Operational Handbook of the network of living labs

D1.5

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Abstract

This deliverable describes the roadmap towards setting up a network of Living lab and focusses on 3 crucial questions: why, what and how. Furthermore, the 'what's in it form whom' is described for all relevant stakeholders. This Operational handbook of Living Labs has been realized based on the joint efforts of the Connsensys and S3FOOD projects and is a crucial part of the strategy of the Smart Sensors 4 Agri – Food Partnership.

Table of Contents

1. EXECUTIVE SUMMARY

To support the digitalization of the European agri-food sector, the SS4Agri-Food platform envisaged the creation of a network of Living Labs, across Europe. This document serves as an operational guideline in the process of creating such a network.

This handbook describes the methodology to set up a network of Living Labs to support the different phases in the innovation process. Three main questions are answered:

- Why is there a need for a network of Living Labs ?
- What do we understand by a network of Living Labs?
- How do we set up such a network?

Recent challenges for the agri-food companies are the main rationale to establish the network of Living Labs. Combined with a changing innovation ecosystem and the definition of the Living Lab as being in the center of this ecosystem, this establishes the need for a network of Living Labs as a cross-regional solution, beneficial to all stakeholders involved.

Figure 1 The graphical representation of the current network of Living Labs. Partner regions of S3FOOD are depicted in darker blue.

Although a Living Lab and a Digital Innovation Hub are similar, they do differ in some aspects. Nonetheless, this network of Living Labs clearly supports the European strategy of the Digital Innovation Hubs.

This operational handbook describes the different actions necessary to implement a cross-sectoral innovation ecosystem centered around the different Living Labs. It is also a living document that will evolve as the network grows. The current situation is depicted in Figure 1. Here you can see that at the moment Greece is represented in S3FOOD, but has at the moment no Living Lab yet.

2. SMART COLLABORATION BETWEEN CONNSENSYS AND S3FOOD

This document serves the implementation of the long-term strategic vision of the Smart Sensors 4 Agri-food (SS4AF) Partnership: setting up a European network of Living Labs as physical backbone for our Partnership. The Operational Handbook is the result of work elaborated within the S3FOOD and Connsensys projects. A collaboration between both projects has been established to smartly use the available resources and maximize impact. Interlinkages between both projects are situated on the data collection and data analysis, strategy development, Operational Handbook and Technology Catalogue preparation.

Main considerations and differentiation between the projects are situated in the scope of both projects:

- The scope of Connsensys project is on smart sensor systems, whereas the S3FOOD project has a broader scope dealing with all aspects of the entire industry 4.0 conversion of the food sector.
- The S3FOOD project has a bigger consortium, has a broader geographical scope and can count on the support of the entire SS4AF Partnership (14 regions). The Connsensys project only covers 6 of the 14 SS4AF regions.

This implies that the content for the Operational Handbook was developed by both projects. The work includes data collection, stakeholder analysis and strategy development. A strict due financial management and implementation plan for the activities and funding in each project was set up to avoid double funding of tasks. The plan was carried out in the following way:

- Connsensys project and the available resources focused on all topics in the scope of smart sensors systems for the 6 Connsensys partner regions.
- S3FOOD project and the available resources focused on the topics in the scope of smart sensors systems for the 8 other SS4AF regions, and on all the other industry 4.0 related topics in the 14 SS4AF regions.

Thanks to the smart and efficient application of resources, from both projects, this Operational Handbook is realized with active feedback from partners coming from the 14 SS4AF partnership regions. As such, all relevant stakeholders in the digital innovation ecosystem were involved and all aspects needed to lift the industry 4.0 transition of the European agri-food industry to a higher level are covered.

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3. METHODOLOGY

Facilitating innovative solutions! This can be understood as the overarching mission of cluster organisations. Thus, enabling innovations is also the guiding principle for the methodology of this Operational Handbook of Living Labs. From this perspective it is most valuable to understand the functioning of the innovation ecosystem and the related changes with regard to the digital transformation of the agri-food value chain. Moreover the Living Labs´ positioning in this ecosystem and the added-value for the actors of the sector need to be described.

This is all closely related to the objectives of the Thematic Smart Specialisation Partnership ***"Smart Sensors 4 Agri-food":*** setting-up a platform and supportive business ecosystem between agri-food- and electronic/ICT clusters, relevant RTOs and other stakeholders, to lower the barriers for agri-food companies – with a specific focus on SMEs - to access and implement the latest smart sensor systems and digital solutions, make them acquainted with and train them in data management and -mining and thus enable the Internet of Things (IoT) transition of the agri-food industry. The network of dedicated Living Labs is the backbone of this Partnership.

The involved ***innovation ecosystem*** is complex and includes multiple actors with different fields of expertise. From a methodological point of view it is important to understand that the mission of the Partnership is to create added value for the agri-food SMEs of the ecosystem. The focus is therefore on innovative and applicable solutions that contribute to the major challenges the agri-food sector is facing. The main steps forward to reach innovations are to facilitate the exchange of expertise and establish contacts between experts from agri-food and ICT-clusters. At the same time a close and direct contact with the research community and policy makers is necessary as well to support the development of the innovation system in all dimensions.

