
ISSM	Innovation Services Maturity Model
RC	Regional Cluster
RDI	Research, development and innovation
RTO	Research and Technology Organisation
SAH	SmartAgriHubs
SME	Small and Medium Enterprise
TRL	Technology Readiness Level
WP	Work Package

LIST OF FIGURES

TABLE OF CONTENTS

PROJECT SUMMARY

"Digital technologies enable a transformation into data-driven, intelligent, agile and autonomous farm operations, and are generally considered as a key to address the grand challenges for agriculture. Recent initiatives showed the eagerness of the sector to seize the opportunities offered by ICT and in particular data-oriented technologies. However, current available applications are still fragmented and mainly used by a small group of early adopters. Against this background, SmartA-griHubs (SAH) has the potential to be a real game changer in the adoption of digital solutions by the farming sector.

SAH will leverage, strengthen and connect local DIHs and numerous Competence Centres (CCs) throughout Europe. The project, already put together a large initial network of 140 DIHs by building on its existing projects and ecosystems such as Internet of Food and Farm (IoF2020). All DIHs are aligned with 9 regional clusters, which are led by organizations that are closely related to national or regional digitization initiatives and funds. DIHs will be empowered and supported in their development, to be able to carry out high-performance Innovation Experiments (IEs). SAH already identified 28 Flagship Innovation Experiments (FIEs), which are examples of outstanding, innovative and successful IEs, where ideas, concepts and prototypes are further developed and introduced into the market.

SAH uses a multi-actor approach based on a vast network of start-ups, SMEs, business and service providers, technology experts and end-users. End-users from the agri-food sector are at the heart of the project and the driving force of the digital transformation.

Led by the Wageningen University and Research (WUR), SAH consists of a pan-European consortium of over 160 Partners representing all EU Member States. SAH is part of Horizon2020 and is supported by the European Commission with a budget of €20 million.

EXECUTIVE SUMMARY

The objective of SmartAgriHubs is to develop a network of DIHs across Europe and through them support the local ecosystems in their agricultural digitization. The capacity building activities within the project (WP4) aimed to empower DIHs to provide relevant services portfolio and improve their operations. Different activities, including a needs assessment, tools to measure DIH services maturity, the DIH observatory and capacity building webinars and peer exchange were organized in the SmartAgriHubs framework. These have resulted in:

- Over 649 surveys received from the agriculture and DIH ecosystem were analyzed to assess the needs and how these match with DIH services
- 12 capacity building webinars, also featuring 6 DIH contributions and collaborations
- 715 attendants in the webinars with further 1559 views for online webinar recordings
- 5 peer learning and exchange meetings (with additional ones planned in Q2 of 2022)
- Learning and Exchange Platform with 11 learning modules and 86 learning items organized in 2 courses.
- Over 100 enrollments for the Learning and Exchange Planform (LXP)
- 90 valid Innovation Services Maturity self-assessments
- Over 300 DIHs registered in the observatory as a result of the project-wide activities and contributions from all WPs.

This deliverable aims to provide observations and lessons learned, based on the experience of the WP4 team within these activities. These observations provide useful insights to the SAH project, the individual partners and stakeholders, which can be utilized for future development of services.

A key take-away has been to remain flexible and to continuously adapt and mix the capacity building modes to respond to the diverse and changing needs of the DIHs.

Capacity building is needed and relevant for all hubs, those just initiating their activities or more experienced ones as evidenced by their participation in the various activities. In addition, many DIHs are interested to engage in capacity building activities – to a lesser or higher degree - as evidenced by the high attendance figures and the revisits to the capacity building tools and materials.

To engage the DIHs (even when physical meetings were not possible) the capacity building adopted different collaboration methods. One of the main observations is that a combination of two approaches (a mass-audience target approach and a more targeted boutique approach) can support wide capacity building needs with more detailed discussions in a safe environment. The boutique approach also supports trust building and raising engagement in a focused manner.

Further, the different tools, approaches and overall activities need to be connected in a (customer/user) journey that clarifies the added value for the DIHs and leverages on other project-wide activities. Lastly, the DIH concept itself is evolving, signalling the need to continue capacity building activities to support the ecosystem with relevant content and connections.

1. INTRODUCTION

1.1. SETTING THE SCENE AND SMARTAGIHUB'S ROLE

The SmartAgriHubs project (SAH) aims to facilitate a broad, connected pan-EU network of Agriculture Digital Innovation Hubs (DIHs) and in this way, foster the digital transformation in the sector. By linking locally-based DIHs, different stakeholders (competence centres, innovation agencies, ICT and agriculture representatives), and innovation initiatives in Europe, SmartAgriHubs facilitates exchange of experience, knowledge and technology expertise to enable the ecosystem to fully access the benefits of digitization in the agriculture sector.

Digital Innovation Hubs (DIHs) and Competence Centres (CCs) are key in developing this interconnected innovation support network across Europe. Digital Innovation Hubs act as a one-stop-shop where companies, farmers and other stakeholders can find support with their digital transformation, access to information, expertise and relevant facilities to explore and adopt advanced technologies and innovative methods to transform their products, operations or business logic. DIHs are often multi-stakeholder organizations (formalized or not), supporting the local ecosystem by connecting the relevant innovation actors and farmers in the region and providing a portfolio of services related not only to technology development and adoption but also business, ecosystem and skills support. Ultimately, by developing a pan-EU network of DIHs with a focus on agriculture, SmartAgriHubs supports connections and collaboration, and therefore the digital transformation, of the agriculture sector in Europe.