Based on the lessons learned from previous projects and cross-sectorial collaborations, a ***5 step model (***Figure 2***)*** was developed that describes the innovation process from creating awareness, via building the trust zone, evaluation and validation, implementation, to broad communication and dissemination to create leverage.

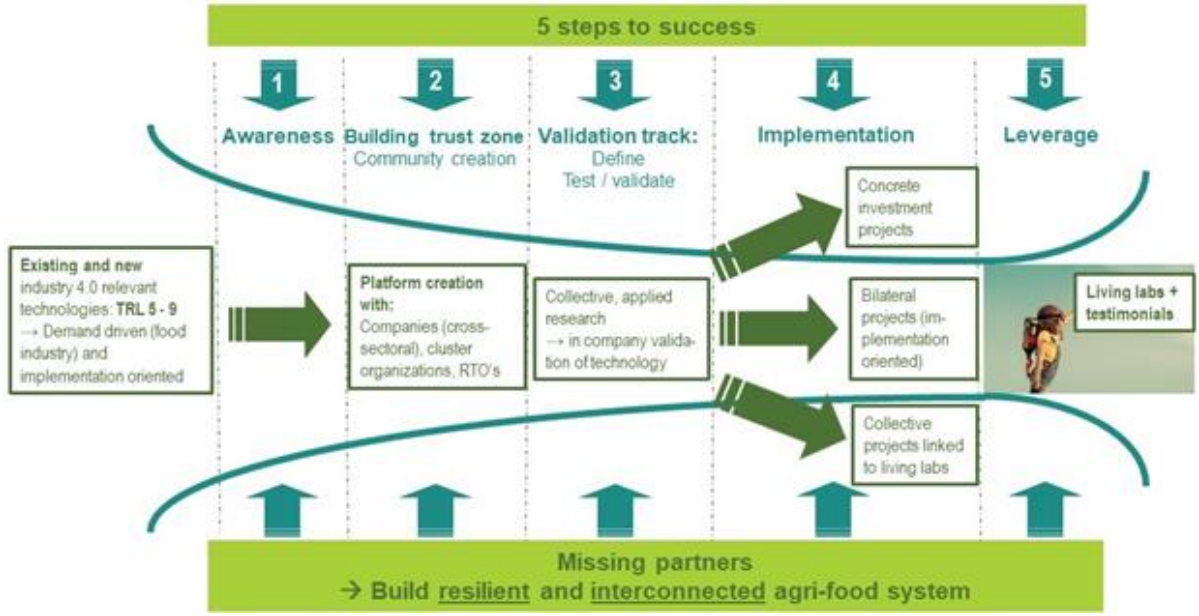

Figure 2 The 5 step model towards innovation

A detailed description of the focus of each step and the activities that fit in each step are provided on here.

Based on these considerations, the SMEs demands and challenges and the mission of the Partnership to support innovation, a set of actions was designed and implemented in the course of the above mentioned EC funded projects Connsensys and S3FOOD. Starting from extensive interviews with actors of the innovation ecosystem, brainstorm session with all relevant stakeholders were organized in the participating regions. The role and profile of 23 Living Labs in the involved regions, relevant for the digital transition of the agri-food sector, were defined and discussed in the course of study visits and multi-stakeholder consultation rounds. The consultations were focused on setting up concrete operational procedures for the network of Living Labs regarding (1) knowledge transfer and (2) starting collaborations between involved parties of the innovation ecosystem.

All insights and results from these activities conducted in the 14 partner regions were analyzed and paved the way to the Operational Handbook of the network of Living Labs. The handbook is set up as a ***roadmap towards the establishment of the network of Living Labs*** providing options and views on the "why", "what" and "how", but always with a clear mission: facilitating innovative digital solutions for SMEs of the agri-food sector. From this perspective the Operational Handbook can be seen as an approach that can be adopted to other industries.

4. STEP 1: WHY A NETWORK OF LIVING LABS

Based on multiple interactions with both the demand side – the food companies – and the supply side – the technology and digital solution providers – it became clear that the SMEs encounter similar needs for digital solutions to tackle daily challenges all over Europe and in most cases not all answers can be found in their own region. Similarly, potential solutions are available all across Europe that now might go undetected outside their own region.

Additionally, several of the challenges are not only present all over Europe but are also too big to solve alone. A clear need for collaboration exists, both cross-sectoral and cross-regional.

The existence of both overarching needs and potential solutions as well as the need for collaboration warrant setting up a network of Living Labs. The Living Labs can create a 'safe' environment where cross-sectoral collaboration towards developing new applicable solutions can prosper and by connecting them in a network we can not only combine expertise in food production with digital knowledge, but also enable the sharing of knowledge and expertise to solve the challenges of SMEs all across Europe.

4.1 FOOD INDUSTRY CHALLENGES AND DIGITAL SOLUTIONS

All over Europe, the agri-food industry is typically a small and medium sized enterprises (SMEs) driven sector. Even 'large companies' are, relatively speaking (in comparison with other sectors), quite small. These food processing companies are all facing similar **challenges** related to resource efficiency, quality control, process optimization, traceability and so on. Digital transformation can provide **answers** to these challenges in many different ways. S3FOOD focusses on digital solutions f for concrete challenges of food companies in 4 thematic priorities:

THEMATIC PRIORITIES

1. **Sensors to monitor real time critical control parameters:** To ensure real time monitoring of the quality of the food products during processing it is of crucial importance that not only the machine parameters but also the characteristic of the products itself can be measured. As soon as the critical control parameters are identified, the search for the best suited sensor system can start. For some quality characteristics no suitable sensor system is commercially available yet and a soft sensor approach can be valuable.
2. **Sensor integration and implementation – Smart system:** The companies in the food processing industry do not need sensor systems, they need integrated solutions. This means that technology providers and digital solution providers will have to work together to understand and grasp the needs of the agri-food companies and develop smart systems accordingly. These smart systems will have to be implemented in the production chain of the food processing companies, implying an active involvement of the technology and solutions providers to fully understand the working conditions in the end market.
3. **Smart data management – from data to information to action:** Capturing data via sensors is only a first step. Data are only the facts and figures that you measure. By understanding patterns in information, we can attain knowledge.
4. **Connectivity within food companies and in the food value chain:** Capturing and monitoring data from one machine or system is one thing, but it becomes much more interesting if the data from different machines or even different plants can be aggregated, compared or used. Therefore, smart systems in the food processing industry need the ability to connect to one another and exchange information, most likely through the Cloud. Digital Solution providers will have to invest time and resources in implementing rigorous security solutions but also in gaining the trust from the companies in the food value chain.

As mentioned in the thematic priorities, different players enter the new ecosystem for digital innovation and they all need to work together to come up with the most optimal digital solutions for the challenges of the food industry.

4.2 CHANGING INNOVATION ECOSYSTEM

In addition to the challenges of the agri-food industry, it is clear that the innovation ecosystem is subject to changes as well. Looking at the "traditional" innovation ecosystem (IES) as it is today, we see the following relevant stakeholders for the agri-food industry (Figure 3):

- Actors from the agri-food chain
- Partners from the process technology supply like machinery, packaging, logistics, and ingredients.
- Partners from research and development like universities, Research & Technology Organisations (RTOs) and technology transfer organizations (TTO).

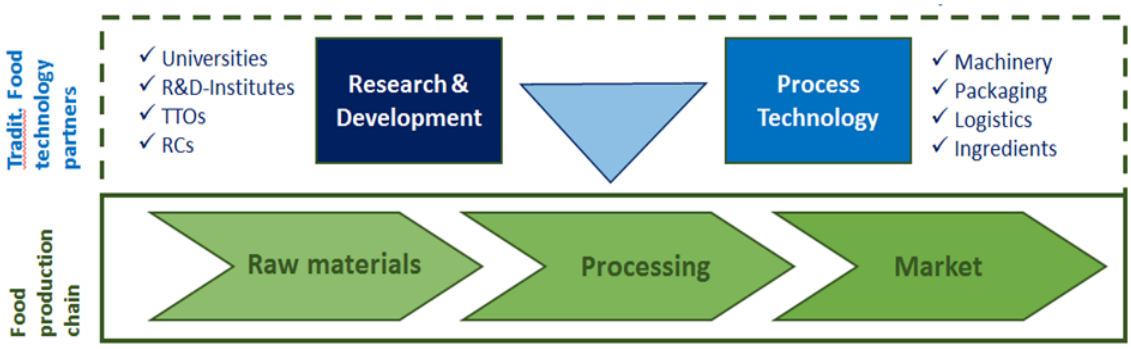

Figure 3: Traditional innovation ecosystem in the food industry

In the "traditional" IES new solutions for the agri-food sector are mainly developed by the interaction of partners from process technology, research and development and actors from the agri-food chain forming a central triangle in the innovation cycle. In the course of the digital transformation new actors are entering the scene. The digital IES is more complex and includes multiple actors with different fields of expertise. The triangle is evolving towards a diamond shaped innovation ecosystem which is displayed in Figure 4. The new partners are digital solution providers like sensor producers, system integrators, and ICT solution providers.

The new partners provide **new digital solutions for the main challenges of the agri-food industry**. They are interacting with all other actors of the innovation ecosystem to develop and implement the new solutions. Yet, not all of them have a background in and experience with the specific challenges and needs of the agri-food companies regarding the digital solutions needed.