SmartAgriHubs – via the WP4 activities - aimed to support and empower DIHs in their development. The focus of the activities was to help the DIHs in building their capacities to deliver a relevant portfolio of innovation services to end-users such as SMEs, farmers and innovation suppliers. The basic assumption of WP4 activities , confirmed in this deliverable, has been that even though DIHs across Europe differ due to the differences in ecosystems they support, there are common topics on which DIHs can further build their capacities, exchange experiences, and learn from each other. Responding to the varying capacity building needs and maturity of DIHs, different activities and capacity building modes were used in SmartAgriHubs to raise awareness on key topics, encourage self-directed capacity building and facilitate peer learning and exchange.

A key approach in the WP4 activities has been to remain flexible and to continuously adapt and mix the capacity building modes to respond to the diverse and changing needs of the DIHs. Learning from the DIH needs and participation, the activities in the project have respectively adapted from an initial mass approach where DIHs could register and build their capacity via webinars, tools and repository of materials, to a current 'boutique' approach where WP4 organizes friendly targeted DIHs peer learning and exchange meetings for DIHs to share (good) practices and experience. To promote self-directed growth, these activities have been complimented with an online social learning platform and online materials for self-study as well as services maturity assessment tool found in the SmartAgriHubs innovation platform.

1.2. OBJECTIVES OF THE DELIVERABLE

This deliverable focuses on the activities of WP4 on capacity building and the lessons learned gathered by the partners while undertaking these tasks. The lessons learned should be seen as a recommendation and lesson for future intervention and support of the (Agriculture) Digital Innovation Hubs ecosystem.

These observations can further support the SmartAgriHubs project, the individual consortium and WP partners but also the DIH ecosystem at large, and point policy-makers towards good practices and possible future interventions.

Even though the capacity building activities will continue within the framework of the project, this deliverable is also the last deliverable within the framework of WP4. Therefore it presents

an overview of observations and conclusions from the already finalized activities and previous deliverables.

1.3. METHODOLOGY

The lessons learned have been collected in the following manner:

- Collection of main conclusions and recommendation based on analysis of Deliverables 4.1 on Needs Analysis, D4.2 on the Maturity Model, D4.3&D4.6 on the Observatory, and D4.4 and D4.5 on the Capacity Building Materials.
- Two brainstorming sessions to gather the observations and lessons learned from the consortium partners, part of WP4.

Based on these outputs, this deliverable outlines the main messages per topic of the WP4 capacity building.

2. THE CAPACITY BUILDING ACTIVITIES

2.1. Overview and Intervention Logic

To support the DIHs in their capacity building, WP4 has focused on the following main activities:

1. Analysis and assessment of the needs of DIH and farmers with regard to the digital transformation. The objective of this activity was to identify topics where SmartAgri-Hubs could intervene based on the needs of the farmers and agriculture stakeholders and how these match to the DIHs services;
2. DIHs were supported in their capacity building via four main complementary elements:
   a. An innovation services maturity assessment model and tool to support the DIHs in self-assessing and benchmarking their service portfolio and progress;
   b. Public webinars on topics identified from the needs assessment and based on the consortium experience, to support DIHs to build their capacities to establish and operate a hub; Frequently viewed recordings of these webinars are also accessible through the Innovation Portal and via SmartAgriHubs' YouTube channel. Relevant materials from other projects have also been selected and reference in the Innovation portal.
   c. Peer exchange discussions among DIHs to encourage networking and peer-learning in the DIH agriculture community;
   d. Modules developed and provided via a peer learning and exchange platform (LXP) to further provide opportunities for peer exchange and to support DIH self-learning on selected topics; The platform itself is provided by Next Learning Valley and access for use by SAH is arranged via a licence. The SAH Innovation Portal provides link to the SAH courses and modules on LXP.
3. Mapping and monitoring of the DIHs via the Observatory, to enable an overview of DIHs and support DIHs finding each other as well as the regional clusters to monitor the number of DIHs registered.
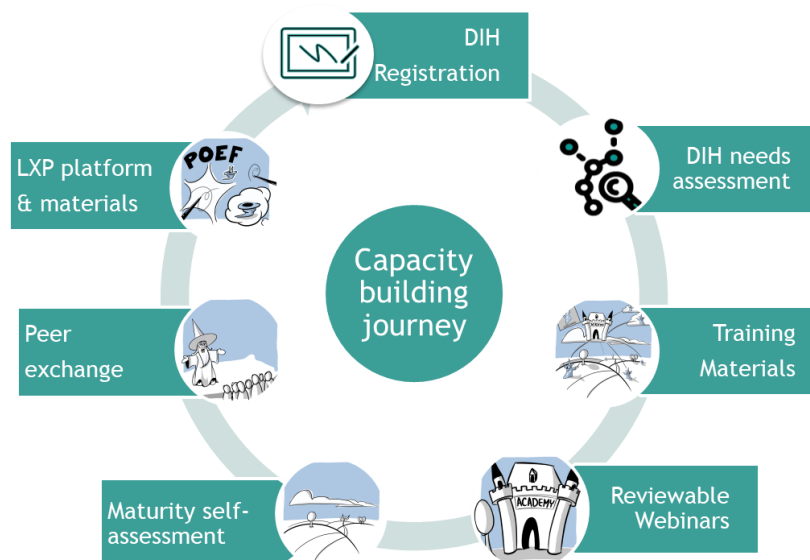
Figure 1: Capacity Building intervention logic for DIHs (adapted from SmartAgriHubs Deliverable 4.5, 2022)

The above elements are all interconnected and should be seen as a learning journey, supporting the DIHs in their capacity building. The intended intervention logic is represented in Figure 1 and shows how SmartAgriHubs connects the dots of the different activities for the DIHs. It should however be noted that this journey intervention is just one example of how DIHs could connect to the capacity building. Depending on their current needs, availability and maturity, some DIHs might only follow a couple of steps, some have started their journey at a different step. For more details on the intervention logic see D4.5 on the 'Capacity building package of materials for operating a hub'.