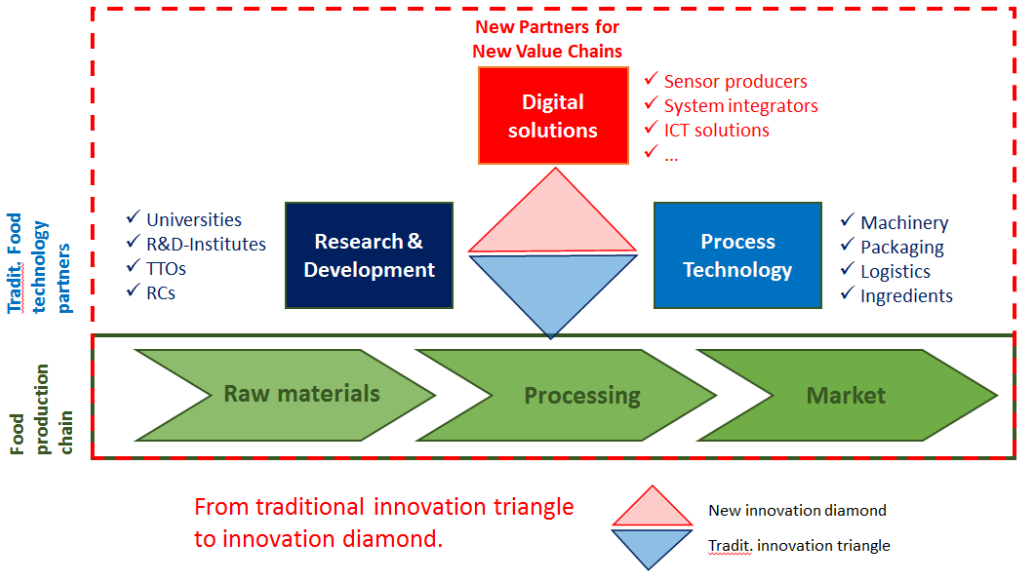

Figure 4: The 'new' digital Innovation ecosystem

4.3 LIVING LABS AT THE CENTER OF THE INNOVATION ECOSYSTEM

Usually, the ecosystem and how different actors are connected is depicted as shown in Figure 5. This representation focuses on what happens outside the cloud and which stakeholders affect the ecosystem. However, in exploring the road towards the network of Living Labs that we aim to create, it became clear that we have to dive into this cloud and take a closer look to the relations between actors and processes that take place when working towards innovative solutions.

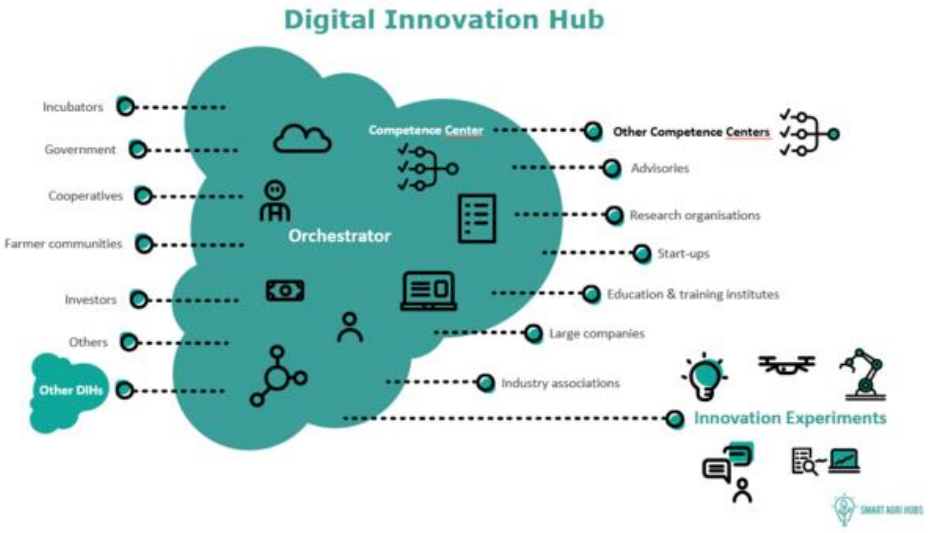

Figure 5 Depiction of the ecosystem around digital innovation hubs (source: www.smartagrihubs.eu)

What we have concluded is that Living Labs are at the center of the innovation ecosystem and that we need to focus on connecting the different players described in section 4.2.

In the new and enlarged ecosystem described in section 4.2, **Living Labs** can play a central role in **bringing the supply side of technological and digital solutions closer to the demand side** (the problem owners, i.e. the companies from the agri-food chain) and as such **bridge the gap between development and validation on the one side and real-life implementation and application on the other side. This will create a win-win situation for all players within this ecosystem.**

Taking this into account, what goes on in the cloud of Figure 5 is visualized in Figure 6, where Living Labs are put in the center of the ecosystem, connecting all necessary actors to enable cross sectoral collaboration and innovation towards developing new digital solutions for the food industry.