Each of the main capacity building activities and tools are described in previous deliverables. In the following chapters, these activities are briefly introduced, focusing on their purpose and main results. Lessons learned and observations from the activities are then provided in chapter 3 to support future policy interventions.

2.2. Results of the Activities

The needs assessment as a starting point[1]

To guide the capacity building activities in SmartAgriHubs, a needs and gap analysis was conducted to evaluate how the needs of the agriculture sector match with the support and services provided by agri-focused DIHs across Europe.

In total, 570 surveys from farmers and 79 DIH surveys were analysed. This provided the SmartAgriHubs with initial analysis of main pain points and valuable insights for the EU and DIH community.

Regarding the capacity building, the 2019 needs assessment survey indicated four initial clusters of services of DIHs that might require different support. By comparing the responses from DIHs and the farming sector on how important they find services and whether these are readily available, the analysis groups services: 1) where there is a match of demand and service offer for topics perceived as highly important, 2) services which even though important are perceived as not available for farmers, therefore suggesting room for

---

[1] See Anda, J., Ángeles Lora, M., Molina, N., Serrano, A., Calero, M., Berkers, F., Van der Weerdt, C., Derks, M., Hof, T., Tsitouras, S., Issa, A. (2019). "SmartAgriHubs D4.1 Needs Assessment Report", SmartAgriHubs deliverable

improvement, 3) Available services but with a perceived lower importance, and 4) a group of services with perceived lower importance and unknown delivery suggesting a need to raise awareness of the services and their added value. This analysis provided a basis for the later capacity building design.[2]

The high response rate to the survey indicated the willingness of the community to participate and engage with SAH activities. The already mapped DIH ecosystem of SmartAgriHubs as well as the connection to the agriculture sector proved sufficient to spread the survey widely. Yet, one of the challenges observed was the (at that time) weaker connection between DIHs and their ecosystem, thus indicating a challenge towards which SAH could support the ecosystem.

Figure 2 Innovation services quadrant according to importance and gap (source D4.1 Needs Assessment, 2019)

For details of the results, refer to the D4.1 Needs Assessment Report (2019).

The observatory[3]

The observatory aims to collect and present key information of the DIH network to foster and facilitate the connection among DIHs and other agriculture stakeholder. It is closely connected to the SmartAgriHubs Innovation Portal (developed within WP1). The observatory and the innovation portal aim to connect the dots for the Digital Innovation Hubs journey by connecting certain functionalities and tools, ensuring that DIHs include relevant information in their profiles to enable searching and finding partners. Further, the observatory aims to function as a tool to monitor activity and collect data – for individual DIHs, for the SAH regional clusters and for the SAH project as a whole – and provide overview of relevant information.

As of July 2021, over 300 DIHs were registered in the SAH innovation portal.[4] This is a significant increase from the initial 140 DIHs at the inception of the project and indicates a growing interest and engagement of the EU DIH Agri ecosystem.

Various functionalities were considered for the observatory: from the registration data, map of the network (with suggestions for further filtering opportunities in D4.6), to ideas how to connect information, provide incentives for higher activity of the DIH (e.g. badges) and connecting the DIH and user journeys. The development of the observatory was therefore very much connected to the development of the innovation portal (WP1) and the various tools provided by other WPs (e.g. on collecting good practices, supporting the work of the regional clusters, registration process, etc).

Many of the envisaged observatory functionalities are now implemented in the Innovation Portal via different tools. One of the overall suggestions of D4.6 is that a well-working tool such as the overview with key data that Regional Clusters see (overall maturity of DIHs, number of DIHs, new DIHs registered), might also be useful for DIHs. Such a tool still requires consideration and evaluation of feasibility and is in the process of discussion in the project.
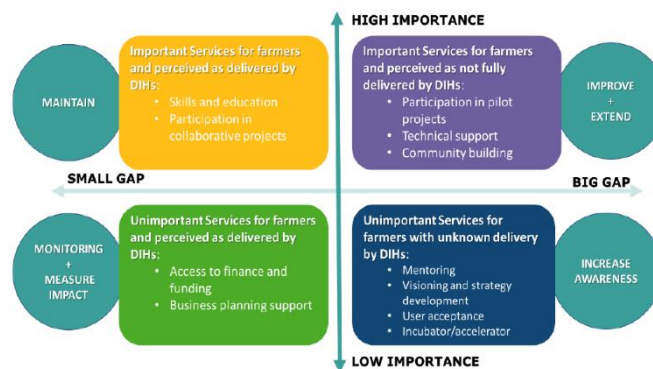
[2] Anda, J., Ángeles Lora, M., Molina, N., Serrano, A., Calero, M., Berkers, F., Van der Weerdt, C., Derks, M., Hof, T., Tsitouras, S., Issa, A. (2019). "SmartAgriHubs D4.1 Needs Assessment Report", SmartAgriHubs deliverable
[3] CAGPDS (2022), "D4.6 DIH OBSERVATORY UPDATE", SmartAgriHubs deliverable 4.6
[4] CAGPDS within the framework of WP 4 SmartAgriHubs (July 2021), "DIH registration activity in SAH", SmartAgriHubs analysis report (confidential)