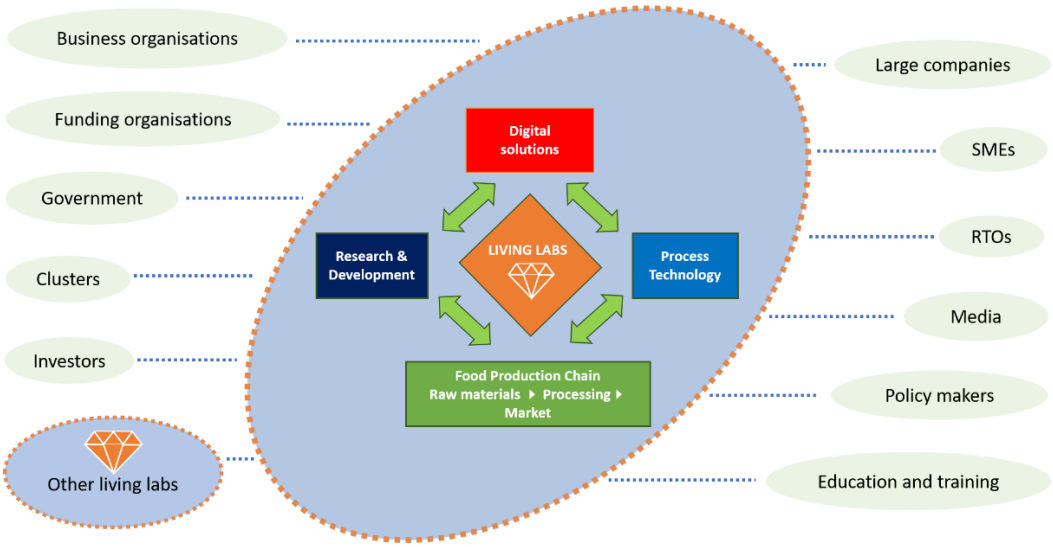

Figure 6: Living Labs as integrators in the digital innovation ecosystem

In this set-up, cluster organizations take up an important role i.e. connecting the actors, who are partly members and financiers of the cluster organizations as well. As it was already clear from Figure 5 that this is a simplified model of a far more complex reality, the roles and potential contributions of all stakeholders have to be considered. These stakeholders create the

necessary environment to facilitate the implementation, dissemination and exploitation of innovative solutions. Without going into all details, the following groups and contributions play a vital role:

1. Policy makers on regional, national, and European level are implementing policies, setting guidelines and provide funding programs that help to stimulate innovations.
2. Branch associations and business organizations act as multipliers to raise awareness for challenges, trends and solutions and support companies to connect for projects.
3. Investors provide additional funds for the sometimes high and risky investments in innovative solutions.
4. Media supports communication and dissemination of innovative solutions to broader public.

4.4 CROSS REGIONAL NETWORK OF LIVING LABS

The rationale behind the network of Living Labs is to connect available expertise and to enable Living Labs to interconnect and specialize. Living Labs do have their core expertise and will hardly ever be able to answer all questions that come up from companies. Via the network of Living Labs we aim to ensure that if the solution for a specific question cannot be found within its own region, companies, with the support of clusters, can reach out to the network and tap in into the combined available expertise.

Innovation ecosystems in the different regions do not automatically include all required stakeholders/partners to solve specific questions or challenges to come to new innovations. **Via networking, a broader European ecosystem of innovative players is established that will be able to provide a wider range of high-quality services to the companies. Unique expertise and/or infrastructure from a specific region can be made accessible through a network of Living Labs, as such creating a bigger platform.**

Digital solutions to support the food challenges are manifold, but still need to be very specific and adopted to a selected application case. The food sector is a very specific and diverse sector with its own general challenges for instance related to hygiene and safety in combination with regional and sector specific challenges. Additionally, the food sector involves many SMEs. As indicated earlier there is not ONE food sector, but many different product categories. Consequently, all potential solutions for all potential challenges cannot be implemented in one region alone. To facilitate easy access to digital solutions for SMEs, the network of Living Labs is needed. Facilitating this network of Living Labs is one of the main services of the SS4AF Partnership.

Additionally, setting up and organizing Living Lab infrastructures and facilities require significant resources. Keeping infrastructure updated in line with the latest technological developments also calls for big investments. Via combining efforts and infrastructures from Living Labs between regions a strong European network can be established, that is capable of facilitating the necessary innovations and enable the Industry 4.0 transition of the agri-food industry.

4.5 WHAT'S IN IT FOR WHOM?

At the core of the network of Living Labs lies the need for cross sectoral collaboration and innovation and creating a trust zone between all the players in the innovation ecosystem will be a key element. As described in the previous section the new digital innovation ecosystem includes several distinctive players. What does each of them have to gain from a network of Living Labs? What is the added value for them?

For a Living Lab

***Increased visibility*:** Members of the SS4AF network of Living Labs will be connected to the SS4AF Partnership and as such gain increased visibility, access to expertise, networking with stakeholders of the entire digital innovation ecosystem and collaboration opportunities.

***Access to new customers*:** Via the SS4AF network of Living Labs each participating Living Lab will be facilitated to provide services to companies from other regions. Additionally, they will be able to help their regional customers on issues on which they don't have the expertise themselves, by forwarding them to a Living Lab in another region.

***Increased collaboration*:** Being part of the network of Living Labs will offer the opportunity to collaborate with other regional Living Labs or stakeholders from the digital innovation ecosystem from other regions in relation to – for instance – additional investments in new technologies, setting up new projects, …

For a food company

The SS4AF network of Living Labs will be an easy entry point to find expertise, competences and solutions related to the digitalization of the food processing industry. Complex challenges on which no answer can be found on a regional level can be tackled through collaboration between partners from different regions. These Living Labs in the network provide a safe environment for agri-food companies to get a first experience with novel technologies and digital solutions. The Living Labs will also form a perfect meeting point for the players in the innovation ecosystem to closely interact and facilitate innovation through collaboration.

For a technology provider

Living Labs will help to bring the demand side (the food industry) closer to the supply side (technology and digital solution providers). The collaboration, testing and demonstration activities that can be organized in the framework of these Living Labs will contribute to bridging the gap between development and validation on one side and real-life implementation and application on the other side. To achieve this, a closer and timely interaction between all the relevant players in the innovation ecosystem is crucial. For technology providers this means that they will get more detailed insights in the challenges and needs of the food company (they are looking for a result, not a technology), but also related to the digital solution providers, to optimize for instance data read outs and enable smart data management. In this view point, Living Labs will not only serve as a showroom for the products and services of the technology providers, they will also facilitate the collaboration with the different actors as a trust zone will be created through the Living Labs.