Innovation Services Maturity Model and assessment tool[5]

Often, DIHs start their capacity building journey with an *Innovation Services Maturity Assessment* (following registration in the innovation portal). The Innovation Services Maturity Tool allows DIHs to self-assess the maturity of their services, benchmark against other DIHs and spot potential areas for improvement on their operations, service portfolio and even individual services level. The innovation services maturity model has been translated into a tool and incorporated in the SAH Innovation portal in collaboration with WP1 (after a pilot from some DIHs). The tool is open to registered DIHs in the Innovation Portal. To stimulate use of the tools and DIHs to identify areas for improvement, the services maturity tool was also connected to the open calls (participating DIHs were expected to perform a self-assessment).

By 20 September 2021, 90 valid self-assessments had been conducted with 20 of them performing a re-assessment (See D4.2[3]). This suggests that DIHs also make use of the tool not only as a one-off assessment but also as a self-monitoring mechanism on their progress.

In addition to enabling a benchmarking functionality, the aggregate data from all the assessments (visible for the consortium only) also allows the project to identify and tailor activities. Interestingly, based on such analysis in 2021, 4 services were found to show comparatively low maturity for at least 15 DIHs. This has been used as an input to organize further peer exchange on the topics. The 4 services are: Strategy Development', 'Ecosystem Learning', 'Representation/Promotion' and 'Technical Support'.[3]

Capacity Building Webinars[6]

To support capacity development on key topics identified via the needs assessment and the experience of the consortium partners, a total of 12 webinars were organized in the period between December 2019 and January 2021.

The webinars were deliberately open to all SmartAgriHubs DIHs and the whole SAH ecosystem in order to provide a wide group of DIHs with insights on setting up and operating a hub. Each webinar aimed to present interactive element with the audience (Q&A session, polls, chat discussions, etc). Overall 715 attendees in the 12 webinars (combined) were recorded.

The webinars were promoted on the Innovation Portal, recorded, and the related materials were later included in the Innovation Portal (see under 'Training') to enable newly coming DIHs to review the materials and for future reference. By February 2022, the online webinar recordings reached 1559 views (combined).

Additional materials from other projects

In addition to the SAH capacity building webinars other projects and initiatives were scouted and reference to relevant capacity building materials and webinars has been included in the Innovation Portal to complement the SmartAgriHubs materials. For further details see D4.4 and D4.5 on the Capacity Building materials for establishing and running a hub, respectively.

The Peer Learning and Exchange Programme

To respond to the DIHs' need for more possibilities to exchange with peers, which was highlighted in the webinars and discussions with the DIH community, the capacity building activities were later shifted to a peer learning and exchange programme. The programme was launched in 2021 after a consultation with DIHs (via interviews) where DIHs indicated the need to complement the information provided with opportunities to learn from each other and exchange experiences and challenges on specific practical cases and topics.

This peer learning and exchange aimed at fostering a facilitated DIH-DIH interaction and sharing of examples. The first 2 sessions were based on a more streamlined approach towards all DIH in the community. However, after a limited attendance despite high registration

numbers (36), the team adapted to a more intimate, "boutique" approach where the meeting is tailored to the specific group of DIHs and preparatory individual discussions are held to scope the topics. The peer exchange itself followed a basic structure of first holding a peer exchange session with a lot of interaction, followed by possibilities to find materials and exchange in a platform (see below).

In total, 5 peer exchanges took place since April 2021 and additional Spring Sprint marathon is expected in May/June 2022.

Learning and exchange in the peer Learning and eXchange Platform (LXP)

To further promote self-learning and exchange of opinions, a learning and exchange platform (LXP) was set up.[7] The LXP provides courses consisting of various short (learning) materials that support individual learning as a follow-up of the peer exchanges. In addition, DIHs can further engage with each other via a chat, facilitated by a dedicate expert, thus providing an opportunity for further interaction.

Currently, there are 2 courses, structured along 11 modules[8] with approximately 86 learning elements – videos, articles, templates, exercises. The first course focuses on peer exchange and covers topics like DIH funding and finance, business models, marketing etc. These topics were identified as areas of interest of the DIHs participating in the peer exchange(from the first round). The second course is on writing a proposal for an innovation experiment and is curated by WP2&3. As of April 2022, there are 80 enrolments for the peer exchange course and 34 for the course on writing a proposal. This indicates interest in the materials and the platform. Yet, we observe limited interaction in the platform with only few of participants actively responding and engaging on the posed questions. Discussions with DIHs on the topic pointed to the challenge of reconciling the tension between learning and busy daily schedules. Those active in the platform have provided positive feedback on the content and its useful-ness.

3. OBSERVATIONS AND LESSONS LEARNT

Based on the experience from the various activities in WP4, we can draw the following observations and lessons learned. We have grouped the observations around the following points:

- Observations on how the DIHs concept has developed and what this implies for capacity building
- Overall observations related to the project level.

3.1. DIHS AND capacity BUILDING

The DIH concept is still developing and the needs of the DIHs vary

Since 2016, Digital Innovation Hubs have emerged as a key policy mechanism to support the digital transformation and adoption of advanced technologies in various sectors, including agriculture.[9] There are a number of agriculture DIHs already in operation across Europe. This is clearly seen from the DIH registrations in the SmartAgriHubs network, where by July 2021,

there were 302 DIHs registered (in comparison to the 140 DIHs at the start of the project).[10] The concept of a DIH is, however, still comparatively young and evolving, especially in the agrifood sector and as compared to sectors like manufacturing.[11]

As a result, the agri DIHs ecosystem is a mix of both highly experienced DIHs and those which are in the early stages of their operations. In addition, DIH vary, not only due to their maturity, but also based on their differing backgrounds (e.g. governmental, campus based, multi-domain,…) and the ecosystem they are trying to support.

This results in many and varying capacity building needs among DIHs. Yet, the DIH development should be seen as a continuous process in which the DIHs evolve their operations to provide the most relevant service portfolio for their ecosystem. This means that some of the topics for establishing a hub might be still relevant for operating a hub and vice versa. This is also reflected in the maturity model, that presents 5 levels of maturity for services and general aspects like governance. We have observed that some new DIHs were able to develop their maturity very quickly, due to access to the materials and/or role models from DIH examples shared in webinars or the peer exchange within SmartAgriHubs.

Therefore, a combination of both topics (developing and operating) should be offered in order to reach the needs of a diverse and growing ecosystem (and new hubs), emphasise key elements such as relevant mix of services (for all) and bring new 'scaling-up' topics that support experienced hubs and give new hubs some anticipatory knowledge and background.

DIH services are evolving, requiring continuous adaptation from the DIHs

Following the previous point, the DIHs service portfolio should be seen as continuously developing to respond to current and emerging needs. One of the key characteristics of a DIH is that they offer a combination of different services – technology, business, ecosystem development – to support the whole innovation process, from idea towards deployment at scale, and respond to the needs of their regional ecosystem. This combination of services and the multi-partner organization often observed in DIHs is what enables DIHs to become a one-stop-shop in the ecosystem, able to connect the relevant stakeholders.[12].

The typologies of DIH services however are also is still evolving and require innovation. Even in the course of the SmartAgriHubs project, we have observed that new types of services are emerging. For instance, in the last years, the topic of *skills* development has gathered momentum and is nowadays pointed as one of the 4 core types of services that should be offered by the newly expected European Digital Innovation Hubs (to be established under the Digital Europe Programme). Similarly, Sassanelli et al. have added 'data' in their reference model for DIH services to account for the need to organize data spaces and data ecosystem among the (regional) stakeholder to support them in utilizing new digital solutions.[13] Similarly, topics surrounding data ethics, privacy and regulations related to gathering, sharing and usage of data and AI applications are increasingly relevant for the digital transformation.

Naturally, the specific activities and services of a DIHs would be dependent on their local ecosystem. But to continue adding value to the ecosystem, DIHs should keep up with such changes and adapt. Continuous connection and interaction in a DIH network can further help DIHs to spot changes, promote peer learning and inspire others to develop or find expertise on these new services. Capacity building activities can be a way to bring awareness and share (good) practices of DIHs offering such services. Further, in SmartAgriHubs, the maturity tool has been designed to allow DIHs to add "other" services, thus giving the DIHs an opportunity

[10] CAGPDS within the framework of WP 4 SmartAgriHubs (July 2021), "DIH registration activity in SAH", SmartAgriHubs analysis report (confidential)
[11] K.Karanikolova et al (2022), "D4.5 Capacity building package of materials for operating a Hub", SmartAgriHubs deliverable
[12] Butter, M., Karanikolova, K., Gijsbers, G., Goetheer, A. (2020), "Digital Innovation Hubs and their position in the European, national and regional innovation ecosystem", in Denise Feldner (ed.), Chapter in: 'Redesigning Organizations - Concepts for the Connected Society', Springer Nature Switzerland
[13] Sassanelli, et al (2020), "Towards a Reference Model for Configuring Services Portfolio of Digital Innovation Hubs: The ETBSD Model", IFIP International Federation for Information Processing 2020

to add new services to their assessment. Still, such evolution of the DIH concept is expected to continue and this also requires that tools (e.g., the maturity tool) and materials (e.g., the recorded webinars) are regularly adapted and the DIH ecosystem is continuously studied and supported.

Capacity building is relevant and important for most DIHs

DIHs, irrespective of their development phase or maturity level, are often willing to engage and learn to improve their capacities. However, it should not be forgotten that DIHs often deal with limited resources to provide their customers with the respective services as well as carrying out their daily operations. Therefore, in terms of learning, the following observations can be made:

- The capacity building topics should be relevant for the DIH operations, and particularly their current needs and daily activities. This might at times be challenging, especially since some strategic topics – e.g. longer term strategic direction of the hub – might not be on their agenda at the moment but are highly valuable in the mid-to-long-term. Further, the daily activities and needs of the individual DIHs are likely to differ, thus making it difficult to offer "one solution fits all" type of training. Therefore, clear communication, awareness creation and sharing of good practices is needed. This also requires that tools and different activities (not only on capacity but also project-wide) need to be connected to translate the activities to a DIH journey.
- Different forms of capacity building should be considered to complement learning phases and respond to different needs. Several topics, have been addressed by both the webinars and the peer exchanges, indicating the need for both background knowledge and deeper discussions on challenges in practice. Self-study and engagement seems to render less interaction (at least in the LXP platform) with already active hubs showing most engagement.