For a digital solution provider

As described in section 4.2 the digital solution providers are new actors in the innovation ecosystem. To address the needs of the food companies they will not only have to acquire a good understanding of what these needs entail and how these relate to digital solutions, a close interaction with technology providers is also crucial. Food companies are looking for an integrated solution that provides them the required result. A specific challenge lays in creating the trust zone with the technology providers: a lot of data is already available in the machines they provide. To come up with new innovative digital solutions, data sharing and making data available to achieve this smart data management will be crucial. Living Labs can again form the perfect experimental playground to explore these opportunities and assess possible pitfalls in a safe environment. In the end, a food company is not interested in the sensor but in the data and the opportunity to use the data in the best way.

Regional authorities and policy makers

Competition and duplication within EU regions limit the development of critical scale in Europe. Collaboration between complementary EU regions is more effective, efficient and sustainable than competition. The SS4AF Partnership and its network of Living Labs has been created in support of the regional strategies on digitalization of the industries and the uptake of industry 4.0 principles in the agri-food industry. All parties of the digital innovation ecosystem are engaged in this network to define the essential investment priorities, on a regional, interregional and European scale. Regional funding bodies will benefit of the decision-making support.

For cluster organizations

Also, on cluster level the need for cross sectoral collaboration forms the core of all activities that will be and are being developed. The SS4AF Partnership connects food clusters and digital and/or technology clusters with the common goal to assist their members to create the best approach possible in dealing with the digital (r)evolution that is taking place.

The major role of clusters is to provide (business) support to their (company) members and they will be able to use the network to find the necessary expertise if it is not available in their own region. Clusters can also provide support to the Living Labs to connect to other stakeholders and as such play a pivotal role in this network. Clusters will be facilitators (orchestrators) of the interactions between the different players in the digital innovation ecosystem and the first link to the Living Labs in their region.

Via the SS4AF network the creation of a European-wide digital innovation ecosystem is facilitated in which industry 4.0 conversion of the agri-food sector can be fostered and accelerated. Clusters - initially the SS4AF partners - will have access to the network stakeholders within the ecosystem. Specific initiatives around the 4 thematic priorities of S3FOOD can be developed around the network.

5. STEP 2: WHAT? – CONCEPT, SERVICES AND REQUIREMENTS

The concept of the SS4AF Living Labs and the services that are connected to them are based on in depth assessments of the needs of the various companies in the innovation ecosystem. A survey was distributed among food companies, technology providers and digital solution providers and brainstorm sessions were organized to gauge what they would expect from individual Living Labs.

5.1 CONCEPT

In view of the strategy and goals of the SS4AF Partnership the concept of a Living Lab is described as follows:

"Living Labs for digital innovation in the food industry are innovation driven organizations that facilitate and foster collaborative innovation between the different stakeholders in the industry 4.0 ecosystem to develop, improve, test and validate digital solutions to specific challenges in the food industry."

As such, Living Labs can play a crucial role to help companies to become more competitive with business/production processes, products or services using digital technologies by providing access to technical expertise and experimentation. In this way, companies can 'test before invest'. In this light, a Living Lab is not necessarily a legal/single physical entity. It can simply be a role that an organization plays.

This concept was established after a series of multi-stakeholder consultations in the digital innovation ecosystem for the agri-food sector. The agri-food sector has been interviewed to

define their concrete challenges that might be solved in the framework of the industry 4.0 revolution. Additionally, technology, digital solution providers and Living Labs have been consulted to understand their affiliation and understanding of the agri-food sector.

5.2 SERVICES

SERVICES OFFERED BY SS4AF LIVING LABS

- **Test before invest**:
  - ✓ Strategic Research Development & Innovation (RDI) such as joint pre-competitive R&D
  - ✓ Contract research such as specific R&D, technology concept development, proof of concept
  - ✓ Technical support on scale-up such as concept validation, prototyping, small series production
  - ✓ Provision of technology infrastructure such as renting equipment, low rate commercial production, offering platform technology infrastructure
  - ✓ Testing and validation such as certification, product demonstration, product qualification
- **Skills and training**: such as courses, workshops, offering technological infrastructure for educational purposes.

Services for the SS4AF Living Labs closely link to the European Digital Innovation HUB (EDIH) description. However, a Living Lab in the framework of SS4AF is not exactly the same as an EDIH as the latter describes two more services, which are not crucial in the view of the SS4AF Living Labs:

- **Support to find investments**: this category of services may include: access to financial institutions and investors, supporting the use of InvestEU and other relevant financing mechanisms, in close co-operation with the foreseen InvestEU Advisory Hub3 and the Enterprise Europe Network (EEN).
- **Innovation ecosystem and networking**: No company can innovate alone. It will help companies greatly if they are brought into contact with other companies of their value chain, with innovators, or early adopters that want to test solutions. EDIHs should play this brokering role and bring e.g. end-users and potential suppliers of technological solutions into contact with each other for e.g. experimentation and testing, or public administrations and GovTech companies to promote co-creation.