Exchange of experience and (good) practices is crucial

The needs analysis pointed to the need to further support the collaboration among DIHs, as well as Competence Centres, to promote the exchange of experience and good practices. The needs report also recommended DIH further share good practices of farmers, to promote adoption of innovations – not only technical but also relevant to business modelling and operations, as well as user-centric innovations.

The peer learning and exchange programme launched in WP4 has aimed to support this exchange and has been prompted by a consultation where DIHs indicated that while they see the added value of expert insight sharing in webinars, they would like to also exchange challenges and experiences with peers. While each experience would be different, the exchange can inspire participants with new approaches.

Examples of DIHs practices have also been included in the LXP course on peer exchange. WP3 and WP1 in SmartAgriHubs have worked on promoting good practices from the SAH innovations experiments (D3.8 – success stories from IEs, 2021)[14] as well as a collection with lessons/(good) practices on the innovation portal.[15] Similar activities are appreciated and should be further continued (even beyond the SAH).

Engagement levels differ and online environment might require more facilitation

Engagement and activity levels vary among the DIHs in the various meetings. In the capacity building activities, we have worked with a significant number of DIHs in the ecosystem. Those

---

[14] *Jovana Vlaškalin, et al, 2021, "D3.8 – success stories from IEs, 2021", SmartAgriHubs deliverable 3.8*
[15] *https://smartagrihubs.eu/portal/lessons?page=2*

that we have managed to engage provided positive feedback. We have also observed that active DIHs tend to return, to participate as pilots and to contribute to materials. However, there is also a group that is only interested to "listen in" and participate in a more passive mode. Both modes should therefore be supported (e.g. combining mass webinars self-use tools with more options to engage and discuss). Leveraging on 'friendly' and active members helps to stimulate the discussions and therefore lower the threshold of less active ones to jump in and participate.

The capacity building activities were mainly designed to take place online. The mode was selected due to the need to reach a large number of DIHs and stakeholders spread across Europe, making digital the most efficient way to connect.

Collaboration however often requires trust building and a personal connection, which is more difficult to promote online. This is especially true when creating trust among stakeholders who often operate in a different region or ecosystem and in organizing EU-wide collaborations. The challenge was further strengthened by the online fatigue and lack of possibility to meet during the COVID pandemic, specifically experienced in 2021.

The project and the capacity building activities have tried to address this with shorter, smaller groups to promote exchange as well as different modes of engagement – moving from a mass-invitation approach, to individual connection to scope topics of interest and a boutique approach. This approach, while more effort-intensive, ensures relevance, builds connections and promotes a 'safer' space to share, even in the limitations where only online contact was possible. A physical event is envisioned for the end of the project (if circumstances allow) and this could be used to further foster the network feeling.

The DIH services maturity assessment supports individual and aggregate improvements that need to be connected in a journey

The DIH services maturity self-assessment tool provides the individual DIH with valuable insights into their services and operations compared with other DIHs. The collection and analysis of the *aggregate* data also allows the ecosystem to 'learn'. This can be done via the benchmarking but also via additional intervention measures such as the analysis identifying 4 services as areas of possible improvement and organizing peer exchange on the topics to stimulate discussion. This provides an example of how different tools and modes of capacity building must be combined to bring more impact to the users. Therefore it is key to implement the tools not in isolation, but to design a users' journey.

The SmartAgriHubs services self-assessment maturity tool and model present one of the few (to the knowledge of the authors) maturity tools specifically designed for DIHs. It has its limitations (see D4.2 v3 on the maturity model and tool). At the same time, we also observe that the SAH model has inspired others – e.g. agROBOfood has indicated that their model is based on the ideas of the SAH tool.

The use of the maturity assessment within SAH (over 90 assessments done by 2021) signifies the need for such instruments. A variety of tools is also useful as it allows users to select the most appropriate for their needs and provide the overall DIH ecosystem to further improve.

Support is needed to strengthen the connection with the local ecosystem

The needs analysis performed (see above) has suggested that DIHs are often connected to "University/Research Centres, local SMEs, Competence Centres, farmer associations and communities, local governments and education & training institutes"[16] but that there was still lack of connection of the DIHs with some (farming) stakeholders. One of the

---

[16] See Anda, J., Ángeles Lora, M., Molina, N., Serrano, A., Calero, M., Berkers, F., Van der Weerdt, C., Derks, M., Hof, T., Tsitouras, S., Issa, A. (2019). "SmartAgriHubs D4.1 Needs Assessment Report", SmartAgriHubs deliverable

recommendations was that DIHs should further map and connect with their local agricultural ecosystem and be aware of differences among needs from different farmers/stakeholders.

While this aspect requires individual initiative by the DIHs in their own local ecosystem, the capacity building activities and EU networks like SmartAgriHubs also play an important role. For instance, the topic was addressed in the webinar on performing an ecosystem analysis. Also, the peer exchange meetings often touched upon the topic of (good) practices to connect to regional stakeholders.. In addition, all WPs have supported to promote engagement of DIH with its local ecosystem with the open calls engaging DIHs and concrete Flagship Innovation Experiments, supporting hackathons, providing overview of the ecosystem in the Innovation Portal, connection via the regional clusters, etc. In the end, such instruments support the DIHs in their activities, build their network, and contribute to their capacities to connect locally.