Although perceived as important the innovation ecosystem and networking is a service that most regional partners within SS4AF can deliver, as well in many cases accompanied by services related to support to find investments.

It is important to note that within the network not all the Living Labs will have the same focus or offer the same portfolio of services in the 2 defined categories (test before invest, skills and training), but rather will be complementary and as such address the needs of the different actors in the digital innovation ecosystem across Europe.

In order to provide the full range of EDIH's services the regional partners within SS4AF and the regional Living Labs will have to work closely together. And when specific expertise in a

regional Living Lab is not available, a regional company can be offered a broader range of services by the other regional partners in the SS4AF partnership.

5.3 REQUIREMENTS

Entities that intend to enter the network of SS4AF Living Labs should own at least a basic set of competences and infrastructures.

BASIC REQUIREMENTS FOR SS4AF LIVING LABS

- **Have expertise regarding**
  - ✓ *Industry 4.0 related technologies and digital solutions* that can potentially be used in the agri-food sector
  - ✓ *The needs and requirements, the processes and the regulatory/ operational framework* of the agri-food sector in the case of food pilot plants
- **Provide easy access for demonstration and testing,** where 'easy' does not mean 'for free'. The living lab can connect a specific fee to the services provided.
- **Possess competences** to provide the following services in its focus/ expertise area
  - ✓ *Test before invest:* have the facilities and expertise for testing and demonstrating industry 4.0 related technologies and digital solutions on pilot scale with/without food samples
  - ✓ *Act as a facilitator for training* opportunities regarding digitalization in the food industry
- **Be willing to collaborate with other living labs** within the network across Europe to provide a complete service offering to the companies in the SS4AF partnership territorial scope.

It is also crucial to note that not all these requirements need to be present in one physical location or entity. The full package can also be realized via regional cross -sectoral collaboration between different entities with their own specific expertise

6. STEP 3: HOW ?

The starting point – the why – of the network of Living Labs is to facilitate cross sectoral collaboration with the aim to advance digital transformation of the agri-food industry. To achieve this, several concrete actions are developed that aim to :

- Support agri-food SMEs in finding the best digital solutions for their daily challenges
- Raise awareness and increase understanding of the needs of agri-food SMEs regarding digital transformation and the challenges that are connected to this process
- Position the Living Labs in the center of the innovation ecosystem as the perfect meeting place between concrete challenges and needs on the one hand and potential digital solution development on the other hand
- Find funding opportunities to support these collaborative innovation projects and facilitate the actual implementation.

To achieve these goals a 5-step innovation process model was described in the SS4AF strategy. The technologies and digital solutions that are considered are available at higher TRLs and ready for validation in an industrial environment:

- Step 1: Creating awareness is a continuous process that addresses all actors in the innovation ecosystem and is a first step in bridging the gap between the needs of the food industry and the potential digitals solutions that are (being) developed.

- Step 2: Building the trust zone between the involved sectors – community creation: bring companies and RTOs together in a forum with focus on the digitalization for the agri-food industry. A trust zone will be built between the agri-food companies and the technology providers, so the agri-food companies know which support and solutions they can obtain and the technology and digital solution providers understand the needs of the agri-food companies.
- Step 3: Evaluation and validation of new technologies and solutions - The process to get from awareness to validation is a collaborative work in which common goals between all partners should be reached: demonstrate/test/feasibility checks of new technologies and digital solutions towards concrete investment projects. The process of validation gives insight in the specifications needed for industrial applications.
- Step 4: Implementation of new technologies and solutions - Close collaboration between the agri-food companies and the technology and digital solution providers will result in concrete investment projects in the agri-food companies and collective large-scale SME group projects linked to the livings labs. When needed, additional partners such as integrators and machine developers will be involved to make the jump from a stand-alone, validated device (demonstrator) to full integration in the production plant.
- Step 5 Leverage - Integration, investments and realizations in the agri-food industry create visibility for all stakeholders and will help to attract new partners for newly defined validation and implementation tracks and new technologies, which is a supporting evolution to reinforce the funnel. Therefore demonstrations, training programs and study visits in the Living Labs, RTOs and frontrunner agri-food companies will be organized in collaboration with technology and digital providers. Furthermore, the activities, news, events, testimonials, success stories and concrete results will be distributed and disseminated via newsletters, presentations, etc. This will enable the cross-fertilization and speed up the learning process. Creating leverage also includes engaging and feeding input to policy makers and managing authorities of regional and European funds, in order to ensure the relevance and the likely translation of our strategy in practice.

In the next paragraphs several concrete actions are described to implement a perfect environment for cross sectoral innovation with the Living Labs in the center of the innovation ecosystem.

6.1 CONNECT AND ENGAGE

The main goal of the network of Living Labs (LL) is to facilitate the initiation of innovative solutions linked to challenges of the food industry. To achieve this, it is crucial that connections are being made on different levels (B2B, LL2LL and B2LL.) and that the different actors engage to work together towards these innovative solutions.