The roles and connection of DIHs with Competence Centres need to be further clarified and strengthened

One of the observations during the project has been that users are at times confused whether to register as a competence centre or a digital innovation hub, or both. In the authors' opinion, the two concepts are connected (see figure 3): competence centres and research organizations often form the core of DIHs and provide expertise on the technology services. DIHs are often formed as a multi-partner organization and connect various stakeholders supporting innovation and building on the mix of services. A competence centre can be the orchestrator of a DIH but this is not necessarily always the case and a CC may not even be part of a DIH (e.g. because of a separate focus, lack of a DIH, etc), participate with different departments in different DIHs or, in due course the roles of CC and DIH can be separated.
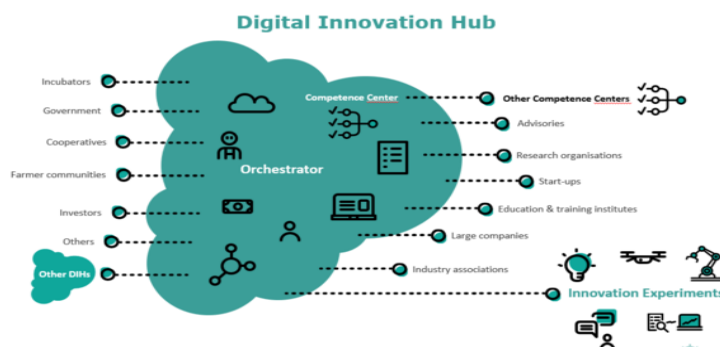

Figure 3:Digital Innovation Hub illustration with connections to different stakeholders (source of image: SmartAgriHubs website, accessed May 2022)

In the end, what matters is that the local ecosystem is connected and SMEs and farmers are supported in reaping the full benefits of the digital transformation. Yet, the discussion suggests that further communication in the ecosystem is needed on the topic. SmartAgriHubs has aimed to address this with various activities in WP4 and WP5. One of the webinars outlining the role of DIHs has also delved into the topic.

3.2. PROJECT AND process RELATED OBSERVATIONS

IT tools should be designed and implemented together and might undergo changes

Ideally, the observatory and the innovation portal as well as other tools should be developed in coherence to allow better anticipatory alignment. The Innovation Portal has been a central deployment tool in SmartAgriHubs. It hosts the different tools. As such it needed to continuously adapt as the project developed. This flexibility however has its boundaries in order to

still remain as a working tool. Therefore, some functionalities were not possible to introduce and some were cancelled in the project lifetime, at times due to time and resource limits. Other functionalities were partially covered by other tools. This leads us to the conclusion that the design of the portal should be considered as a continuous process. Such continuous process admittedly has its risks, e.g. of similarity with already developed functionalities, more limited user interest, or resource limits but it also allows a community like SmartAgriHubs to continuously develop and be responsive to the user needs.

Project-wide collaboration and alignment needed to secure engagement

The SmartAgriHubs project presents a large project with a number of interconnected activities and services targeting a diverse group of users. This allows the project to leverage on the different activities to provide added value and support the network and to promote engagement. For instance, to ensure attendance of the webinars or any other events, promotion plays a key role in attracting the DIHs. This is also valid for any of the SAH tools. Respectively, these tools and capacity building events support the awareness creation by showcasing the added value of SAH to the network. SAH has therefore continuously worked to connect the activities of the different WPs, promote the tools and the network and raise awareness of event (related to the overall ecosystem, capacity building, the FIEs, open calls, CCs, etc).

This requires significant efforts in communication and community building for all partners which should be carefully considered for any project aiming to focus on the development of the network. The alignment and collaboration is however not always easy or obvious and should present a continuous effort. Feedback from the regional clusters for instance, indicated that some capacity building activities might have benefitted from earlier alignment with the regional clusters to enable more promotion, e.g., in non-English language. This however needs to be balanced with challenges of over-information and agility to quickly change direction as well as the resources and capabilities of the regional cluster organizations.

The need for incentives to stimulate engagement

Clear added value and incentives for participation are needed to stimulate higher engagement. The DIHs, just like any other organization, are pressed for time and resources. Attracting them to participate in various activities is hard as this competes with their daily responsibilities as well as any other offers. The value proposition of each activity should therefore be clear, well communicated and targeted towards a particular need.

To help alleviate this challenge, incentives might be considered by SAH future plans or by future projects. These could take various forms: from more mild/supportive incentives (such as highlighting more active users as use cases, badges/contests based on participation levels), to more demanding forms (e.g. exclusivity access via limited spaces, payment (even if only perceived by providing a market estimate of the service), or setting pre-conditions for participation, e.g., as the requirement to complete a maturity self-assessment to participate in open calls). Recognition, promotion or even participation in events from EU policy makers could also be a valuable incentive (e.g. by recognizing a badge/brand, or in events such as SAH high-level event where a meeting with the European Parliament attained great exposure towards the SAH ecosystem and activities). These incentives should be designed at an early stages, and clearly communicated. Secondly, more individualized activities, closer connection (via calls, personal exchange) and follow up and focusing on the active participants could also be strategies to alleviate the challenge. Leveraging on active DIHs willing to contribute and pilot also helps to keep their interest, but also involve others by peer-to-peer showcasing the added value of collaboration. This was chosen as a way forward for the boutique peer exchanges but it also requires more resources.

Key milestones and activities needed continuously to grow the network

Analysis of the new registrations from 2021,[17] indicated that the registration to the Innovation Portal is connected to specific activities (e.g. the open calls, the launch of the innovation portal, etc). This is not per se a surprise as the open calls present a financial incentive. But it suggests that registrations and the network expand with the continuous offer of interesting services or materials. In the future, SmartAgriHubs can therefore expect further expansion at key milestone moments (e.g. events, launching new services, (social) media buzz). The initial work of identifying and registering some of the DIHs has however also facilitated the project to reach a critical mass of registrations and increase potential to connect to other DIHs in the ecosystem.

4. CONCLUSION

In this deliverable we have aimed to outline some of the main conclusions and lessons learned from the capacity building activities in the scope of WP4 of the SmartAgriHubs project. The analysis is based on the activities conducted, the experience of the team collected in two brainstorming sessions and analysis of conclusions from previous deliverables.

The capacity building activities have aimed to support and empower DIHs in the agriculture sector to develop into a one-stop-shop and provide a portfolio of relevant and value adding services to their local agriculture ecosystem. In this sense, the capacity building activities have strived to support DIHs in the process of setting up their initiatives as well as with building capacities to operate DIHs.

The needs of the DIHs however vary not only based on their development stage (setting up or operating a hub) but also based on their regional circumstances, history, partnerships, etc. This has necessitated the adoption of multiple capacity building activities to ensure flexibility. In the process, via continuously adapting to address the DIHs feedback, we can conclude that both mature and younger hubs are willing to learn. Engagement differs but we have managed to connect to large part of the DIH ecosystem via the different activities (from webinars to peer exchange programme and online learning and exchange platform) and those that have participated provided positive feedback. We also observe that materials are reviewed online, tools (e.g. the maturity self-assessment) are used and re-used, indicating that the supporting materials have been appreciated and add value.

Active participants are willing to engage in different ways, including piloting activities, responding to interviews, connecting with others in the peer exchange. Active participation, e.g. in the first peer exchanges, was below expectation despite high enrolments. This prompted the switch to a combination of mass and boutique approach, which enhanced engagement.

The overall capacity building experience has allowed the consortium to conclude that:
- Capacity building is relevant for both mature and younger hubs as evidenced by the participation of both. To maintain the relevance of the capacity building for then, a flexible approach that combines different types of learning (to allow for self-learning as well as group sharing), different modes of capacity building (in large and small groups, more focused on knowledge/insight sharing or experience exchange, etc) should be offered. Online collaboration and connection allow for easier/quicker connections but on the other hand may require more effort to engage people and facilitate trust.

---

[17] *CAPDER within the framework of WP 4SmartAgriHubs (July 2021), "DIH registration activity in SAH", SmartAgriHubs analysis report (confidential)*

- The different tools and activities should be connected to provide a seamless journey for the users (DIHs). This connection among tools and activities acts not only to convey the added value to the DIHs and show them the overall logic of activities, but also to raise awareness and interest in complimentary activities and tools. Ultimately, a connected DIH journey can contribute to attract new members, grow the network and connect members but this requires alignment of activities.
- The DIH are continuously developing as entities but also the DIH concept is evolving and is comparatively new in some ecosystems/ for some stakeholders. This points to the need to further support and promote capacity building as well as to continue supporting peer-exchange and connections in the network.

REFERENCES

- Anda, J., Ángeles Lora, M., Molina, N., Serrano, A., Calero, M., Berkers, F., Van der Weerdt, C., Derks, M., Hof, T., Tsitouras, S., Issa, A. (2019). "SmartAgriHubs D4.1 Needs Assessment Report".
- Berkers, F.; van der Weerdt, C.; Karanikolova, K.; Gijsbers, G.; Issa, A.; Tsitouras, S.; Butter, M.; Vonder, M. (2021), "D4.2 DIH Capability Maturity Model.v3"
- TNO (2020), "D4.4. Capacity Building Package of Materials for the Establishment of a Hub, deliverable in the framework of the SmartAgriHubs project".
- JRC (2020), "Digital Innovation Hubs As Policy Instruments to Boost Digitalisation of SMEs: A Practi-cal Handbook & Good Practices For Regional/National Policy Makers And DIH Managers"
- Butter, M., Karanikolova, K., Gijsbers, G., Goetheer, A. (2020), "Digital Innovation Hubs and their position in the European, national and regional innovation ecosystem", in Denise Feldner (ed.), Chapter in: 'Redesigning Organizations - Concepts for the Connected Society', Springer Nature Switzerland
- CAPDER within the framework of WP 4SmartAgriHubs (July 2021), "DIH registration activity in SAH", SmartAgriHubs analysis report (confidential)
- Jovana Vlaškalin, et al, 2021, "D3.8 – success stories from IEs, 2021", SmartAgriHubs deliverable 3.8
- https://smartagrihubs.eu/portal/lessons?page=2
- Sassanelli, et al (2020), "Towards a Reference Model for Configuring Services Portfolio of Digital Innovation Hubs: The ETBSD Model", IFIP International Federation for In-formation Processing 2020
- K. Karanikolova, C. van der Weerdt (TNO), F. Berkers (TNO) (2022), "D4.5 Capacity building package of materials for operating a Hub", SmartAgriHubs deliverable