Actions that can be taken by cluster partners to make this happen (and that have been taken in the framework of the S3FOOD project) are:

- Organize cross-sectoral meetings and workshops (skills and training), both on a regional and cross – border level, to:
    - Assess the needs from food companies as well as from technology and digital solutions providers
    - Connect concrete challenges to potential solutions
    - Provide information, inspiration and training

- Facilitate one – on – one meetings between companies for instance during match-making events.
- Facilitate interaction between different LL and between LL and companies - To this extend a regional consultation round has been executed to map the available Living Labs and their expertise in the S3FOOD regions. The collected information has been summarized into fact sheets that can help the cluster partners to assess to which LL a specific question can be referred to or which LL have complementary expertise.
- Initiate projects to develop applicable solutions allowing test before invest for both the agri-food companies as well as technology and digital solutions providers.
- Promote knowledge transfer via thematic seminars, workshops, training courses and demonstrations

6.2 BRANDING AND PROMOTION

Branding and promotion of the Living Lab network can be done in different steps:

- Profiling the Living Labs: listing their core competences, backgrounds, relevant projects etc. in fact sheets that can complement the descriptive technology catalogue that was developed by S3FOOD for internal use by the cluster partners.
- Promoting the network of Living Labs on a European level to engage and attract additional participants and expand the outreach across Europe.
- Visualizing the competences present in the network. In the framework of the S3FOOD project a technology interactive map was developed that shows which expertise is available in which region. At the moment, only companies are depicted here but the Living Labs will be added to this tool.
- Targeted communication towards agri-food companies on promising digital solutions that can be tested in the Living Labs
- Targeted communication to the technology and digital solution providers on the challenges / concrete questions put forward by the food companies
- Sharing testimonials on cross-sectoral collaboration that resulted in new solutions
- Internal communication and networking between the different Living Labs in the network

6.3 FUNDING AND FINANCING

To effectively support innovation at SME-level it is of importance to create a backbone of funding and financing options for these innovations.

The first focal point is to assure and give insight into available funding and financing options for SMEs at the regional, national and European level. To do so clusters and other regional partners will engage with regional and national governments for grant schemes. Clusters will also engage with other financing parties such as Venture Capital funds. Via the SS4AF partnership engagement on the European level will be organized.

The second focal point is to find funding opportunities for the supporting infrastructure for innovation at SME-level. This supporting infrastructure is not limited to the clusters and the regional partners but also includes the (network of) Living Lab(s). At the European level the current H2020-INNOSUP funding scheme offers some good funding and financing possibilities, but clusters and regional members can also set up a collaboration with regional and/or national governments for this purpose.

The SS4AF working group on project generation will fulfill a central role in combining information, opportunities and activities on this subject.

6.4 OPERATING PRINCIPLES

Next to the above-mentioned issues, the success of a network of Living Labs depends to a large degree on defining a fair way of interaction and contribution to the overall success of the network. It has to be clear that the network is composed of independent organisations collaborating on a shared vision and sharing responsibilities. From this perspective a set of operating principles is necessary to set clear procedures and responsibilities for all shared activities.

As it became clear from the interaction and profiling of the 23 Living Labs analysed for this Operational Handbook, their competences, backgrounds and organisational structures vary significantly. This can be seen as the clear added-value of the network of Living Labs as the combination of diverse and partly complementary expertise allows the creation of synergies and joint services for the actors in the innovation ecosystem.

The operating principles for the network of Living Labs should be targeted to (1) cross-sectoral knowledge transfer and to (2) cross-regional collaborations between involved parties of the innovation eco-system. It has to be noted that these collaborations reach from activities on regional level, involving companies and one Living Lab to collaborative actions of a number of Living Labs in the network to align and improve their services for partners. Taking this into account the operating principles should cover multiple interactions between different actors.

With this in mind, it is important to agree on and arrange an effective interaction between involved parties to guarantee an early stage involvement in relevant activities. In the same way, in-depth information on results and learnings from projects should be shared in the network. This way an aligned development of the network with growing interaction will be achieved.

On the other hand, it has to be clear as well, that specific innovation projects between selected parties are a matter of negotiations among involved actors. Consequently, the operating principles should restrain from overregulation with potential constraints for a dynamic development of collaborations. A good balance is needed to keep the necessary flexibility and to build the absolutely needed trust zone between involved actors.

In the end it can be summarized that the network of Living Labs needs operating principles that are more phrased like a code of conduct or a memorandum of understanding, instead of a very formal governance structure. As many of the involved Living Labs in the established network do collaborate with or are even members of the cluster organisations of the Smart Sensor 4 Agri-food Partnership, the network can benefit from the already existing governance structure of this Partnership.

SS4AF clusters will support the progress of the network, initiate and moderate interactions between the Living Labs as well as the other actors and stakeholders in the innovation ecosystem. They will also support the development of the operational principles in close dialogue with the Living Labs managers. This will be a process with continuous developments as new innovation topics and thematic priorities as well as new partners will appear on the map. So, balancing out the need for rules with the necessary flexibility is at the core of the development of the operating principles.

7. WANT TO KNOW MORE?

As mentioned this document describes the roadmap towards setting up a network of Living Labs and the implementation is still ongoing. For updates we gladly refer to www. S3FOOD.eu and to the Smart Sensors 4 Agri-Food Partnership.